P 062 921 879

Receipt for Certified Mail

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UNITED STATES POSTAL SERVICE

Sent to Wayne Barlow

Street and No. Container Corp

P.O., State and ZIP Code Fernandina Bch, Fl

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PS Form **3800**, June 1991

PS Form 3811, July 1983 447-845

● **SENDER: Complete items 1, 2, 3 and 4.**

Put your address in the "RETURN TO" space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for service(s) requested.

1. ☐ **Show to whom, date and address of delivery.**

2. ☐ **Restricted Delivery.**

3. **Article Addressed to:** Wayne S. Barlow, VP.
Container Corp. of America
N. 8th St.
Fernandina Bch, Fl 32034

4. **Type of Service:**
☐ **Registered** ☐ **Insured**
☒ **Certified** ☐ **COD**
☐ **Express Mail**

Article Number P062 921 879

Always obtain signature of addressee or agent and DATE DELIVERED.

5. **Signature – Addressee**
X

6. **Signature – Agent**
X James C. Blue

7. **Date of Delivery** 8-28-92

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

Fold at line over top of envelope to the

Florida Department of Environmental Regulation
Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-2400
Lawton Chiles, Governor
Carol M. Browner, Secretary

August 26, 1992

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Wayne S. Barlow
Vice President & General Manager
Container Corporation of America
North 8th Street
Fernandina Beach, Florida 32034

Dear Mr. Barlow:

Re: Response to the August 5, 1992 Letter

The Department has reviewed your letter received on August 10, 1992, regarding the proposal to construct a new No. 8 Power Boiler (PB) and install a package boiler in the interim time while constructing the proposed PB. Also, you requested an evaluation of the pollutant emissions of the No. 4 PB and to see if any are available as contemporaneous credit.

For the package boiler, it will require a construction permit. Before we can address the permitting strategy, the Department will need to see the potential pollutant emissions expected from the proposed temporary source. Therefore, please calculate and submit the projected potential pollutant emissions for the proposed package boiler, including all reference material, calculations and assumptions.

Based on a review of the files and the rules, there are no contemporaneous creditable pollutant emissions available for the No. 4 PB. Even though the source operated for a few hours in 1988, the source had essentially not operated after 1986, which is outside the corridor of time (i.e., 5 years) for contemporaneous emissions changes to be considered.

The Department and the U.S. EPA Region IV reviewed the request for contemporaneous emissions credit for the No. 4 PB at the time of permitting the "Phoenix Project", which included the proposed new construction of a batch digester system and brown stock washer system. As a result, ~~of~~ my letter of December 19, 1990, was issued and stated that there would not be any contemporaneous credit available. The rationale behind this decision was that the No. 4 PB had not operated after 1986, but for a few days in 1988; and, therefore, actual emissions were considered zero for the two years preceding the request for the facility modification. In addition, the Department's permitting strategy was to rely on the modelling of the facility's future potential/allowable pollutant emissions, pursuant to PSD new source review, as the primary mechanism for establishing reasonable assurance for the proposed project. Based on the acceptance of the above decision regarding contemporaneous emission changes and permitting strategy by the facility's representatives, the permitting process was completed.

If there are any questions, please call Bruce Mitchell at (904)488-1344 or write to me at the above letterhead.

Sincerely,

C. H. Fancy, P.E.
Chief
Bureau of Air Regulation

CHF/BM/rbm

Attachment

cc: A. Kutyna, NED
D. Buff, P.E., KBN
J. Harper, EPA
C. Shaver, NPS
J. Braswell, Esq., OGC

BEST AVAILABLE COPY

CONTAINER CORPORATION OF AMERICA

AN AFFILIATE OF JEFFERSON SMURFIT CORPORATION

Mill Division
NORTH 8TH STREET
FERNANDINA BEACH, FL 32034
TELEPHONE: 904/261-5551

RECEIVED
AUG 10 1992
Division of Air
Resources Management

August 5, 1992

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

Re: Container Corporation of America
Proposed Power Boiler No. 8

Dear Mr. Mitchell:

In follow up to our meeting on July 6, this is to confirm Container Corporation of America's (CCA) ongoing evaluation associated with the permitting of a new No. 8 Power Boiler (PB8) at the Fernandina Beach mill. As we described in our meeting, PB8 will be a new carbonaceous fuel fired steam boiler, with the capability to fire low sulfur fuel oil as backup. As is the case with the mill's No. 5 power boiler the carbonaceous woodwaste fuel includes bark, sawdust/fines and other rejected material from the mill manufacturing operations, such as dewatered settleable solids from the primary and secondary effluent treatment system.

The boiler will be a base loaded unit designed to operate year-around in order to burn the excess woodwaste generated by the mill. Currently, only about 65 percent of the woodwaste production from the mill can be burned in the existing No. 5 Power Boiler (the only boiler permitted to burn woodwaste). The new boiler, operating in conjunction with the No. 5 power boiler, will facilitate utilization of essentially all of the woodwaste. And since woodwaste is a much cleaner fuel and will normally displace 2.5% sulfur fuel oil currently burned as supplemental fuel in No. 5 power boiler, it is anticipated that a significant environmental benefit in lower emissions of SO_2 will result.

The new boiler will not affect the maximum operating rates of other production units at the facility. As indicated in the attached mill steam balance, these production units, such as the batch and continuous digester systems, are not now steam limited (i.e., steam needs for these units are currently being met). What the new boiler will provide is less downtime for these and other production units at the mill which use steam, since the mill will be operating three reliable power boilers (existing Power Boilers 5 and 7 plus new PB8). Because of this, annual operating hours for facility production units may increase after the new boiler begins operating.

The Florida/USEPA PSD rules do not include an increase in the operating hours or production rate of a source in the definition of modification, as long as the source is permitted for the higher operating rate. Since the new power boiler is not "debottlenecking", and since maximum operating rates are not increasing, it is not necessary to consider other sources at the mill in the PSD source applicability determination for the new PB8. We request the Department's concurrence on this matter.

We agreed at our meeting to each research the previous operaton of the mill's Power Boiler No. 4 (PB4) and how it was treated during the (Phoenix project) permitting for the No. 8 batch digester and C-Line brown stock washer. PB4 did not operate in 1987, and operated for only a limited time in 1988, with emissions in 1988 of approximately 20 tons per year for PM and SO_2. Normal boiler operations occurred in 1985-1986; however, these emissions were not used as a credit during the Phoenix permitting. Given these circumstances and that the Phoenix permit applications fixed the time frame for determining emission credits for the shutdown of PB4, we view the 1985-1986 period as representative of normal boiler operation within the 5-year window, and hence, that the emissions should be creditable reductions. We would like the Department's findings from its research and its interpretation on this matter.

As we also mentioned during our meeting, CCA is considering the installation of a new package boiler in the interim period before PB8 begins operating. This boiler would only be operated when one of the existing boilers is not operating or operating at reduced load, meaning that the instantaneous overall steam production would not increase. Moreover, the package boiler would operate for no more than 24 months duration which is the anticipated time frame for permitting, designing, equipment order and delivery and construction of PB8. We would like confirmation that such a package boiler would only require a minor source construction permit.

On behalf of CCA I want to thank you and Tom Rogers for the time you spent with us on July 6, 1992 discussing these issues. We look forward to your response and if further information is needed please contact me, Richard Posey (904/277-5808) or Carla Gay (904/277-5807).

Sincerely,

WS Barlow

Wayne S. Barlow
Vice President/General Manager

WSB/sl

BOILER	**PRIOR TO #2 PAPER MACHINE**		**1992**		**PLANNED NO. 4 POWER BOILER**	
	Base	Reserve	Base	Reserve	Base	Reserve
No. 5 Power (Bark-Fired)	240	210	330	120	220	230
No. 7 Power (Coal-Fired)	580	100	660	40	610	90
No. 4 Recovery	340	40	380	20	380	20
No. 5 Recovery	340	40	380	20	380	20
No. 4 Power (New, Bark-Fired)	0	0	0	0	190	110
Purchased Power (Equated to Steam Capacity)	-60*	210	60	90	30	120
TOTAL	1,560	600	1,810	290	1,810	590

* Represents six megawatts of co-generated power.

MILL STEAM BALANCE
BOILER BASE AND RESERVE CAPACITY
(THOUSANDS OF POUNDS PER HOUR)

EXHIBIT 1.1

CONTAINER CORPORATION OF AMERICA

AN AFFILIATE OF JEFFERSON SMURFIT CORPORATION

Mill Division
NORTH 8TH STREET
FERNANDINA BEACH, FL 32034
TELEPHONE: 904/261-5551

RECEIVED
AUG 10 1992
Division of Air
Resources Management

August 5, 1992

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

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Sincerely,

W S Barlow

Wayne S. Barlow
Vice President/General Manager

WSB/sl

CHF/PL
Andy Kutyna, NED } 8/18/92 RBM
Bruce Mitchell

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* Represents six megawatts of co-generated power.

MILL STEAM BALANCE
BOILER BASE AND RESERVE CAPACITY
(THOUSANDS OF POUNDS PER HOUR)

EXHIBIT 1.1

TRS COMPLIANCE PLAN

CONTAINER CORPORATION OF AMERICA

FERNANDINA BEACH, FLORIDA

NOVEMBER 1987

DER
NOV 12 1987
BAQM

OVERVIEW

Container Corporation of America (CCA) of Fernandina Beach, Florida is proposing several changes at its existing pulp mill in order to achieve compliance with the State of Florida's total reduced sulfur (TRS) regulations. Florida's TRS regulations are found in Florida Administrative Code (FAC), Rule 17-2.600(4)(c). The changes include replacement of existing equipment, addition of new equipment, and incineration of non-condensible TRS gases in a new energy-efficient lime kiln. Specifically, the following changes are proposed:

- Kamyr Digester system - The liquor flash tank system and the turpentine recovery system will be replaced with new systems. Two new flash tanks will be installed adjacent to the digester to replace two existing flash tanks currently located across the mill. Non-condensible gases will be collected from the surge tank (blow tank), steaming vessel, flash tanks and turpentine system. A gas transportation system will be installed to deliver the collected gases to the No. 4 Lime Kiln for incineration.

- Batch Digesters - The existing batch digesting system consists of seven batch digesters, two blow tanks and a turpentine recovery system. The existing turpentine condensing system will be replaced, and a new blow heat recovery system will be installed on the existing blow tanks. The non-condensible gases from both the turpentine and blow heat recovery systems will be collected and transported to the No. 4 Lime Kiln for incineration.

- No. 5 Multiple Effect Evaporator (MEE) System - Non-condensible gases from the No. 5 MEE system will be collected and delivered to the No. 4 Lime Kiln for incineration. Vapors from the existing evaporators and concentrators will be routed to the existing surface condenser, to a new hot well, then to the collection system and No. 4 Lime Kiln.

- o No. 4 MEE System will be shutdown
- o No. 4 Recovery Boiler is in compliance with the TRS regulations, and a new Continuous Emissions Monitoring System (CEMS) for TRS has been installed.
- o No. 4 Smelt Dissolving Tank (SDT) - a new flooded elbow type venturi scrubber will be installed to provide control of particulate and TRS emissions.
- o Tall Oil Plant - TRS emissions from the lignin tank, the saltcake tank and the acidulator will be collected and scrubbed in a new wet scrubber. The scrubber will be of the packed tower type and will utilize caustic soda as the scrubbing medium.
- o No. 4 Lime Kiln - a new modern energy efficient kiln will be installed to replace No. 2 and No. 3 Lime Kilns.

Air construction permit applications have been prepared for the Kamyr Digester System, the Batch Digester system, the No. 5 MEE system, the No. 4 SDT, the Tall Oil Plant, and the new No. 4 Lime Kiln. The applications are contained in this permit package.

CCA has previously submitted a Conceptual TRS Compliance Plan to FDER, including a request for a variance to allow final compliance dates for the No. 5 MEE system, both digesting systems, and No. 2 and 3 Lime Kilns to coincide with the compliance date for the new No. 4 Lime Kiln. This is necessary because the non-condensible gases from these sources will be incinerated in the new No. 4 Lime Kiln. The conceptual plan set forth a schedule of events which must be met in order to ensure compliance by the final compliance dates specified in FAC Rule 17-2.600(4)(c). This schedule includes dates by which CCA must provide FDER with certification of purchase orders for major pieces of equipment. However, before purchase orders can be executed, air construction permits must be obtained from FDER. This requires FDER to complete review of the permit applications and issue construction permits by certain dates. The latest dates by which construction permits can be received and still meet the schedule set forth in the conceptual compliance plan are presented in Table 1.

Other pertinent dates set forth in the Conceptual TRS Compliance Plan are also shown in Table 1. To allow sufficient time after proof of final compliance is required and in order to prepare and have approved air operating permits for the sources, it is requested that construction permit expiration dates be set no earlier than 6 months after proof of final compliance is required.

Table 1. Schedule for Achieving Compliance with TRS Regulations, CCA Fernandina Beach Mill

Source	Construction Permit Issued By	Certification of Equipment Order	Certification of Initial Construction	Completion of Construction	Final Compliance	Submit Operating Permit Application	Construction Permit Expiration Date
Kamyr Digesting System	3/12/88	2/01/89	4/01/89	2/01/90	6/01/90	8/30/90	11/30/90
Batch Digesting System	3/12/88	2/01/89	4/01/89	2/01/90	6/01/90	8/30/90	11/30/90
No. 5 MEE System	3/12/88	2/01/89	4/01/89	2/01/90	6/01/90	8/30/90	11/30/90
No. 4 Smelt Dissolving Tank	3/12/88	7/01/88	10/01/88	4/01/89	5/12/89	8/12/89	11/12/89
Tall Oil Plant	3/12/88	7/01/88	10/01/88	4/01/89	5/12/89	8/12/89	11/12/89
No. 2 Lime Kiln*	3/12/88	11/01/88	3/01/89	2/01/90	5/01/90	8/30/90	11/30/90
No. 3 Lime Kiln*	3/12/88	11/01/88	3/01/89	2/01/90	5/01/90	8/30/90	11/30/90
No. 4 Lime Kiln	3/12/88	11/01/88	3/01/89	2/01/90	5/01/90	8/30/90	11/30/90

* Refers to dates concerning construction of new No. 4 Lime Kiln.

BEST AVAILABLE COPY

Subcode 05

Receipt # 76195
V# 1214413
$100.00
AC 45-141871

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

DER
NOV 12 1987
BAQM

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Continuous Digester [ ] New[1] [x] Existing[1]

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

COMPANY NAME: Container Corporation of America COUNTY: Nassau

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) Kamyr Digester System

SOURCE LOCATION: Street North 8th Street City Fernandina Beach

UTM: East (17) 456.2 North 3394.2

Latitude 30 ° 40 ' 53 "N Longitude 81 ° 27 ' 26 "W

APPLICANT NAME AND TITLE: Paul J. Magnell, General Manager

APPLICANT ADDRESS: North 8th Street, Fernandina Beach, Florida 32034

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Container Corporation of America

I certify that the statements made in this application for a Construction 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 contro facilities in such a manner as to comply with the provision of Chapter 403, Florid 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-transferabl and I will promptly notify the department upon sale or legal transfer of the permitte establishment.

*Attach letter of authorization

Signed: Paul Magnell

Paul J. Magnell, General Manager
Name and Title (Please Type)

Date: 11-11-87 Telephone No. (904) 261-5551

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 hav been designed/examined by me and found to be in conformity with modern engineerin principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, tha

---

[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.

DAVID A. BUFF
No. 19011

Signed David A. Buff

David A. Buff
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

P.O. Box 14288, Gainesville, Florida 32604
Mailing Address (Please Type)

Florida Registration No. 19011 Date: 11/9/87 Telephone No. (904)375-8000

SECTION II: GENERAL PROJECT INFORMATION

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

See Attachment A

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

Start of Construction March 1988 Completion of Construction November 1990

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.)

$2,970,000

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

Permit: A045-115840

Issued: 9/10/86

Expires: 5/12/89

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52

if power plant, hrs/yr_____; if seasonal, describe:______________________

F. If this is a new source or major modification, answer the following questions. (Yes or No) Not Applicable

1. Is this source in a non-attainment area for a particular pollutant? ______

   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. ______

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

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

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? ______

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? ______

   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.

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		
Wood Chips			264,798 (dry)	Fig. A-2: (1)
White/Black Liquor			1,388,110	Fig. A-2: (2)

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

1. Total Process Input Rate (lbs/hr): 1,652,908

2. Product Weight (lbs/hr): 141,667 (dry)

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/~~yr~~ hr	T/yr	
TRS*	796	3,486	2.600(4)(c)1.	Incineration	796	3,486	Fig.A-2: (3)&(4)

[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).

* TRS will be incinerated in new No. 4 Lime Kiln

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)
Incineration (Refer to	No. 4 Lime Kiln	application)		

E. Fuels Not Applicable

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

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

Fuel Analysis:

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 Not Applicable Maximum ______________

G. Indicate liquid or solid wastes generated and method of disposal.

Liquid wastes are recycled back into process.

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):
Refer to No. 4 Lime Kiln application

Stack Height: ____________ ft. Stack Diameter: ____________ ft.

Gas Flow Rate: ________ ACFM ________ DSCFM Gas Exit Temperature: ________ °F.

Water Vapor Content: ____________ % Velocity: ____________ 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							
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

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)]
   SEE ATTACHMENT B
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach propose 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 use 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 wa made.
   SEE ATTACHMENT C
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   SEE ATTACHMENT C
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 includ cross-section sketch, design pressure drop, etc.)
   SEE ATTACHMENT A
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).
   SEE ATTACHMENT A
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 evolve and where finished products are obtained.
   SEE ATTACHMENT A
7. 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).
   ATTACHED
8. 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.
   ATTACHED

9. The appropriate application fee in accordance with Rule 17-4.05. The check should b 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

Not Applicable

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

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:

F. 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

A. Company Monitored Data Not Applicable

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. _____ 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^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.

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

ATTACHMENT A

PROJECT DESCRIPTION

CCA currently operates a continuous pulp digesting process (Kamyr Digester System) at its Fernandina Beach mill. The Kamyr system consists of a chip steaming tank, continuous digester, blow tank, two flash tanks, and a turpentine recovery system. Wood chips are pre-conditioned in the steaming vessel prior to entering the digester. In the digester, the wood chips are mixed with white liquor and black liquor and are cooked to produce pulp. Black liquor produced from the digesting process flows to two flash tanks in series. From the flash tanks, most of the black liquor is sent to the multiple effect evaporators, while a portion of the black liquor is reused in the digesting process.

Flash steam from the flash tanks is sent to the turpentine system for recovery of turpentine. The recovered turpentine is sent to storage.

A flow diagram of the existing Kamyr digesting system is presented in Figure A-1. Currently, non-condensible TRS gases from the chip steaming vessel, blow tank, black liquor flash tanks and turpentine system are vented directly to the atmosphere. In order to collect and control these TRS emissions, CCA is proposing the following changes to the Kamyr system:

- Non-condensible gases from the chip steaming vessel will be collected and incinerated in the new No. 4 Lime Kiln.
- The two existing flash tanks will be replaced with two new flash tanks in series. Non-condensible gases from the new flash tanks and the existing blow tank will be collected and incinerated in the new No. 4 Lime Kiln.
- The existing turpentine system will be replaced with a new turpentine recovery system. Non-condensible gases from the new system will be collected and sent to the new No. 4 Lime Kiln for incineration.

A flow diagram of the modified Kamyr system is shown in Figure A-2. Process input and product rates for the modified system are presented in Attachment B. *TRS emission estimates are shown in Attachment C.*

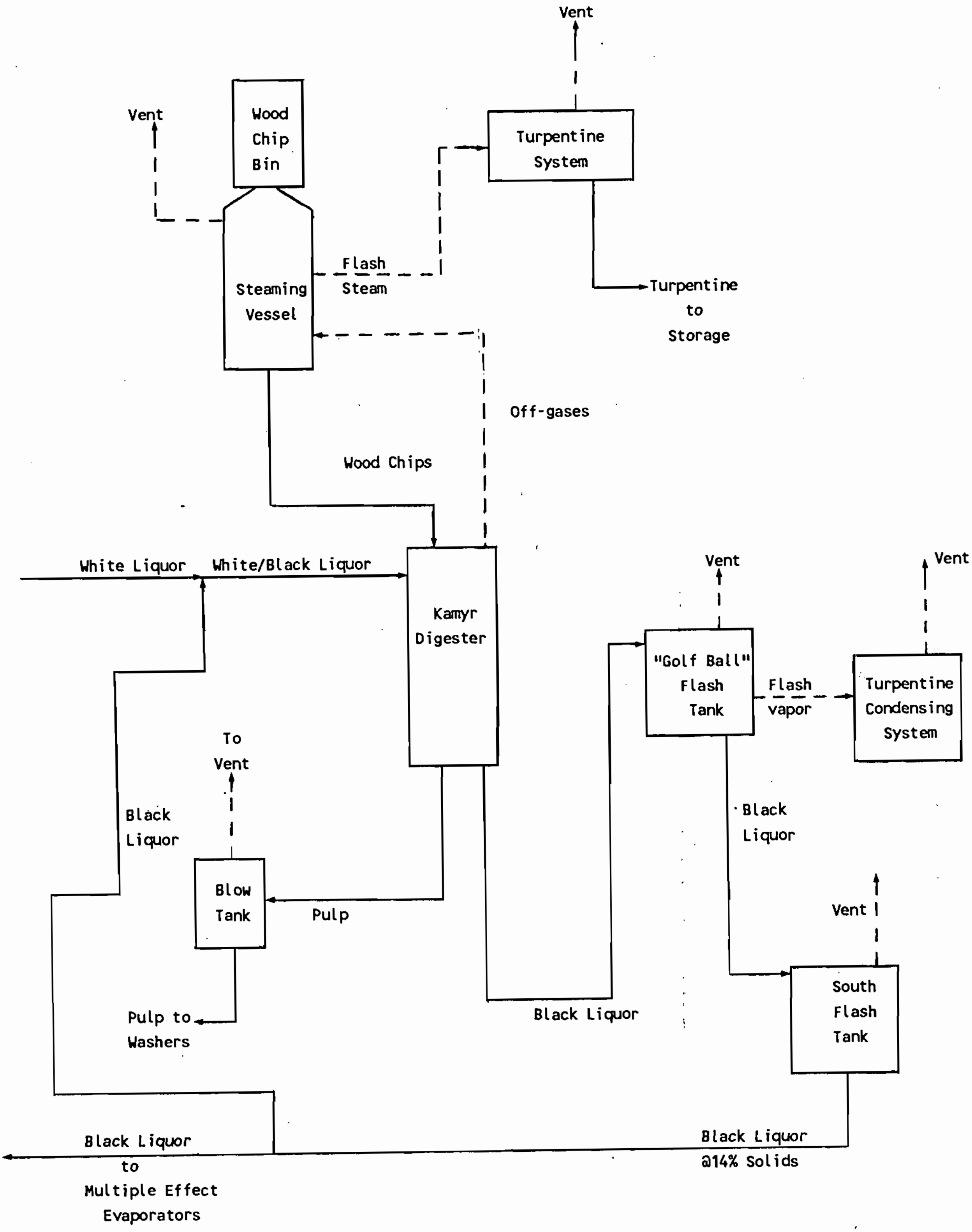

Figure A-1. Flow Diagram of CCA Existing Kamyr Digester System

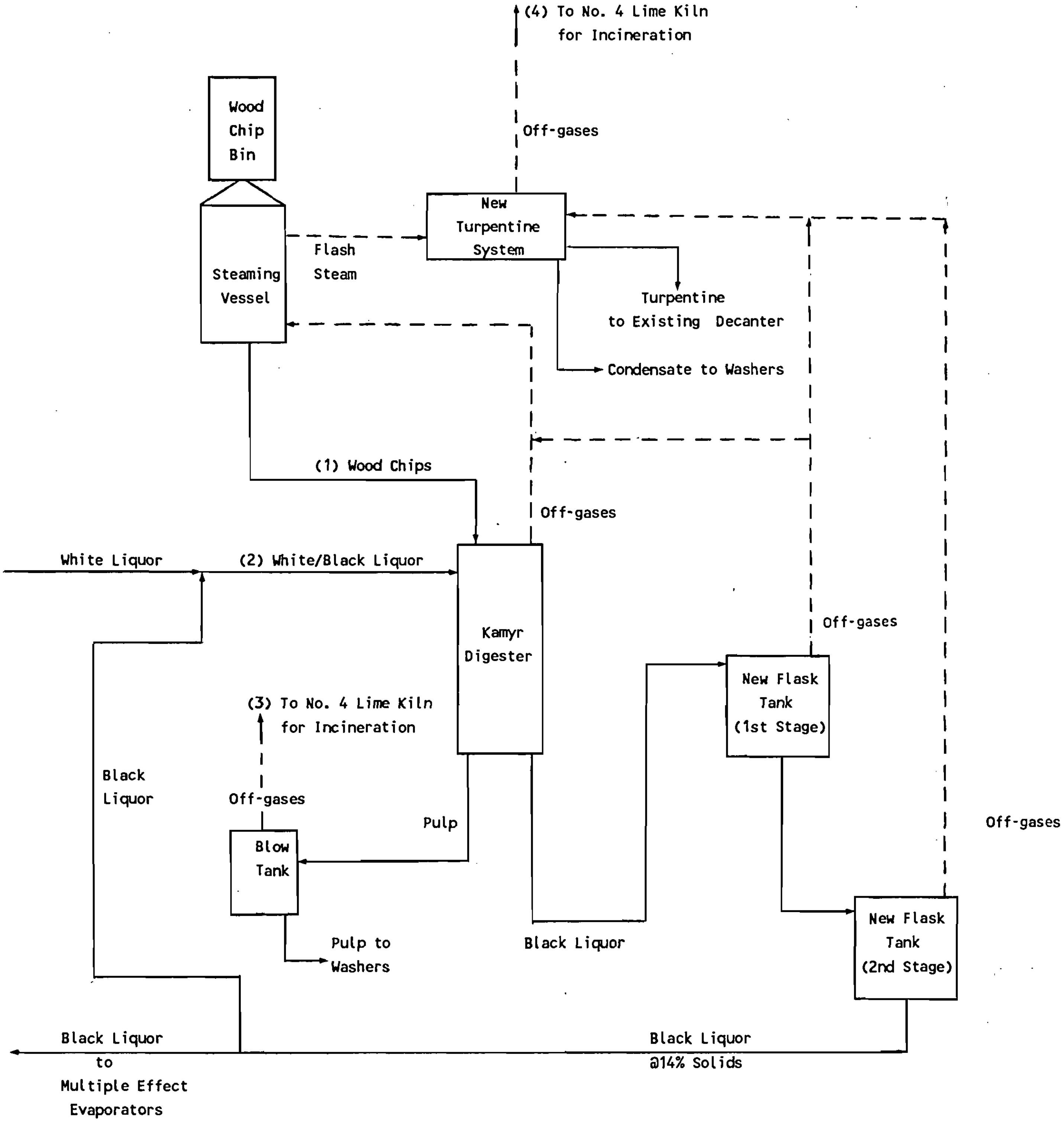

Figure A-2. Flow Diagram of CCA Modified Kamyr Digester System

ATTACHMENT B

DERIVATION OF PROCESS RATES

I. KAMYR CONTINUOUS DIGESTER INPUT RATES

Basis:

Maximum pulp production = 1,700 TPD dry pulp
= 1,819 TPD ADP

1 ton wood chips (dry) yields 0.535 tons pulp (dry)

A. Wood Chips

1700 TPD dry pulp x 1 ton chips (dry)/0.535 tons pulp (dry)
x 2,000 lb/ton / 24 hr/day
= 264,798 lb/hr (dry)

B. Black /White Liquor

Total liquor flow = 2,774 gpm

Liquor @ 8.34 lb/gal

2,774 gpm x 8.34 lb/gal x 60 min/hr = 1,388,110 lb/hr

C. Total Input Rate

Wood Chips + Liquor = 264,798 + 1,388,110 = 1,652,908 lb/hr

II. KAMYR CONTINUOUS DIGESTER PRODUCT RATES

1,700 TPD dry pulp x 2,000 lb/ton / 24 hr/day = 141,667 lb/hr (dry)

1,819 TPD ADP x 2,000 lb/ton / 24 hr/day = 151,583 lb/hr ADP

ATTACHMENT C

EMISSION ESTIMATES

The best available estimate of TRS from the system is based upon the USEPA publication entitled "Kraft Pulping: Control of TRS Emissions from Existing Mills" (EPA-450/2-78-003b, March 1979). The highest emission factor for digester systems is 10.5 lb/ton ADP. TRS emissions from the digester system are calculated as follows:

1,819 TPD ADP x 10.5 lb/ton ADP / 24 hr/day = 796 lb/hr
796 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 3,486 TPY

BEST AVAILABLE COPY

Subcode 05

Receipt # 76195
✓ # 1214414
$100.00
AC 45-141872

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

DER
NOV 12 1987
BAQM

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Batch Digesters [ ] New[1] [X] Existing[1]

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

COMPANY NAME: Container Corporation of America COUNTY: Nassau

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) Batch Digester System

SOURCE LOCATION: Street North 8th Street City Fernandina Beach

UTM: East (17) 456.2 North 3394.2

Latitude 30 ° 40 ' 53 "N Longitude 81 ° 27 ' 26 "W

APPLICANT NAME AND TITLE: Paul J. Magnell, General Manager

APPLICANT ADDRESS: North 8th Street, Fernandina Beach, Florida 32034

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Container Corporation of America

I certify that the statements made in this application for a construction 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: Paul Magnell

Paul J. Magnell, General Manager
Name and Title (Please Type)

Date: 11-11-87 Telephone No. (904)261-5551

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.

DAVID A. BUFF
NO. 19011

Signed David A. Buff

David A. Buff
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

P.O. Box 14288, Gainesville, Florida 32604
Mailing Address (Please Type)

Florida Registration No. 19011 Date: 11/9/87 Telephone No. (904)375-8000

SECTION II: GENERAL PROJECT INFORMATION

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

See Attachment A

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

Start of Construction March 1988 Completion of Construction November 1990

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.)

$3,660,000

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

Permit: A045-115842

Issued: 9/10/86

Expires: 5/12/89

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;

if power plant, hrs/yr_____; if seasonal, describe:__________

F. If this is a new source or major modification, answer the following questions. (Yes or No) Not Applicable

1. Is this source in a non-attainment area for a particular pollutant? __________

   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. __________

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

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

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? __________

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? __________

   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.

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		
Wood Chips			212,418 (dry)	Fig.A-2: (1)
Black/White Liquor			443,954	Fig.A-2: (2)

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

1. Total Process Input Rate (lbs/hr): 656,372

2. Product Weight (lbs/hr): 108,333 (dry)

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/~~yr~~ hr	T/yr	
TRS*	609	2,667	2.600(4)(c)1.	Incineration	609	2,667	Fig.A-2: (3)&(4)

[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).

* TRS will be incinerated in the new No. 4 Lime Kiln

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)
Incineration (refer to	No. 4 Lime Kiln	application)		

E. Fuels Not Applicable

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

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

Fuel Analysis:

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 Not Applicable Maximum ____________

G. Indicate liquid or solid wastes generated and method of disposal.

Not Applicable

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):
Refer to No. 4 Lime Kiln application

Stack Height: ____________ ft. Stack Diameter: ____________ ft.

Gas Flow Rate: ________ ACFM ________ DSCFM Gas Exit Temperature: ________ °F.

Water Vapor Content: ________ % Velocity: ________ 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							
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

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)]

   SEE ATTACHMENT B
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.

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

   SEE ATTACHMENT C
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.)

   SEE ATTACHMENT A
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).

   SEE ATTACHMENT A
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.

   SEE ATTACHMENT A
7. 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).

   ATTACHED
8. 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.

   ATTACHED

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

Not Applicable

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

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:

F. 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

Not Applicable

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. _____ 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^2	______________________________	grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description o 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.

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

ATTACHMENT A

PROCESS DESCRIPTION

CCA currently operates a batch pulp digesting process at its Fernandina Beach mill. The Batch Digesting System consists of seven (7) batch digesters, two (2) blow tanks, and a turpentine recovery system (see Figure A-1). Wood chips and white and black liquor are fed to the batch digesters. The digesting process is performed over a defined time period, and the cooked pulp is then discharged to the blow tanks. Digesters 1, 2 and 3 blow to Blow Tank A, while Digesters 5, 6 and 7 blow to Blow Tank B. Digester 4 can blow to either blow tank. From the blow tanks, the pulp and black liquor is sent to process.

Currently, TRS gases from the Batch Digesting System at CCA vent directly to the atmosphere from the two blow tanks and from the turpentine recovery system. Florida's TRS regulations [FAC Rule 17-2.600(4)(c)1.] require that these gases be incinerated or otherwise controlled. In order to comply with the TRS regulations, CCA proposes to modify the existing system to collect and transport the non-condensible TRS gases to the proposed No. 4 Lime Kiln for incineration.

A new hot water accumulator system will be added to condense the steam from both blow tanks. Non-condensible TRS gases from the new secondary condenser will be routed to the No. 4 Lime Kiln for incineration (see Figure A-2). Condensate from the new secondary condenser will be sent to the existing turpentine decanter for turpentine recovery. The existing batch digesters and blow tanks will continue to be utilized in the modified system.

A new Turpentine Recovery System will replace the existing turpentine recovery system to provide more efficient recovery of turpentine from the digester relief gases. Non-condensible gases from the new turpentine condensers will be collected and sent to the proposed No. 4 Lime Kiln for incineration. Condensate streams will be sent to the existing condensate washers and to the existing turpentine decanter.

Process input and product rates for the modified system are presented in Attachment B. TRS emission estimates are presented in Attachment C.

The Florida TRS rules require that a contingency plan be developed for times when emergency venting of TRS emissions occurs, or when a TRS control device is shutdown for essential maintenance [FAC Rule 17-2.600(4)(c)1.c.]. CCA will submit the required contingency plan in conjunction with the application for an operating permit for this source.

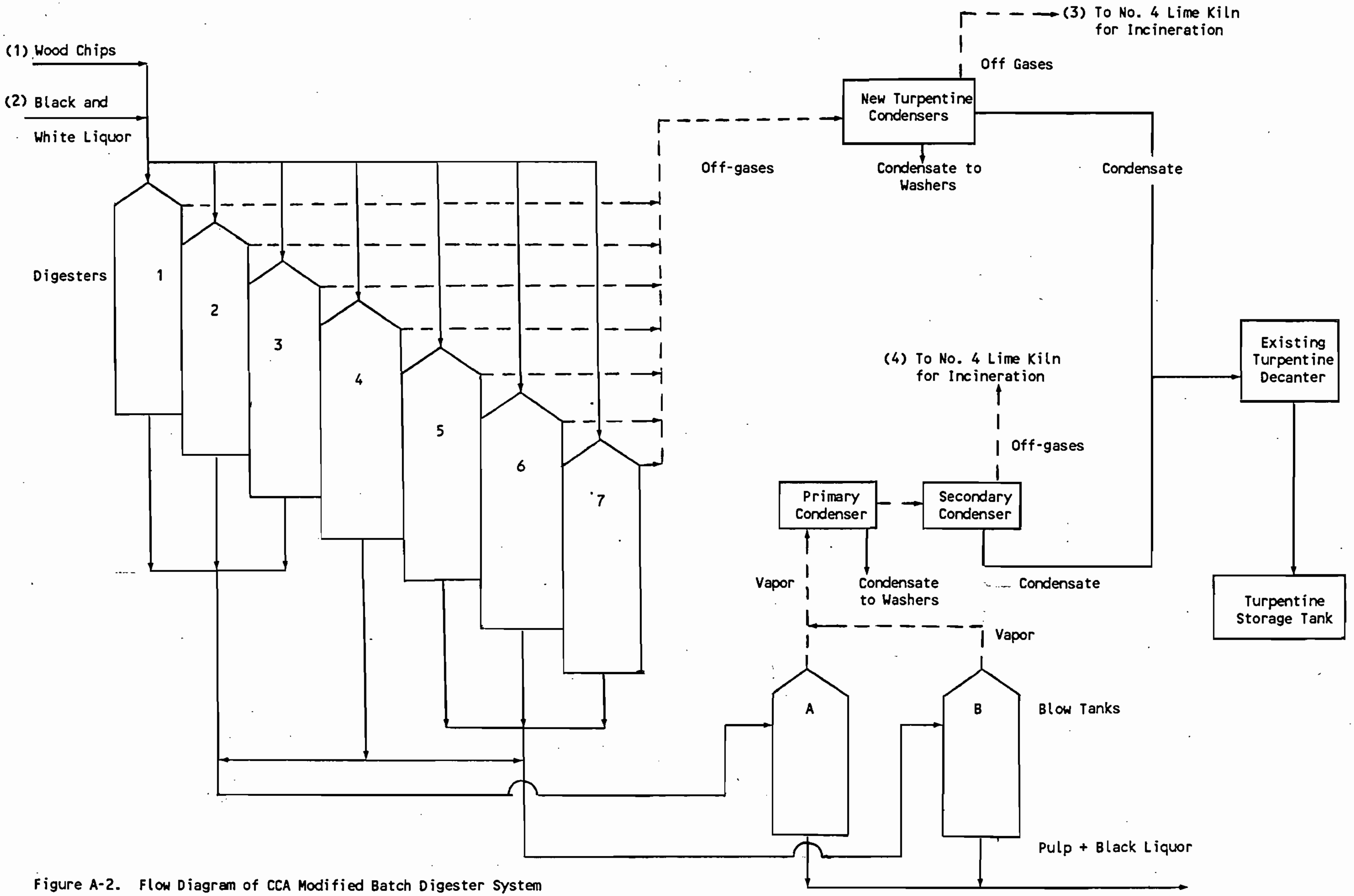

Figure A-2. Flow Diagram of CCA Modified Batch Digester System

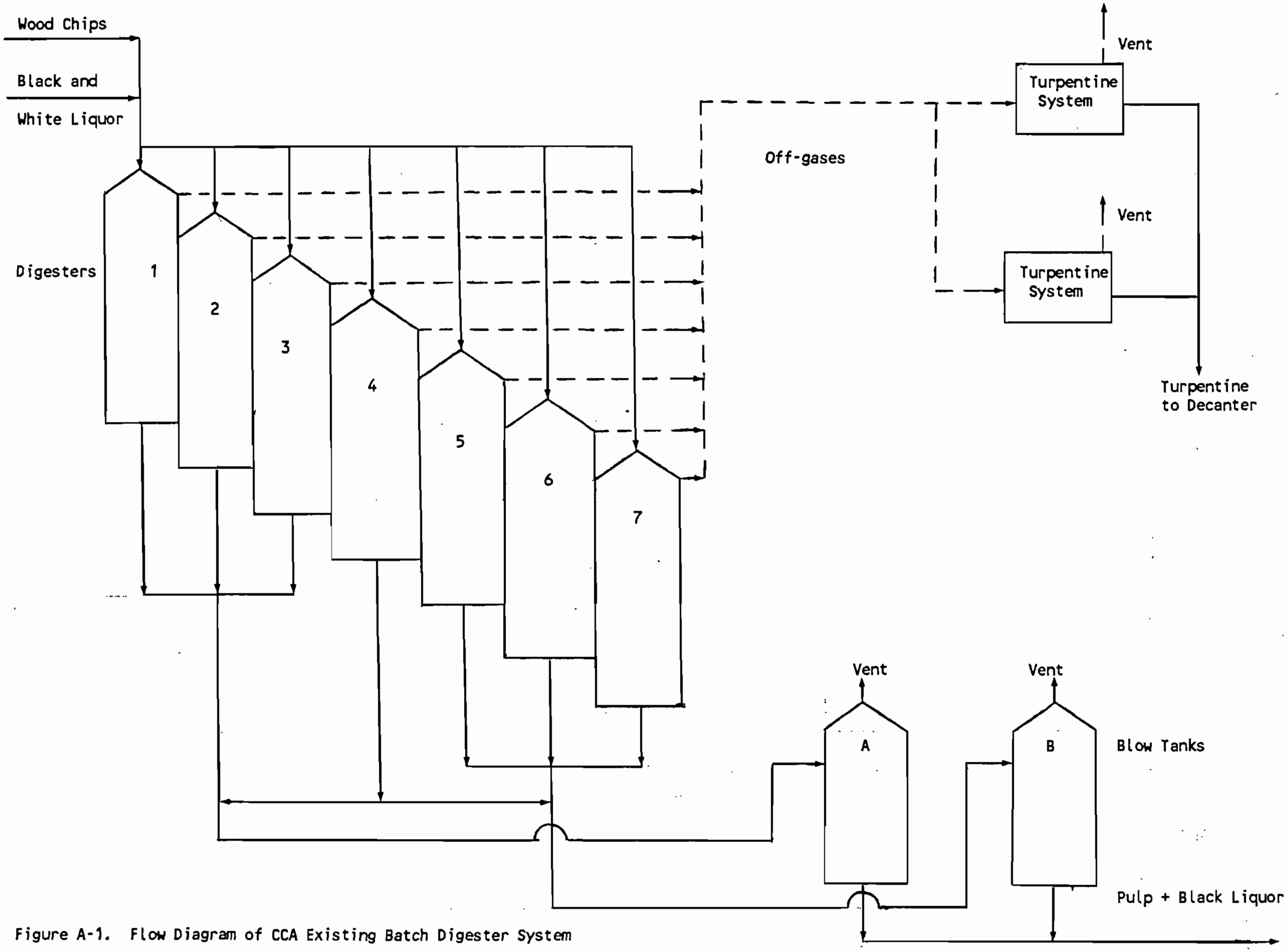

Figure A-1. Flow Diagram of CCA Existing Batch Digester System

ATTACHMENT B

DERIVATION OF PROCESS RATES

I. BATCH DIGESTER INPUT RATES

Basis:

Maximum pulp production = 1,300 tons per day (TPD) dry pulp
= 108,333 lb/hr (dry)
= 1,391 TPD air dried pulp (ADP)

Liquid/dry wood ratio = 2.09

A. Wood Chips

Yield factor = 51%

Dry wood input = 108,333 lb/hr / 0.51 = 212,418 lb/hr (dry)

B. Black/White Liquor

Total liquor = 212,418 lb/hr chips (dry) x 2.09 lb liq/lb chips
= 443,954 lb/hr

C. Total Input Rate

Wood Chips & Liquor = 212,418 lb/hr + 443,954 lb/hr = 656,372 lb/hr

II. BATCH DIGESTER PRODUCTION RATES

1300 TPD dry pulp x 2000 lb/ton / 24 hr/day = 108,333 lb/hr dry pulp

1391 TPD ADP x 2000 lb/ton / 24 hr/day = 115,917 lb/hr ADP

ATTACHMENT C

EMISSION ESTIMATES

The best available estimate of TRS from the system is based on emission factors contained in the USEPA publication entitled "Kraft Pulping: Control of TRS Emissions from Existing Mills" (EPA-450/2-78-003b, March 1979). The highest emission factor for digesters systems is 10.5 lb/ton ADP.

1391 TPD ADP x 10.5 lb/ton / 24 hr/day = 609 lb/hr
609 lb/hr x 8,760 hr/yr / 2000 lb/ton = 2,667 TPY

Subcode 05

Receipt #76195
V# 1214412
$100.00
AC 45-141873

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

DER
NOV 12 1987
BAQM

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Black Liquor Evaporators ☐ New[1] ☒ Existing[1]

APPLICATION TYPE: ☒ Construction ☐ Operation ☐ Modification

COMPANY NAME: Container Corporation of America COUNTY: Nassau

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. 5 Multiple Effect Evaporator

SOURCE LOCATION: Street North 8th Street City Fernandina Beach

UTM: East (17) 456.2 North 3394.2

Latitude 30 ° 40 ' 53 "N Longitude 81 ° 27 ' 26 "W

APPLICANT NAME AND TITLE: Paul J. Magnell, General Manager

APPLICANT ADDRESS: North 8th Street, Fernandina Beach, Florida 32034

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Container Corporation of America

I certify that the statements made in this application for a construction 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: Paul Magnell

Paul J. Magnell, General Manager
Name and Title (Please Type)

Date: 11-11-87 Telephone No. (904)261-5551

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 David A. Buff

David A. Buff
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

P.O. Box 14288, Gainesville, Florida 32604
Mailing Address (Please Type)

DAVID A. BUFF

Florida Registration No. 19011 Date: 11/9/87 Telephone No. (904)375-8000

SECTION II: GENERAL PROJECT INFORMATION

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

See Attachment A

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

Start of Construction March 1988 Completion of Construction November 1990

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.)

$650,000

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

Permit: A045-115844

Issued: 9/10/86

Expires: 5/12/89

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;

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

F. If this is a new source or major modification, answer the following questions. (Yes or No) Not Applicable

1. Is this source in a non-attainment area for a particular pollutant? ______

   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. ______

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

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

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? ______

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? ______

   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.

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		
Black Liquor			1,340,690	Fig.A-2: (1)

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

1. Total Process Input Rate (lbs/hr): 1,340,690 @ 23% solids

2. Product Weight (lbs/hr): 474,398 @ 65% solids

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/~~yr~~ hr	T/yr	
TRS*	394	1,726	2.600(4)(c)1.	Incineration	394	1,726	Fig.A-2:(2)

[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).

* TRS will be incinerated in the new No. 4 Lime Kiln

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)
Incineration (refer to	No. 4 Lime Kiln	application)		

E. Fuels Not Applicable

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

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

Fuel Analysis:

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 Not Applicable Maximum ________

G. Indicate liquid or solid wastes generated and method of disposal.

Not Applicable

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):
Refer to No. 4 Lime Kiln application

Stack Height: ____________ ft. Stack Diameter: ____________ ft.

Gas Flow Rate: ________ ACFM ________ DSCFM Gas Exit Temperature: ____________ °F.

Water Vapor Content: ____________ % Velocity: ____________ 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							
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

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)]

   SEE ATTACHMENT B

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.

   SEE ATTACHMENT C

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

   SEE ATTACHMENT C

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.)

   SEE ATTACHMENT A

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).

   SEE ATTACHMENT A

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.

   SEE ATTACHMENT A

7. 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).

   ATTACHED

8. 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.

   ATTACHED

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

Not Applicable

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

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:

F. 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

Not Applicable

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. _____ 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^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.

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

ATTACHMENT A

PROJECT DESCRIPTION

CCA currently operates a black liquor multiple effect evaporator system (No. 5 MEE) at its Fernandina Beach mill. A flow diagram of the system is shown in Figure A-1. In the existing system, weak black liquor (23% solids content) is pumped from the weak black liquor storage tanks to the evaporators. From the evaporators, the black liquor enters the black liquor concentrators. The black liquor leaving the concentrators contains approximately 65% solids. Currently, non-condensible TRS gases from the evaporators are vented to the atmosphere through the hot well. The concentrators also vent directly to the atmosphere.

CCA is proposing changes in the No. 5 MEE system to collect non-condensible TRS gases and to transport these gases to the new No. 4 Lime Kiln for incineration. Vapors from the evaporators and the concentrators will be routed to the existing surface condenser and then to a new hot well. Non-condensible TRS gases from the new hot well will be collected and sent to the lime kiln for incineration. No changes will be made in the existing process capacities of the evaporators and concentrators. A flow diagram of the proposed system is presented in Figure A-2.

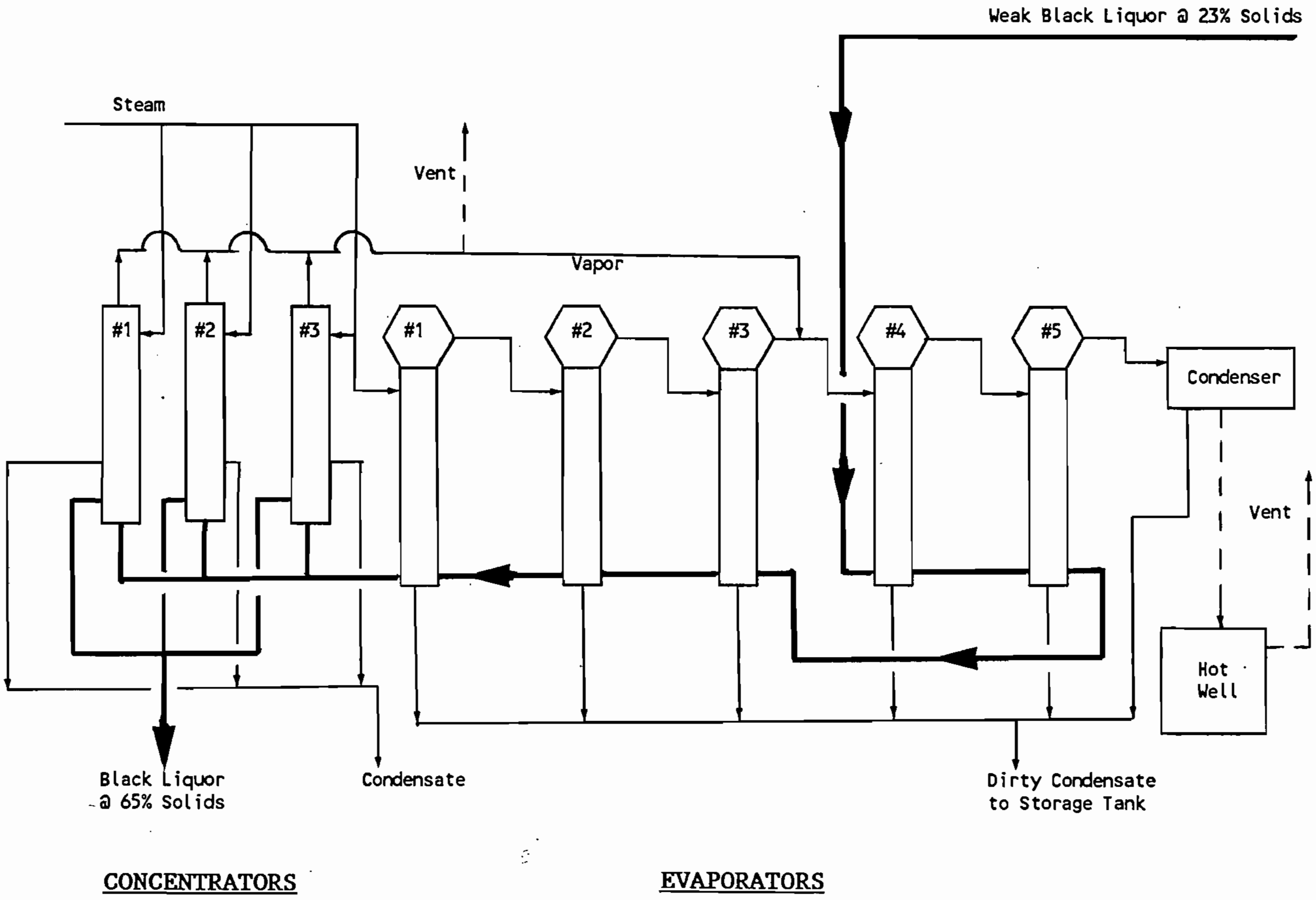

Figure A-1. Flow Diagram of CCA Existing No. 5 Multiple Effect Evaporator System

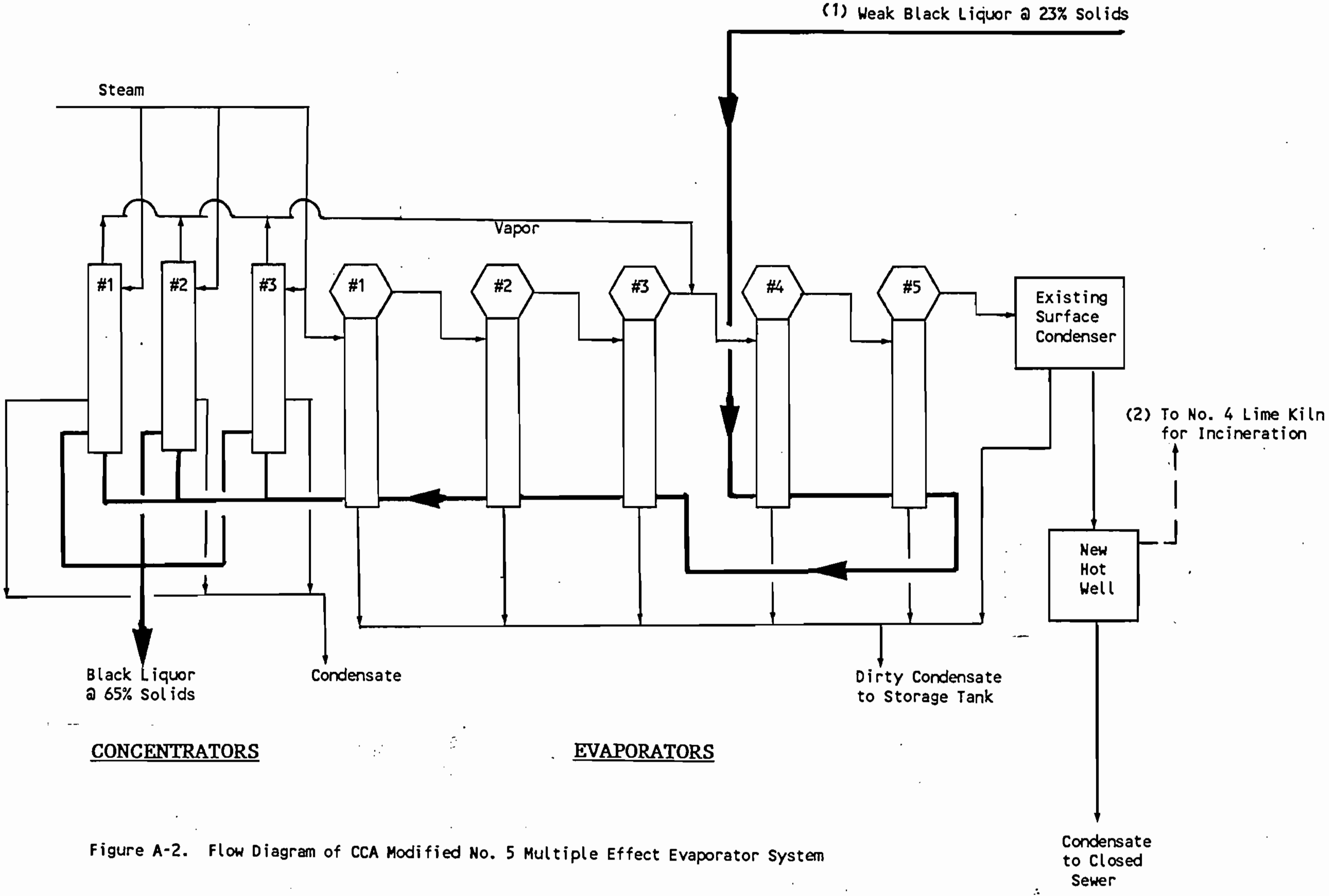

Figure A-2. Flow Diagram of CCA Modified No. 5 Multiple Effect Evaporator System

ATTACHMENT B

DERIVATION OF PROCESS RATE

I. UTILIZATION RATE

Based upon operating data, maximum input rate of black liquor

= 1,340,690 lb/hr @ 23% solids

= 308,359 lb/hr BLS

II. PRODUCT WEIGHT

Black liquor is at 65% solids leaving concentrators.

308,359 lb/hr BLS / 0.65 = 474,398 lb/hr @ 65% solids

ATTACHMENT C

EMISSION ESTIMATES

The best available estimate of TRS from the No. 5 MEE system is based upon the USEPA publication entitled "Kraft Pulping: Control of TRS Emissions from Existing Mills" (EPA-450/2-78-003b, March 1979). The highest factor for multiple effect evaporator systems is 6.3 lb/ton ADP. The maximum pulp producing capacity of the No. 5 MEE system is 1,500 TPD ADP.

Estimated TRS emissions are calculated as follows:

1,500 TPD ADP x 6.3 lb/ton ADP / 24 hr/day = 394 lb/hr
394 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 1,726 TPY

Subcode 05

Receipt #76195
✓#1214411
$100.00
AC45-141874

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

DER
NOV 12 1987
BAQM

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Tall Oil Plant [ ] New[1] [X] Existing[1]

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

COMPANY NAME: Container Corporation of America COUNTY: Nassau

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) Tall Oil Plant

SOURCE LOCATION: Street North 8th Street City Fernandina Beach

UTM: East (17) 456.2 North 3394.2

Latitude 30 ° 40 ' 53 "N Longitude 81 ° 27 ' 26 "W

APPLICANT NAME AND TITLE: Paul J. Magnell, General Manager

APPLICANT ADDRESS: North 8th Street, Fernandina Beach, Florida 32034

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Container Corporation of America

I certify that the statements made in this application for a construction 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: Paul Magnell

Paul J. Magnell, General Manager
Name and Title (Please Type)

Date: 11-11-87 Telephone No. (904) 261-5551

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.

DAVID A. BUFF
NO. 19011

Signed David A. Buff

David A. Buff
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

P.O. Box 14288, Gainesville, FL 32604
Mailing Address (Please Type)

Florida Registration No. 19011 Date: 11/9/87 Telephone No. (904)375-8000

SECTION II: GENERAL PROJECT INFORMATION

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

See Attachment A

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

Start of Construction March 1988 Completion of Construction November 1989

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.)

$250,000

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

Permit: A045-115841
Issued: 9/8/86
Expires: 5/12/89

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;

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

F. If this is a new source or major modification, answer the following questions. (Yes or No) Not Applicable

1. Is this source in a non-attainment area for a particular pollutant? ______

   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. ______

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

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

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? ______

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? ______

   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.

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		
Soap			24,573	Fig. A-2
Sulfuric acid			3,866	Fig. A-2
Caustic			5,972	Fig. A-2

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

1. Total Process Input Rate (lbs/hr): 34,411

2. Product Weight (lbs/hr): 17,000

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/~~yr~~ hr	T/yr	
TRS	0.43	1.88	2.600(4)(c)2.	* 0.43	0.43	1.88	Fig.A-2 scrubber

[1] See Section V, Item 2. * 0.05 lb TRS/ton tall oil produced

[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).

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)
Caustic Scrubber	TRS	98.95%	N/A	See Att. C
(vendor not yet selected)				

E. Fuels Not Applicable

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

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

Fuel Analysis:

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 Not Applicable Maximum ______

G. Indicate liquid or solid wastes generated and method of disposal.

Scrubbing liquid is recycled back to scrubber or back into Tall Oil Plant process.

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

Stack Height: 32 ft. Stack Diameter: 1.5 ft.

Gas Flow Rate: 4,000 ACFM 2,600 DSCFM Gas Exit Temperature: 130 °F.

Water Vapor Content: Saturated % Velocity: 37.7 FPS

SECTION IV: INCINERATOR INFORMATION

Not Applicable

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Patholog-ical)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Inciner-ated							
Uncon-trolled (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

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)]

   SEE ATTACHMENT B
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.

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

   SEE ATTACHMENT B
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.)

   SEE ATTACHMENT C
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).

   SEE ATTACHMENT C
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.

   SEE ATTACHMENT A
7. 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).

   ATTACHED
8. 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.

   ATTACHED

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

Not Applicable

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

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:

F. 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

Not Applicable

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. _____ 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^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.

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

ATTACHMENT A

PROCESS DESCRIPTION

CCA currently operates a Tall Oil Plant at its Fernandina Beach mill. A flow diagram of the existing process is presented in Figure A-1. Soap from the soap tanks is sent to the acidulator where acid and steam are added to produce lignin and tall oil. The lignin is sent to the lignin tank where caustic is added to produce dissolved lignin. From the lignin tank, the dissolved lignin is then sent to the east soap tank and eventually back to the pulp mill in the liquor from the soap tank. Tall oil produced in the acidulator is sent to a settling tank where caustic is added, and then to the tall oil storage tanks. Acid water produced in the acidulator is sent to the saltcake tank.

TRS emissions from the existing Tall Oil Plant come from the acidulator, lignin tank and saltcake tank. The acidulator has a vent to the atmosphere, while the lignin tank and saltcake tank are open-top tanks, exposed to the atmosphere.

In order to control TRS emissions from the three TRS sources, CCA is proposing to install tops on the lignin tank and saltcake tank, and route off-gases from these tanks and gases from the acidulator to a new wet scrubber. The scrubber will be of the packed tower type and will use a solution of caustic soda as the absorbing liquid. The scrubber will be designed to meet the TRS regulation of 0.05 lb TRS/ton tall oil produced, as a 12-hour average [FAC Rule 17.-2.600(4)(c)2.a.].

The TRS regulations also require that tall oil plants install and operate a continuous emission monitoring system (CEMS) for TRS emissions, or monitor the performance of the TRS control system. CCA proposes to continuously monitor the performance of the TRS scrubber by developing a surrogate parameter to be monitored, as provided by FAC Rule 17-2.710(3)(c). The surrogate parameter, rationale for selection of the parameter, and other required information will be submitted in conjunction with the application for an operating permit for the Tall Oil Plant.

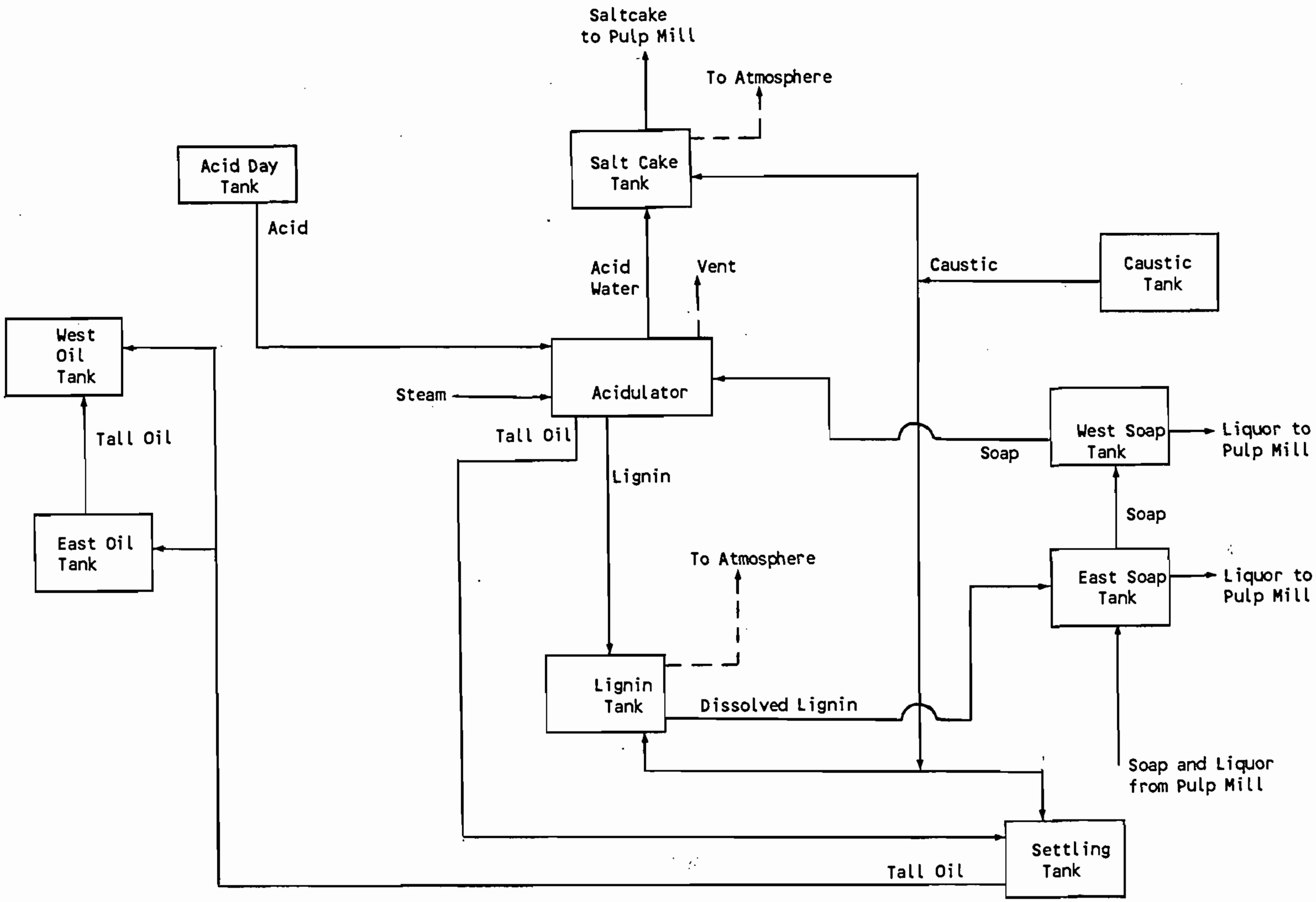

Figure A-1. Flow Diagram of CCA Existing Tall Oil System

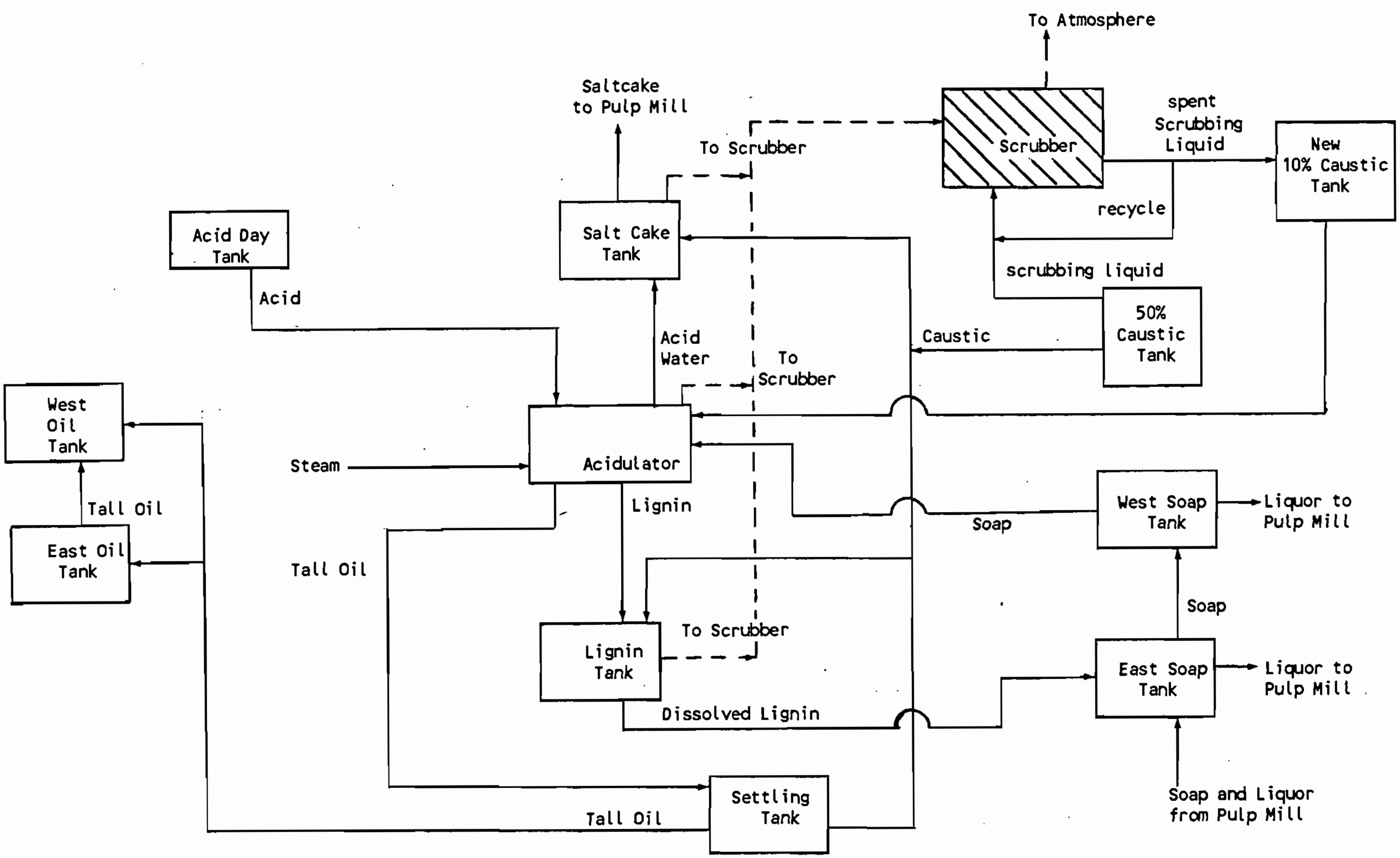

Figure A-2. Flow Digram of CCA Modified Tall Oil System

ATTACHMENT B

PROCESS RATES AND EMISSION ESTIMATES

I. PROCESS RATE

The maximum production rate of tall oil is 8.5 tons/hr, based upon operating data for the system.

A. Derivations

Batch Process 2.59 hr/cook = 0.39 cooks/hr

Soap = 9,404 gal/cook measured
x 0.39 cook/hr x 6.7 lb/gal = 24,573 lb/hr

Sulfuric Acid = 650 gal/cook
x 0.39 cook/hr x 15.25 lb/gal = 3,866 lb/hr

Caustic = 1,200 gal/cook
x 0.39 cook/hr x 12.76 lb/gal = 5,972 lb/hr

Tall Oil Production = 22 tons/cook maximum
22 tons/cook / 2.59 hr/cook = 8.5 TPH
= 17,000 lb/hr

II. TRS EMISSIONS

A. Uncontrolled emissions

Based upon TRS testing conducted on the acidulator exhaust at the CCA mill, and TRS testing conducted at the G-P mill on the Tall Oil System, maximum TRS loading to the scrubber is conservatively estimated at 2,200 ppm TRS @ 3,500 scfm and 140^{o}F.

$$\text{TRS} = 2116.8\ \frac{\text{lb}_f}{\text{ft}^2} \times 3{,}500\ \frac{\text{ft}^3}{\text{min}} \times \frac{34\ \text{lb}_m\text{-}^{o}\text{R}}{1545\ \text{ft-lb}_f}\ \frac{1}{528^{o}\text{R}}\ \frac{2200}{10^6} \times 60\ \frac{\text{min}}{\text{hr}}$$

$$= 40.8\ \text{lb/hr}$$

B. Controlled emissions

Maximum TRS = 0.05 lb/ton tall oil produced

Tall oil produced (max) = 8.5 tons/hr

Maximum emissions = 8.5 tons/hr x 0.05 lb/ton
= 0.43 lb/hr

0.43 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 1.88 TPY

ATTACHMENT C

CONTROL SYSTEM DESIGN PARAMETERS

I. WET SCRUBBER DESIGN

The wet scrubber to be used on the Tall Oil Plant has not yet been selected. The following presents the general scrubber design to be selected. The selected scrubber will be equal to or better than the general scrubber design.

The wet scrubber will be a packed tower type absorber unit, approximately 3.5 feet in diameter and 17.5 feet high. Sodium hydroxide solution will be used as the absorbing liquid. Scrubber packing will be that recommended by the supplier. A mesh type demister pad follows the absorption section to remove entrained liquid.

II. WET SCRUBBER OPERATING CONDITIONS

Gas Inlet Volume (Design Capacity)	3500 SCFM, 4040 ACFM
Gas Inlet Temperature	140°F
Gas Outlet Volume	4,000 ACFM
Gas Outlet Temperature	130°F
Pressure Drop Across Packed Tower	4 - 5" w.c.
Scrubbing Liquid Rate (Recycle)	80 to 90 GPM @ 15 psig
Scrubbing Liquid	Sodium Hydroxide solution

III. TRS REMOVAL EFFICIENCY

From Attachment B: uncontrolled TRS = 40.8 lb/hr
controlled TRS = 0.43 lb/hr

Minimum removal efficiency = [(40.8 - 0.43)/40.8] x 100 = 98.95%

Subcode 05

Receipt #76195
V# 1214410
$100.00
AC 45-141875

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

DER
NOV 12 1987
BAQM

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Smelt Dissolving Tank ☐ New[1] ☒ Existing[1]

APPLICATION TYPE: ☒ Construction ☐ Operation ☐ Modification

COMPANY NAME: Container Corporation of America COUNTY: Nassau

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. 4 Smelt Dissoving Tank

SOURCE LOCATION: Street North 8th Street City Fernandina Beach

UTM: East (17) 456.2 North 3394.2

Latitude 30 ° 40 ' 53 "N Longitude 81 ° 27 ' 26 "W

APPLICANT NAME AND TITLE: Paul J. Magnell, General Manager

APPLICANT ADDRESS: North 8th Street, Fernandina Beach, Florida 32034

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Container Corporation of America

I certify that the statements made in this application for a construction 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: Paul Magnell

Paul J. Magnell, Genretal Manager
Name and Title (Please Type)

Date: 11-11-87 Telephone No. (904) 261-5551

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 discharg 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 prope maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

DAVID A. BUFF
NO. 19011

Signed David A. Buff

David A. Buff
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

P.O. Box 14288, Gainesville, FL 32604
Mailing Address (Please Type)

Florida Registration No. 19011 Date: 11/9/87 Telephone No. (904)375-8000

SECTION II: GENERAL PROJECT INFORMATION

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

See Attachment A

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

Start of Construction March 1988 Completion of Construction Nov. 1989

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.)

$350,000

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

Permit: A045-107514

Issued: 10/9/85

Expires: 10/9/90

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52

if power plant, hrs/yr_____; if seasonal, describe:______

F. If this is a new source or major modification, answer the following questions. (Yes or No) Not Applicable

1. Is this source in a non-attainment area for a particular pollutant? ______

   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. ______

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

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

5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? ______

H. Do "Reasonably Available Control Technology" (RACT) requirements apply to this source? ______

   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.

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		
Smelt			56,513	Fig A-2: (1)

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

1. Total Process Input Rate (lbs/hr): 56,513

2. Product Weight (lbs/hr): Green liquor 56,513 (dry)

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/~~yr~~ hr	T/yr	
TRS	2.20	9.64	2.600(4)(c)4*	2.20	2.20	9.64	Fig A-2(2)
PM	28.5	122.0	2.610(1)	28.5	28.5	122.0	Fig A-2(2)

[1] See Section V, Item 2. * 0.0480 lb TRS/3000 lb BLS

[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).

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)
Venturi Scrubber	TRS	98.8%	Not Applicable	See Att. B
(vendor not yet selected)	Particulates	93.4%	1 um and above	See Att. B

E. Fuels Not Applicable

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

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

Fuel Analysis:

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 Not Applicable Maximum __________

G. Indicate liquid or solid wastes generated and method of disposal.

Scrubber water is recycled back into smelt dissolving tank

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

Stack Height: 244 ft. Stack Diameter: 6.0 ft.

Gas Flow Rate: 49,500 ACFM 32,500 DSCFM Gas Exit Temperature: 142 °F.

Water Vapor Content: saturated % Velocity: 29.2 FP

SECTION IV: INCINERATOR INFORMATION

Not Applicable

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Patholog-ical)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Inciner-ated							
Uncon-trolled (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: FP

*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

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)]

SEE ATTACHMENT A

2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach propose 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 use 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 wa made.

SEE ATTACHMENT C

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

SEE ATTACHMENT C

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.)

SEE ATTACHMENT B

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).

SEE ATTACHMENT B

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 evolve and where finished products are obtained.

SEE ATTACHMENT A

7. 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).

ATTACHED

8. 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.

ATTACHED

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

Not Applicable

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

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:

F. 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

Not Applicable

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. _____ 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^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.

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

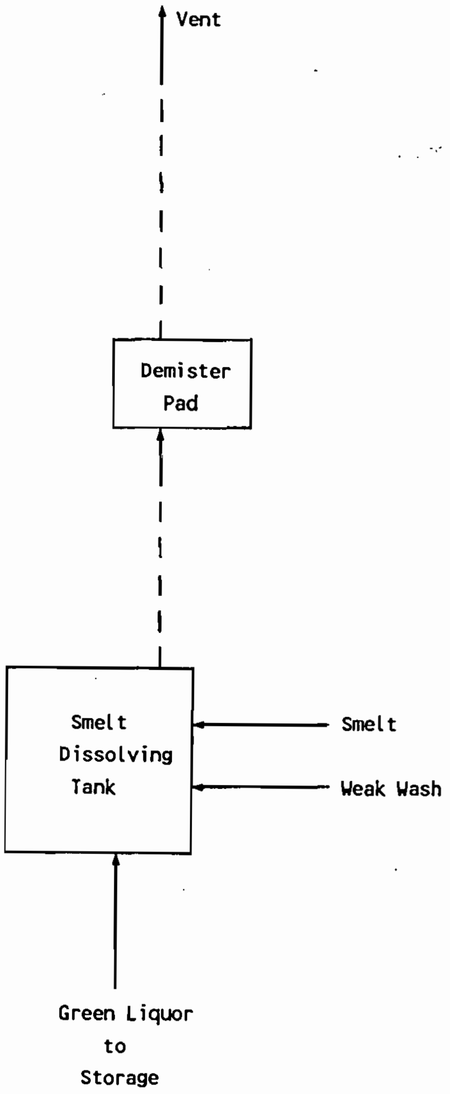

Figure A-1. Flow Diagram of CCA Existing No. 4 Recovery Boiler Smelt Dissolving Tank

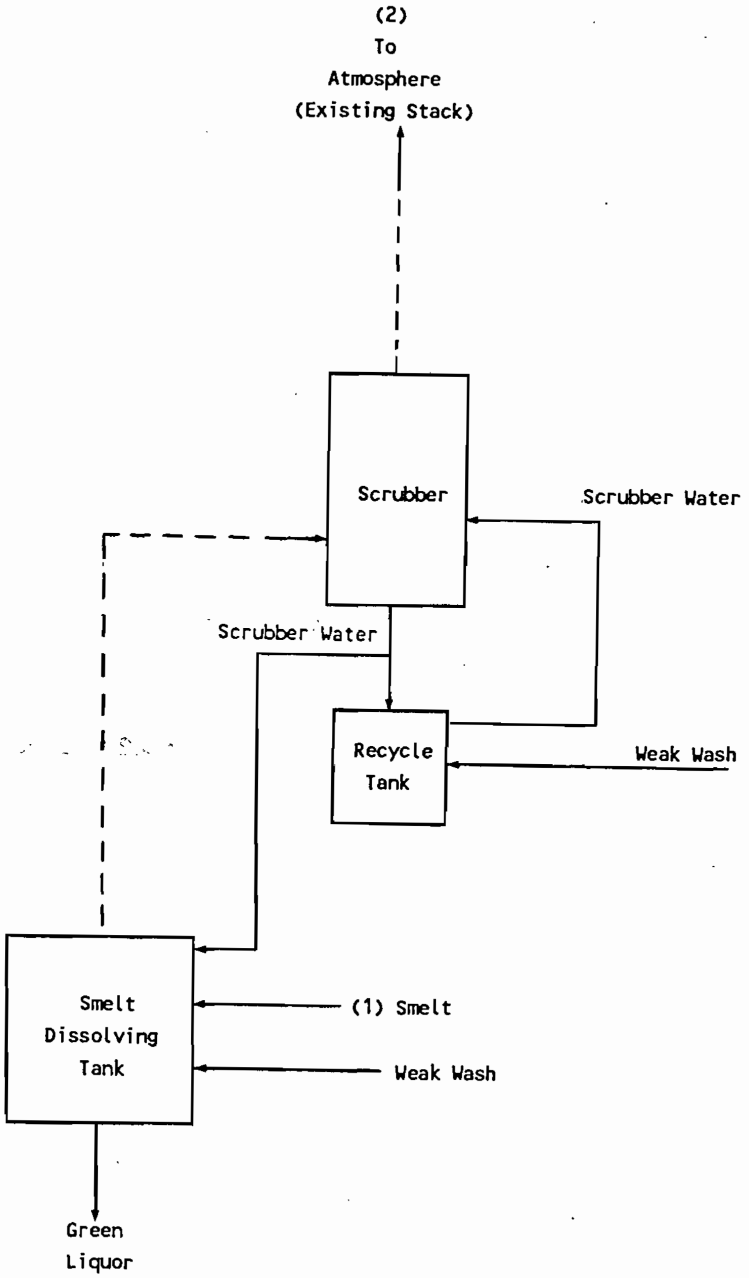

Figure A-2. Flow Diagram of CCA Modified No. 4 Recovery Boiler Smelt Dissolving Tank

ATTACHMENT A
PROCESS DESCRIPTION

CCA currently operates the No. 4 Recovery Boiler Smelt Dissolving Tank (No. 4 SDT) at its Fernandina Beach mill. The No. 4 SDT receives smelt from the No. 4 Recovery Boiler. Weak wash is added to the tank to produce green liquor for the causticizing system. A flow diagram of the existing process is presented in Figure A-1.

The existing No. 4 SDT has a demister pad to control particulate matter (PM) emissions. This demister pad will be replaced with a venturi scrubber for control of TRS emissions. No changes are being made to the smelt dissolving tank itself. The permitted capacity of the No. 4 SDT is 56,513 lb/hr smelt, as reflected in the current operating permit (A045-107514). A flow diagram of the Smelt Dissolving Tank and proposed scrubber is presented in Figure A-2.

The scrubber manufacturer has not yet been selected, and therefore generic scrubber design information and requirements are presented in Attachment B. The selected scrubber will be equivalent to or better than the generic scrubber. The generic scrubber design is similar to the scrubber now being used on the No. 5 SDT at CCA. This scrubber has demonstrated the ability to meet the TRS and particulate emission requirements, and is therefore proposed for use on the No. 4 SDT.

The existing stack on the smelt dissolving tank will still be utilized with the new scrubber. As such, sampling ports are provided on the Smelt Dissolving Tank stack in accordance with FAC Rule 17-2.700(4)(c) to allow stack sampling to be properly conducted.

Rule 17-2.600(4)(c)4 requires that smelt dissolving tank vents comply with Rule 17-2.710, Continuous Monitoring Requirements. Rule 17-2.710(3), General Requirements-Kraft (Sulfate) Pulp Mills, does not require a continuous TRS emission monitoring system be installed on smelt dissolving tanks. Therefore, Rule 17-2.710(3)(c) requires that the source owner or operator develop a surrogate test parameter to be used to demonstrate that the source is complying with the TRS emission standard. CCA will develop the surrogate test parameter and rationale for selection of the parameter and submit a surrogate test protocol as part of the air operating permit application for the smelt dissolving tank.

ATTACHMENT B

SCRUBBER DESIGN INFORMATION

A scrubber manufacturer has not yet been selected, therefore specific design information is not available, and generic design data are presented. The scrubber will utilize weak wash as the scrubbing medium. A recycle tank will be used to recycle the scrubber water. Spent scrubbing liquid will be sent to the smelt dissolving tank. The scrubber will contain a venturi impactor section of the flooded elbow type, followed by a cyclonic entrainment separator.

OPERATING CONDITIONS

Gas Inlet Volume (Design Capacity)	50,000 ACFM
Gas Inlet Temperature	165°F
Inlet Dust Loading (max)	1.0 gr/ACF
Inlet TRS Loading (max)	800 ppm
Gas Outlet Volume (max)	49,500 ACFM
Gas Outlet Temperature	142°F (saturated)
Pressure Drop across Scrubber	10-11" w.c.
Water Rate recycled	300-350 GPM @ 3 to 5 PSIG
Make Up Water Rate	10 to 12 GPM
Scrubber Inlet Particulate Loading (max)	428.6 lb/hr
Scrubber Outlet Particulate Loading (max)	28.5 lb/hr
Scrubber Inlet TRS Loading (max)	187 lb/hr
Scrubber Outlet TRS Loading (max)	2.2 lb/hr
Scrubbing Liquid	Weak Wash

The scrubber must achieve, as a minimum, the maximum emission rates as shown in Attachment C. These are 28.5 lb/hr for particulate matter and 2.20 lb/hr for TRS. The scrubber removal efficiency required to achieve these emission levels at maximum capacity are based upon the uncontrolled emissions shown above:

Particulate matter removal efficiency:

$$[(428.6 \text{ lb/hr} - 28.5 \text{ lb/hr}) / 428.6 \text{ lb/hr}] \times 100 = 93.4\%$$

TRS removal efficiency:

$$[(187 \text{ lb/hr} - 2.20 \text{ lb/hr}) / 187 \text{ lb/hr}] \times 100 = 98.8\%$$

ATTACHMENT C

EMISSION ESTIMATES

I. PARTICULATE MATTER

Maximum PM (TSP) emissions from the Smelt Dissolving Tank are based upon the permitted level of 28.5 lb/hr and 122.0 TPY contained in the current operating permit for the source (A045-107514). This limit is based upon the Process Weight Table regulation (FAC Rule 17-2.610(1) and a process input rate of 56,513 lb/hr (28.26 TPH) smelt.

II. TOTAL REDUCED SULFUR

TRS emissions from the Smelt Dissolving Tank are limited by FAC Rule 17-2.600(4)(c)4 to 0.0480 lb/3000 lb BLS fed to the associated recovery boiler. The maximum BLS flow to the No. 4 Recovery Boiler is limited by permit A045-107514 to 137,500 lb BLS/hr.

137,500 lb/hr x 0.0480 lb/3,000 lb BLS
= 2.20 lb/hr

2.20 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 9.64 TPY

Subcode 01

Receipt #76195
√# 1214408
$1000.00

AC 45-141877

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

DER
NOV 12 1987
BAQM

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Lime Kiln [X] New[1] [ ] Existing[1]

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

COMPANY NAME: Container Corporation of America COUNTY: Nassau

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.4 Lime Kiln

SOURCE LOCATION: Street North Eighth Street City Fernandina Beach

UTM: East (17) 456.2 North 3394.2

Latitude 30 ° 40 ' 53 "N Longitude 81 ° 27 ' 26 "W

APPLICANT NAME AND TITLE: Paul J. Magnell, General Manager

APPLICANT ADDRESS: North Eighth Street, Fernandina Beach, Florida 32034

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Container Corporation of America

I certify that the statements made in this application for a construction 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: Paul Magnell

Paul J. Magnell, General Manager
Name and Title (Please Type)

Date: 11-11-87 Telephone No. (904) 261-5551

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.

DAVID A. BUFF
NO. 19011

Signed David A. Buff

David A. Buff
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

P.O. Box 14288, Gainesville, Florida 32604
Mailing Address (Please Type)

Florida Registration No. 19011 Date: 11/9/87 Telephone No. (904) 375-8000

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.

The existing lime kiln and causticizing system will be replaced by one large kiln and a new causticizing system. The project will result in significantly increased fuel efficiency and a significant reduction in most pollutants.

See Attachment A for details.

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

Start of Construction March 1988 Completion of Construction November 1990

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.)

$16,000,000

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

Not Applicable

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ;

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

F. 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. No
3. Does the State "Prevention of Significant Deterioriation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. No
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

H. 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.

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		
Lime mud	Particulate	100	93,749	(1)

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

1. Total Process Input Rate (lbs/hr): 93,749
2. Product Weight (lbs/hr): 52,500

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/~~yr~~ hr	T/yr	
PM(TSP)	43.5	190.5	0.13 gr/dscf*	43.5**	43.5	190.5	(2)
PM10	38.5	168.6	NA	NA	38.5	168.6	(2)
TRS	2.63	11.52	NSPS-8ppm*	2.63	2.63	11.52	(2)
SO_2	26.8	117.4	NA	NA	26.8	117.4	(2)
NO_x	187.7	822.1	NA	NA	187.7	822.1	(2)

[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).

* Corrected to 10% O_2.

** This level of emissions is proposed by applicant and is lower than that required by FAC 17-2 or by federal NSPS.

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		

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

1. Total Process Input Rate (lbs/hr): __________

2. Product Weight (lbs/hr): __________

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/~~yr~~ hr	T/yr	
CO	78.8	29.9	NA	NA	78.8	29.9	(2)
VOC	15.2	44.9	NA	NA	15.2	44.9	(2)
PM(TSP) - fugitive	0.89	3.9	NA	NA	0.89	3.9	Kiln leaks
PM10-fugitive	0.15	0.7	NA	NA	0.15	0.7	Kiln leaks

[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).

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)
Electrostatic Precipitator	Particulate	99.5%	Submicron and above	See Att. D
(vendor not yet selected)				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
No.6 Fuel Oil	1176.8 gal/hr	1176.8 gal/hr	170.63

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

Fuel Analysis: No.6 Fuel Oil

Percent Sulfur: 3.0% Max Percent Ash: 0.1% Typical

Density: 8.1 lbs/gal Typical Percent Nitrogen: 0.9% Typical

Heat Capacity: 17,901 BTU/lb 145,000 BTU/gal

Other Fuel Contaminants (which may cause air pollution):

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

Annual Average Not Applicable Maximum

G. Indicate liquid or solid wastes generated and method of disposal.

Dust collected in ESP will be injected back into kiln.

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

Stack Height: 75 ft. Stack Diameter: 5.5 ft.

Gas Flow Rate: 79,500 ACFM 40,105 DSCFM Gas Exit Temperature: 325 °F.

Water Vapor Content: 25 % Velocity: 55.8 FPS

SECTION IV: INCINERATOR INFORMATION

NOT APPLICABLE

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
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

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)]
   SEE ATTACHMENT A
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.
   SEE ATTACHMENT B
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   SEE ATTACHMENT B
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.)
   SEE ATTACHMENT D
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).
   SEE ATTACHMENT D
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.
   SEE ATTACHMENT A
7. 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).
   SEE ATTACHMENT A
8. 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.
   ATTACHED

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

NOT APPLICABLE

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

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:

F. 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 b available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

NOT APPLICABLE

A. Company Monitored Data

1. ____________ no. sites ____________ TSP ____________ ( ) SO2* ____________ 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. _____ 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^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.

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

ATTACHMENT A

PROJECT DESCRIPTION

I. PROJECT DESCRIPTION

Container Corporation of America (CCA), located in Fernandina Beach, Florida, produces kraft pulp. The proposed project consists of the replacement of major components of the existing causticizing system, including installation of a new lime kiln of 630-TPD lime product capacity. Non-condensible TRS gases from several sources at the CCA mill will be collected and burned in the lime kiln for destruction of the TRS. The project will result in full compliance with the State of Florida TRS regulations.

The project includes replacement of two existing lime burning units with one new large, energy-efficient oil-fired lime kiln. This new kiln will yield a significant fuel savings in terms of Btu per ton of lime product--roughly 70% of the old kilns fuel usage rate. This large fuel savings also will result in a benefit to the environment--much less pollutants from combustion of fuel are produced per ton of lime produced. TRS emissions (odor) from the existing kilns, will be reduced by about 96% as a result of the project.

The process flow diagram (Figure A-1) details the flow of materials and air emission points. The new causticizing system will consist of the following:

1. The existing green liquor clarifiers will feed two new green liquor heaters. A new dregs filter will support the existing green liquor clarifiers.

2. Two new slaking lines, each consisting of a slaker and three causticizers, will replace the existing slaking line. The new slaking lines will each be equipped with condensing scrubbers to control particulate emissions from the slakers and causticizers.

3. The existing white liquor clarifiers and lime mud washers (two stages) will be used in the new system. The lime mud washers

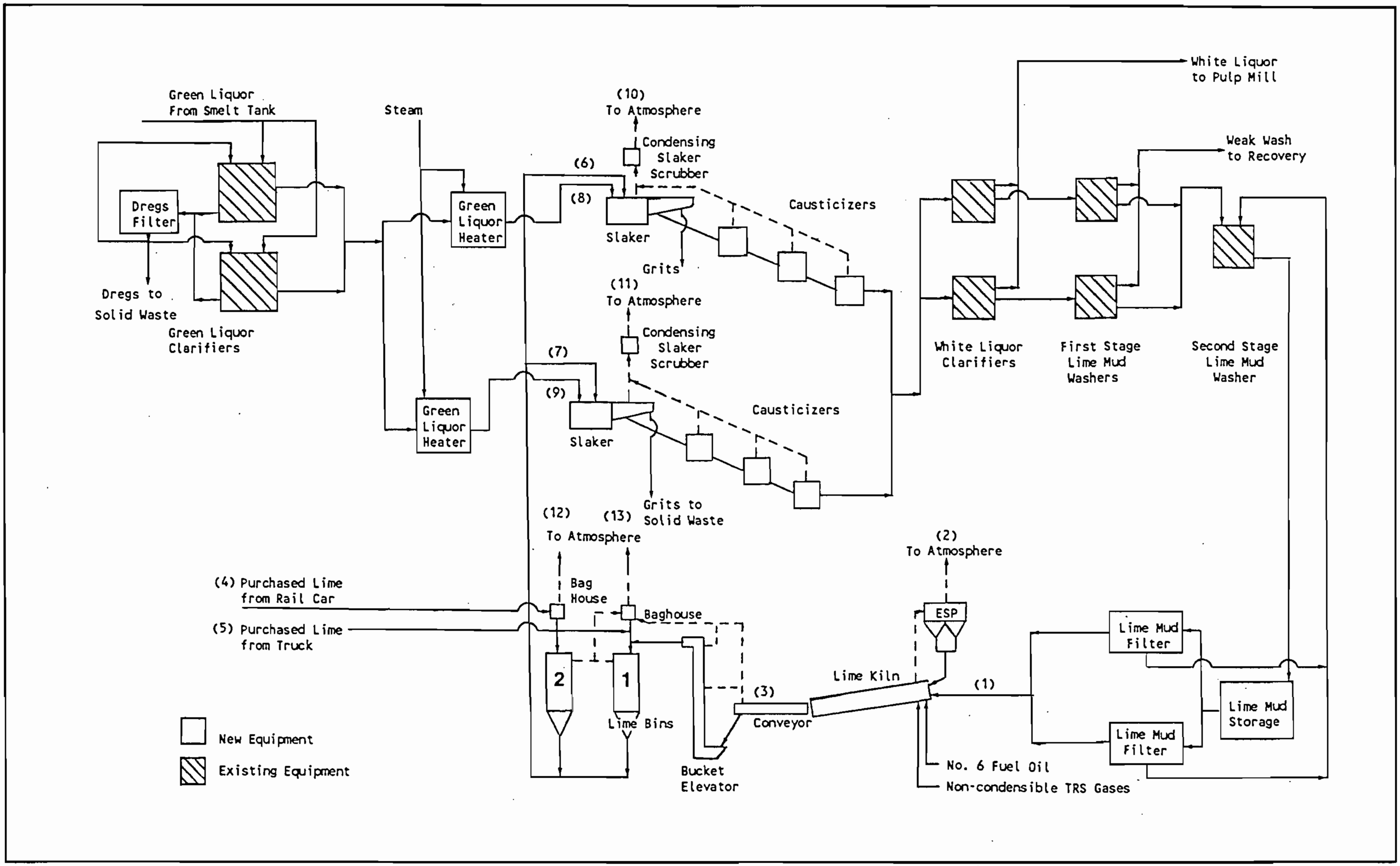

Figure A-1. Flow Diagram of Proposed CCA Causticizing System

KBN

will feed into a new lime mud storage tank, and then into two new lime mud filters. The lime mud filters will feed the new lime kiln.

4. The two existing lime kilns, each equipped with venturi scrubbers (total permitted lime product capacity of approximately 390 TPD), will be replaced by a single 630-TPD lime product kiln (No. 4 Lime Kiln) which will be equipped with an electrostatic precipitator for particulate control. The kiln will be fired with No. 6 fuel oil with a sulfur content not to exceed 3.0%.

5. Non-condensible TRS gases from several sources at the mill will be incinerated in the new kiln. These sources will consist of the following:
    - * Batch digesters
    - * Kamyr digesters
    - * No. 5 Multiple Effect Evaporators
    - * No. 6 Multiple Effect Evaporators

   Non-condensible TRS gases from the No. 6 Multiple Effect Evaporator system are currently incinerated in the No. 3 Lime Kiln. The other TRS sources identified above currently vent directly to the atmosphere. The incineration of non-condensible TRS gases from these sources will result in full compliance with the State of Florida TRS rules.

6. The two existing causticizing lime bins, currently uncontrolled, will be replaced by two new causticizing lime bins, each controlled by a dust filter. One lime bin (Lime Bin #1) will receive lime from the kiln by bucket elevator, and will also receive purchased lime by truck through pneumatic conveyors. The filter on this lime bin will also be used to control particulate emissions from the lime conveyor and bucket elevator. Three pick-up points are provided to maintain a negative draft on the conveying system. The second

lime bin (Lime Bin #2) will receive lime from trucks and railcars. This lime bin is also controlled by a filter. Lime from the lime bins will be transferred to the lime slakers through an enclosed system.

A plot plan of the CCA mill, depicting the location of the new lime kiln and causticizing system, is presented in Figure A-2.

This air construction permit application addresses the new No. 4 Lime Kiln. In addition, a Prevention of Significant Deterioration (PSD) source applicability analysis is presented, which quantifies emissions of regulated pollutants from the new sources and from the existing sources which will be shut down. A companion air construction permit application addresses minor source emissions from the proposed project.

II. PSD SOURCE APPLICABILITY DETERMINATION

The CCA plant is an existing major stationary source under PSD regulations since it currently emits regulated pollutants in quantities greater than 100 tons per year (TPY). As described in Section I, the proposed project will involve construction of new facilities and shutdown of certain existing equipment. Estimated emissions from the proposed No. 4 Lime Kiln are presented in Attachment B. Attachment A of the companion air construction permit application provides estimated emissions for other equipment associated with the project (i.e., lime bins and slakers). The emission offsets provided by the existing sources to be shut down are detailed in Attachment C of this application. Emission estimates for those sources to be shutdown are based upon actual operation during years 1986 and 1987. Emission estimates for new sources are based upon maximum anticipated operating rates. Documentation supporting all calculations, emission factors, and assumptions in arriving at the emissions estimates are presented in the attachments.

Presented in Table A-1 is a summary of the contemporaneous emission increases and decreases at the CCA plant for the new sources and

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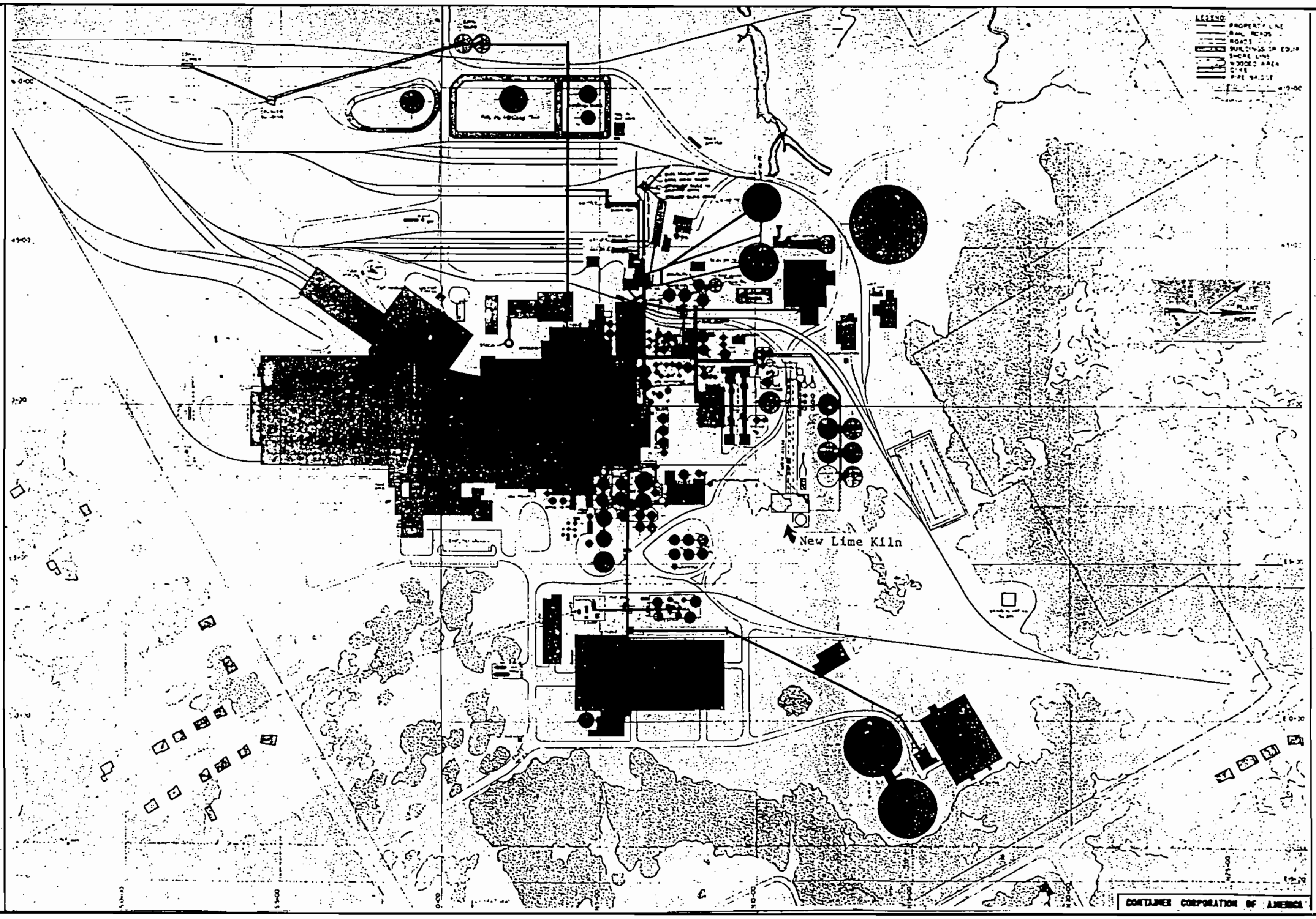


Figure A-2. Plot Plan of CCA Mill

KBN

sources to be shutdown. There have been no other contemporaneous increases occurring over the last five years at CCA. As shown in Table A-1, the net emissions change due to the proposed project does not trigger PSD new source review. Unused contemporaneous emissions reductions remain for several pollutants which are available for future use by CCA.

III. NSPS APPLICABILITY

The new lime kiln is subject to and will comply with NSPS under 40 CFR 60, Subpart BB. The kiln is subject to the following emission limitations under NSPS.

Particulate matter	0.13 gr/dscf, corrected to 10 percent oxygen, for liquid fossil fuel burning.
Total reduced sulfur	8 ppm by volume on a dry basis, corrected to 10 percent oxygen.

CCA will comply with the NSPS requirements to:

1. Install, calibrate, maintain, and operate a TRS continuous emissions monitor and an oxygen monitor for the lime kiln exhaust gases. The monitors will be located downstream of the control device for the lime kiln [40 CFR 60.284(a)(2)].
2. Perform daily TRS emission rate calculations and report any excess emissions based upon 40 CFR 60.284.
3. Utilize current particulate matter and TRS test methods as specified in FAC Chapter 17-2.
4. Install stack sampling access and ports for the No. 4 Lime Kiln in conformance with FAC Chapter 17-2.700(4).

Table A-1. Summary of Net Emissions, Container Corporation of America Causticizing Project

Source	Annual Emissions (TPY)						
	PM	PM10	SO_2	TRS	CO	NO_x	VOC
<u>PSD SIGNIFICANCE LEVEL</u>	25	15	40	10	100	40	40
EMISSIONS FROM EXISTING <u>SOURCES TO BE SHUT DOWN</u>							
No. 2 and 3 Lime Kilns	156.5	153.9	111.4	280.7	25.7	835.9	27.0
Kiln Leaks	23.7	4.0	-	-	-	-	-
Slakers	9.4	8.8	-	-	-	-	-
Lime Conveying, Transfer & Storage	16.5	6.0	-	-	-	-	-
Subtotal	206.1	172.7	111.4	280.7	25.7	835.9	27.0
TOTAL EMISSIONS AVAILABLE FOR NEW SOURCES WITHOUT CAUSING PSD REVIEW	231.1	187.7	151.4	290.7	125.7	875.9	67.0
<u>PROPOSED NEW SOURCES</u>							
No. 4 Lime Kiln	190.5	168.6	117.4	11.5	29.9	822.1	44.9
Kiln Leaks	3.9	0.7	-	-	-	-	-
Lime Slakers	8.8	8.3	-	-	-	-	-
Lime Bin #1	5.3	5.3	-	-	-	-	-
Lime Bin #2	3.2	3.2	-	-	-	-	-
Subtotal	211.7	186.1	117.4	11.5	29.9	822.1	44.9
UNUSED CONTEMPORANEOUS EMISSIONS REDUCTIONS <u>AVAILABLE FOR FUTURE USE</u>	19.4	1.6	34.0	279.2	95.8	53.8	22.1

The sources included in the companion permit application will have controls as described in the application, which will meet applicable standards and will be tested with appropriate methods if required by FDER. Total particulate emissions from these sources are insignificant (17.3 TPY). It is therefore expected that routine testing will not be required for these sources.

IV. DERIVATION OF PROCESS RATE

Basis: Maximum Product rate = 630 TPD lime product (dry)
= 26.25 TPH = 52,500 lb/hr (dry)

To be conservative, assume the product is 100 percent CaO and all dust lost is recycled back into the kiln.

Calculate lime mud feed/ton product:
2,000 lb lime/ton product x (100 lb $CaCO_3$/56 lb CaO)
= 3,571.4 lb lime mud feed/ton product

Lime mud feed = 26.25 TPH product x 3,571.4 lb feed/ton product
= 93,749 lb/hr (dry)
= 46.87 TPH (dry)

ATTACHMENT B

EMISSION CALCULATIONS

PROPOSED NEW LIME KILN

I. PARTICULATE MATTER

A. PM(TSP)

PM(TSP) represents total particulate matter emissions from the lime kiln. The NSPS for lime kilns at kraft pulp mills (40 CFR 60, Subpart BB) is 0.130 gr/dscf, corrected to 10% O_2, when burning fuel oil. The NSPS level will not be exceeded by the new kiln. In addition, mass PM(TSP) emissions from the kiln will not exceed 43.5 lb/hr at any time.

Annual PM(TSP) emissions are calculated as follows:

43.5 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 190.5 TPY

B. PM10

PM10 emissions represent that fraction of PM(TSP) which has an aerodynamic particle size diameter of 10 um and less. AP-42, Section 10.1, Chemical Wood Pulping (10/86), contains information related to PM10 emissions from lime kilns controlled by an electrostatic precipitator. The AP-42 data show that PM10 emissions represent 88.5% of PM(TSP) emissions.

Maximum hourly emissions = 43.5 lb/hr x 0.885 = 38.5 lb/hr
Maximum annual emissions = 190.5 TPY x 0.885 = 168.6 TPY

II. TOTAL REDUCED SULFUR

Maximum emissions are based upon the NSPS for lime kilns at kraft pulp mills (40 CFR 60, Subpart BB): 8 ppm by volume, dry basis, corrected to 10% O_2.

Maximum flue gas flow rate at maximum lime production rate of 630 TPD (26.25TPH)

= 79,500 acfm @ 325°F (785°R), 25% H_2O, 4% - 6% O_2

Correct to dscfm: 79,500 (1-0.25)(528°R/785°R) = 40,105 dscfm

Equate NSPS level at 10% O_2 to actual oxygen level in exhaust gases:

$C_{corr} = C_{act}$ [(21 - X)/(21 - Y)]

X = corrected O_2 = 10%

Y = actual O_2 = 4% (minimum O_2 results in maximum concentration)

$C_{corr} = C_{act}$ [(21-10)/(21-4)] = 0.647 C_{act}

$C_{act} = C_{corr}/0.647$

C_{act} = 8 ppm/0.647 = 12.4 ppm

Maximum flow rate = 40,105 dscfm

PVC = mRT   m = PVC/RT

R = 1,545 ft-lb_f/lb_{mole}-°R

Molecular weight TRS (as H_2S) = 34 lb_m/lb_{mole}

R = 45.44 ft-lb_f/lb_m-°R

C = 12.4 ppm

$$m = \frac{2116.8\ lb_f}{ft^2} \times \frac{40{,}105\ ft^3}{min} \times \frac{12.4}{10^6} \times \frac{lb_m\text{-}^{\circ}R}{45.44\ ft\text{-}lb_f} \times \frac{1}{(528)^{\circ}R} \times \frac{60\ min}{hr}$$

= 2.63 lb/hr TRS as H_2S

2.63 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 11.52 TPY TRS as H_2S

III. SULFUR DIOXIDE

The new lime kiln will incorporate several features that will result in greater absorption of SO_2 within the kiln, as compared to the existing lime kiln. These features include:

- A much greater length to diameter ratio (27.1 for the new kiln versus 14.8 for the existing kilns), which provides increased surface area of lime mud exposed to the kiln gases.
- Improved tumblers in the new kiln, also providing increased exposure of kiln gases to the material in the kiln.
- Increased retention time of material in the kiln (4 hours on the new kiln versus 2 hours on the existing kilns), thereby increasing the time available for SO_2 absorption.

* Increased energy efficiency of the new kiln (6.5×10^6 Btu/ton lime for the new kiln versus 9.5×10^6 Btu/ton lime on the existing kilns).

Based upon these design considerations, it is expected that the new kiln will achieve lower SO_2 emissions than the existing kilns on a per ton of lime produced basis. An SO_2 emission factor of 0.2 lb/ton ADP produced is considered a maximum for the new kiln, compared to 0.3 lb/ton ADP for the existing kilns.

The digesting systems at CCA are designed for a total pulp production of 3,210 TPD ADP (1,391 TPD from the batch digester and 1,819 TPD from the Kamyr digester).

Maximum hourly SO_2 = 3,210 TPD / 24 hr/day x 0.2 lb/ton
= 26.8 lb/hr

26.8 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 117.4 TPY

IV. NITROGEN OXIDES

Emissions of NO_x from the new kiln were based upon the same emission factor equation as used to calculate NO_x from the existing lime kilns. The equation was taken from a study performed by NCASI on lime kilns at pulp mills. The study found a linear relationship between NO_x emissions and combustion zone temperature over the range of 1,850°F to 2,250°F. The relationship is expressed according to the following equation:

$$\text{lb } NO_x/10^6 \text{ Btu} = [2.17 \times 10^{-3} \times T(^\circ F)] - 3.58$$

For a more complete discussion of this study and the applicability of the emission factor equation, refer to Attachment C regarding NO_x emission estimates for the existing kilns at CCA.

The design combustion zone temperature for the new lime kiln is 2,150°F. Substituting this temperature into the above equation yields an emission factor of 1.1 lb/10^6 Btu. Heat input to the new kiln will be a maximum of 170.63×10^6 Btu/hr, based upon a maximum lime production rate of 630 TPD (26.25 TPH) and a maximum heat rate of 6.5×10^6 Btu/ton of lime produced.

Maximum hourly NO_x emissions = 170.63×10^6 Btu/hr x 1.1 lb/10^6 Btu
= 187.7 lb/hr

Maximum annual NO_x = 187.7 lb/hr x 8,760 hr/yr / 2,000 lb/ton
= 822.1 TPY

V. CARBON MONOXIDE

Maximum annual emissions of CO from the new lime kiln were based upon the same emission factor used to estimate CO from the existing kilns (0.04 lb/10^6 Btu). This factor was taken from an NCASI study on CO emissions from lime kilns at pulp mills (Technical Bulletin No. 416) and represents an average emission level. It is therefore considered appropriate for annual emission calculations.

Maximum annual heat input to kiln
= 170.63×10^6 Btu/hr x 8,760 hr/yr
= 1.495×10^{12} Btu/yr

Annual emissions
= 1.495×10^{12} Btu/yr x 0.04 lb/10^6 Btu / 2,000 lb/ton
= 29.9 TPY

The maximum 1-hour CO emission rate measured during the NCASI study on the two kilns where adequate data were obtained (Kilns A and B) was approximately 3.0 lb/ton lime produced. This emission factor and the maximum lime production rate of 26.25 TPH was used to estimate the maximum 1-hour CO emission rate from the new kiln.

26.25 TPH lime x 3.0 lb/ton = 78.8 lb/hr

VI. VOLATILE ORGANIC COMPOUNDS

Maximum emissions of VOC from the new kiln were based upon a NCASI study (Technical Bulletin No. 358, "A Study of Kraft Process Lime Kiln Total Gaseous Non-Methane Organic Emissions"). Of the three kilns tested in this study, Kilns A and C were considered most representative of the proposed new lime kiln. All three kilns were equipped with wet scrubbers for particulate control. Kilns A and C used fresh water, but Kiln B had high organic levels in the lime mud and scrubber water. Kiln B burned only natural gas, while Kiln A burned oil and gas and

Kiln C burned only oil. Thus, Kiln B emissions were considered unrepresentative of the proposed CCA kiln.

Kilns A and C exhibited average VOC emissions of 0.060 and 0.024 lb/10^6 Btu, respectively. The higher level of 0.060 lb/10^6 Btu was used to estimate annual emissions from the new kiln.

1.495 x 10^{12} Btu/yr x 0.060 lb/10^6 Btu / 2,000 lb/ton = 44.9 TPY

The maximum 1-hour VOC emission rate was based upon the highest measured emission rate when burning oil in either Kiln A or C from the NCASI study. This emission rate was 0.089 lb/10^6 Btu.

Maximum heat input for new kiln = 170.63 x 10^6 Btu/hr

170.63 x 10^6 Btu/hr x 0.089 lb/10^6 Btu = 15.2 lb/hr

VII. KILN LEAKS

A. PM(TSP)

The seals at the ends of the new kiln and at the I.D. fan will be much improved over those on the existing kilns. For the existing kilns, kiln leaks were estimated to be 1/1000 of the total air flow from the kiln. Air leakage from the new kiln is estimated to be at least a factor of 10 lower than the existing kilns, or 1/10,000 of the total air flow through the new kiln.

Maximum air flow through new kiln = 40,105 dscfm

Maximum kiln air leakage = 40,105 / 10,000 = 4 dscfm

Kiln outlet dust loading = 26 gr/dscf

PM(TSP) emissions = 4 dscfm x 26 gr/dscf / 7,000 gr/lb x 60 min/hr
= 0.89 lb/hr

0.89 lb/hr x 8,760 hr/hr / 2,000 lb/ton = 3.9 TPY

B. PM10

PM10 emissions represent that fraction of PM(TSP) which has an aerodynamic particle size diameter of 10 um and less. AP-42, Section 10.1, Chemical Wood Pulping (10/86), contains information related to uncontrolled emissions from lime kilns. The AP-42 data show that PM10 emissions represent 16.8% of uncontrolled PM(TSP) emissions.

0.89 lb/hr x 0.168 = 0.15 lb/hr

3.9 TPY x 0.168 = 0.7 TPY

ATTACHMENT C

ESTIMATION OF CONTEMPORANEOUS EMISSIONS REDUCTIONS FROM EXISTING SOURCES TO BE SHUTDOWN

Rationale for Selection of Representative Period

Actual emissions from existing sources to be shutdown must be determined in order to define the contemporaneous creditable emission reduction from these sources. "Actual emissions" is defined in Florida Administrative Code (FAC), Chapter 17-2.100(2) as:

> The actual rate of emission of a pollutant from a source as determined in accordance with the following provisions:
>
> a) In general, actual emissions as of a particular date shall equal the average rate, in tons per year, at which the source actually emitted the pollutant during a two-year period which precedes the particular date and which is representative of the normal operation of the source.
>
> The Department may allow the use of a different time period upon a determination that it is more representative of the normal operation of the source. Actual emissions shall be calculated using the source's actual operating hours, production rates and types of materials processed, stored, or combusted during the selected time period.

In the proposed CCA project, the existing lime kilns and causticizing system will be shut down when the new lime kiln and new causticizing system are fully operational. Therefore, the most recent two years of operation for these sources were reviewed to determine if this time period is "representative of the normal operation of the source."

The CCA mill in Fernandina Beach produces linerboard. In order to determine a representative time period which reflects actual emissions from the existing lime kilns and causticizing system, linerboard production records were reviewed. Lime kiln operation will generally parallel linerboard production, although this may deviate somewhat from year to year due to lime kiln availability, volume of purchased lime and other mill operating parameters. Linerboard production at CCA for 1984 through 1986, and the projected 1987 production (based upon actual production through September 1987), are presented below:

Year	Linerboard Production (Avg.TPD)	(Total Tons)
1984	1748	638,020
1985	1331	485,815
1986	1715	625,975
1987	2035	742,897

As indicated, 1984 and 1986 were similar in terms of production, while 1985 was a low production year. The low production in 1985 was due to two paper machines being down; therefore, 1985 is considered unrepresentative of normal source operation.

A significant increase in production has occurred in 1987 due to favorable market conditions. Based upon plant production, 1987 is considered the most representative year indicative of current actual emissions. Therefore, the year 1987 was used as the basis of actual emissions for the existing lime kilns and causticizing system. However, for many of the calculations, data from calendar year 1986 were used because 1987 data were not yet available.

I. EXISTING LIME KILNS

A. Particulate Matter (TSP)

Actual particulate matter (total suspended particulate) [PM(TSP)] emissions from No. 2 and No. 3 Lime Kilns were reported in the 1986 Annual Operation Report to be 73 TPY and 83.5 TPY, respectively, for a total of 156.5 TPY from both kilns.

B. Particulate Matter (PM10)

Emissions of particulate matter having aerodynamic particle size diameters of 10 um and less (PM10) were estimated based upon particle sizing data contained in USEPA Publication AP-42, Section 10.1, Chemical Wood Pulping (10/86). AP-42 presents information which shows that lime kilns with venturi scrubbers produce PM emissions with 98.3% of the mass having particle sizes of 10 um or less. The existing kilns at CCA are controlled by venturi scrubbers. Based upon this information, PM10 emissions were estimated as follows:

No. 2 Lime Kiln - 73.0 TPY x 0.983 = 71.8 TPY
No. 3 Lime Kiln - 83.5 TPY x 0.983 = 82.1 TPY
Total = 71.8 + 82.1 = 153.9 TPY

C. Total Reduced Sulfur (TRS)

Two approaches were used to estimate actual TRS emissions from the No. 2 and No. 3 Lime Kilns. The first approach uses the published TRS emission factor for lime kilns, USEPA Publication AP-42, "Compilation of Air Pollutant Emission Factors" Fourth Edition, (updated through Supplement A, October 1986). The AP-42 factor, from Section 10.1, Chemical Wood Pulping, is in terms of lb/ton of air dried unbleached pulp (ADUP). A factor of 0.5 lb/ton for H_2S and 0.2 lb/ton for RSH is given for lime kilns (applicable to lime kilns with wet scrubbers for PM control). Adding these two factors together yields a TRS emission factor of 0.7 lb/ton. Since this factor is in terms of tons of ADUP produced by the mill, applying the factor yields the total TRS emissions from both lime kilns at the mill. Using the 1987 production data, actual TRS emissions are calculated as follows:

742,897 tons/yr ADUP x 0.7 lb/ton / 2,000 lb/ton = 260.0 TPY

The second approach utilized measurements of TRS emissions conducted by CCA on the lime kilns. These tests have indicated from 200 ppm to 600 ppm TRS in the kiln exhaust gases. Using gas flow rate data from the most recent (January 1987) PM compliance tests conducted on the kilns, actual TRS emissions were calculated in terms of lb/ton of lime mud input. For purposes of this calculation, a TRS level of 300 ppm was assumed, although the test data indicate TRS levels can range up to 600 ppm. The TRS emission factor calculated from the compliance tests was then applied to the 1986 annual lime mud input to each kiln.

The calculation is based upon the ideal gas relationship: PVC = mRT

m = PVC/RT

where, P = 2,116.8 lb_f/ft^2

V = volume of gas (acfm)

m = mass of TRS (lb/hr)

C = concentration of TRS (300 ppm)

R = ideal gas constant, which for TRS (as H_2S) is (1545/34) $ft\text{-}lb_f/lb_m\text{-}{}^oR$

T = temperature of gas (^oR)

Compliance Test Data

Lime Kiln	Test Date	Lime Mud (TPH)	Gas Flow (acfm)	Gas Temp. (^oF)	TRS Emissions (lb/hr)	TRS Emissions (lb/ton)
2	1-15-87	12.7	24,639	159	33.4	2.63
3	1-27-87	18.1	27,901	166	37.4	2.07

Actual TRS emissions:

No. 2 L.K. - 108,264 TPY lime mud x 2.63 lb/ton / 2,000 lb/ton = 142.4 TPY

No. 3 L.K. - 133,632 TPY lime mud x 2.07 / 2,000 = 138.3 TPY

Totals - 142.4 + 138.3 = 280.7 TPY

This level of TRS emissions based upon 300 ppm TRS is in good agreement with emissions calculated from the AP-42 factor. The emissions based upon the TRS test results were therefore used as the appropriate estimate of actual TRS emissions from the kilns.

D. Sulfur Dioxide (SO_2)

Actual emissions of SO_2 were based upon emission factors in AP-42, Section 10.1, Chemical Wood Pulping (10/86). A factor of 0.3 lb/ton ADUP is given for lime kilns. This factor is based upon plant production, and therefore represents the total from all lime kilns at the plant. Applying this factor to the 1987 production data yields the following:

742,897 tons/yr ADUP x 0.3 lb/ton / 2,000 lb/ton = 111.4 TPY

E. Nitrogen Oxides (NO_x)

Emission factors for NO_x emissions from lime kilns are not presented in AP-42, Section 10.1, Chemical Wood Pulping. However, NCASI has conducted a study of NO_x emissions from lime kilns at pulp mills (Technical Bulletin No. 107). This bulletin was reviewed to determine an appropriate NO_x emission factor for the kilns at CCA.

Lime kilns at five (5) sites were studied by NCASI. The Site 1 and Site 2 lime kilns were oil fired and had rated capacities of 138 TPD lime and 250 TPD lime, respectively. CCA's lime kilns are also oil fired, and No. 2 Lime Kiln's capacity (approximately 135 TPD lime) is nearly identical to the kiln at Site 1. The No. 3 Lime Kiln's capacity (approximately 230 TPD lime) is nearly identical to the kiln at Site 2. The Site 1 lime kiln exhibited average NO_x emissions of 0.85 lb/10^6 Btu heat input, while the Site 2 kiln exhibited average emissions of 0.155 lb/10^6 Btu.

A study of the relationship between NO_x emissions and combustion zone temperature was conducted on the kiln at Site 5. This kiln was gas fired and had a rated capacity of 125 TPD lime. The kiln exhibited a mean NO_x emission rate of 0.78 lb/10^6 Btu with a mean combustion zone temperature of 2053°F. NO_x emissions were found to vary linearly with combustion zone temperature over the range of 1850°F to 2250°F, according to the following equation:

$$\text{lb } NO_x/10^6 \text{ Btu} = [2.17 \times 10^{-3} \times T(^{\circ}F)] - 3.58$$

A high correlation coefficient of 0.965 was obtained based on the data.

The combustion zone temperature in the lime kilns at CCA are strictly maintained between 2250°F and 2300°F. Substituting the lower temperature into the above equation yields an NO_x emission rate of 1.30 lb/10^6 Btu.

The combustion zone temperatures of the kilns at Sites 1 and 2 of the NCASI study were not measured, thus no conclusion can be drawn concerning the representativeness of the NO_x emission rates measured from these two kilns. However, the dynamics of thermal NO_x generation demonstrate that NO_x emissions increase with increasing combustion zone temperature. In addition, an oil fired kiln will produce additional NO_x emissions from the nitrogen in the fuel oil as compared to natural gas fuel, which contains essentially no nitrogen. Because of this consideration and the indicated strong correlation of NO_x emissions with combustion zone temperature, the NO_x emission factor of 1.30 lb/10^6 Btu calculated using the equation developed by NCASI based upon gas firing was considered to be the most representative factor for the CCA kilns.

Heat input rates for the existing kilns at CCA were based upon recent fuel usage data for the kilns. In late 1986, an improved computerized kiln control system was installed which provides much better measurement of fuel burned in the kilns. The recent data show that the heat rate of the existing kilns averages 9.5×10^6 Btu/ton lime produced.

Actual NO_x emissions from the kilns are estimated based upon the measured heat rate, actual 1986 lime production, and the emission factor of $1.3 \text{ lb}/10^6$ Btu:

Lime Production -	No. 2 Lime Kiln =	60,530 tons
	No. 3 Lime Kiln =	74,797 tons
	Total =	135,327 tons

Total Heat input to Kilns = 135,327 tons x 9.5×10^6 Btu/ton
= 1.286×10^{12} Btu

NO_x emissions = 1.286×10^{12} Btu x $1.3 \text{ lb}/10^6$ Btu / 2,000 lb/ton
= 835.9 TPY

F. Carbon Monoxide (CO)

CO emissions from the No. 2 and No. 3 Lime Kilns were based upon NCASI Technical Bulletin No. 416, "Carbon Monoxide Emissions from Selected Combustion Sources Based on Short-Term Monitoring Records" (January 1984). This publication presented CO emission data from two lime kilns operating at pulp mills. Emissions from the two kilns were very similar, averaging 0.038 and $0.041 \text{ lb}/10^6$ Btu heat input. Based upon this information, a CO emission factor of $0.04 \text{ lb}/10^6$ Btu heat input was used to calculate actual emissions from CCA's two lime kilns.

Total heat input to kilns (see NO_x calculations)
= 1.286×10^{12} Btu

1.286×10^{12} Btu x $0.04 \text{ lb}/10^6$ Btu / 2,000 lb/ton = 25.7 TPY

G. Volatile Organic Compounds (VOC)

AP-42 does not contain a VOC emission factor for lime kilns. However, NCASI conducted a study of VOC (non-methane) emissions from kraft process lime kilns (Technical Bulletin No. 358, September 1981). Three kilns were tested - Kiln A and Kiln C were most like the existing kilns at CCA. Kiln A had a rated capacity of 106 TPD lime, while Kiln C was rated at 245 TPD lime.

Both used fresh water in venturi scrubbers for PM control. Both kilns exhibited similar VOC emissions; 0.060 lb/10^6 Btu for Kiln A, and 0.024 lb/10^6 Btu for Kiln C. The average value from these kilns, 0.042 lb/10^6 Btu, was used as the basis for actual VOC emissions from the existing kilns at CCA. Based upon the total heat input calculated for the existing kilns (see NO_x calculations), VOC emissions are calculated as follows:

$$1.286 \times 10^{12} \text{ Btu} \times 0.042 \text{ lb}/10^6 \text{ Btu} / 2{,}000 \text{ lb/ton} = 27.0 \text{ TPY}$$

II. EXISTING KILN LEAKS

Inspection of the No. 2 and No. 3 Lime Kilns at CCA showed that leaks of exhaust gases occur at the cold end of the kilns, specifically at the kiln seal and the I.D. fan. Visible emissions of dust were observed at each of these points. Fugitive PM emissions were estimated for these leaks by first estimating the uncontrolled PM entrained in the exhaust gases, and then estimating the fraction of total kiln exhaust gases which leak through the seals and ductwork.

A. PM

Uncontrolled PM in the kiln exhaust gases were estimated using emission factors presented in AP-42, Section 8.15, Lime Manufacturing. This section presents an uncontrolled PM emission rate for rotary kilns of 350 lb/ton lime produced. Applying this factor to the total 1986 lime production from the two kilns yields the following:

No. 2 Lime Kiln production:	60,530 TPY
No. 3 Lime Kiln production:	74,797 TPY
Total:	135,327 TPY

Uncontrolled PM emissions:
135,327 TPY x 350 lb/ton / 2,000 lb/ton = 23,682 TPY

The exhaust flows from each kiln is approximately 14,000 dscfm. It is estimated that the kiln leaks accounted for at least 1/1000 of the total gas flow, or 14 dscfm from each kiln. Therefore, the total fugitive PM emissions due to kiln leaks are 1/1000 of the total uncontrolled PM emissions entrained in the exhaust gas stream:

23,682 TPY / 1,000 = 23.7 TPY

B. PM10

AP-42, Section 10.1, Chemical Wood Pulping, presents particle size data for lime kilns. This section states that 16.8% of uncontrolled PM emissions from lime kilns are less than 10 um in diameter. Based upon this information, PM10 emissions due to kiln leaks were estimated as follows:

23.7 TPY x 0.168 = 4.0 TPY

III. EXISTING LIME SLAKERS

There are two slakers at the CCA mill. These slakers are atmospheric hydrators and are uncontrolled. All lime produced from the two lime kilns is hydrated in the slakers. In addition, purchased lime is also processed by the hydrators.

A. PM

AP-42, Section 8.15, Lime Manufacturing, presents a PM emission factor of 0.1 lb/ton lime produced for atmospheric hydrators, or 0.125 lb/ton of lime feed to the hydrator. The emission factor based upon lime feed was used to estimate current actual emissions from the slakers. Lime production from the lime kilns in 1986, and actual purchased lime amounts for 1986 were also used.

Lime production - No. 2 Lime Kiln:	60,530 TPY
Lime production - No. 3 Lime Kiln:	74,797 TPY
Purchased lime:	14,641 TPY
Total:	149,968 TPY

149,968 TPY x 0.125 lb/ton / 2,000 lb/ton = 9.4 TPY

B. PM10

Information related to the particle size distribution of PM emissions from slakers was not found in the available literature. Therefore, Appendix C.2 of AP-42 (10/86), Generalized Particle Size Distributions, was reviewed and was found to contain general particle size distribution data for hydration processes (Category 9). The particle size data indicates that PM10 emissions constitute approximately 94% of total PM emissions from hydration processes. These data are considered to be the best currently available to estimate PM10 emissions from the lime slakers. The calculation of PM10 emissions, based upon the total PM emissions, is presented below:

9.4 TPY x 0.94 = 8.8 TPY

IV. EXISTING LIME BINS - CONVEYING, TRANSFER AND STORAGE

The CCA mill has two lime bins servicing the existing causticizing system. The No. 2 Lime Kiln has one lime bin, and the No. 3 Lime Kiln has one lime bin. The No. 3 Lime Kiln lime bin also receives all purchased lime. Visual inspection of the conveying, transfer and storage of lime from the kilns to the lime bins revealed several sources of fugitive dust. These sources, along with control systems (typically only enclosures), are identified below. The relative dustiness as observed from visible emissions of each source is indicated:

Source	Control Technology	Relative Dustiness	Estimated Control Efficiency
No. 2 Lime Kiln			
Kiln discharge	Enclosure	some dust observed	80%
Pan elevator transfer to bucket elevator	Enclosure	some dust observed	80%
Bucket elevator transfer to lime bin load chute	Enclosure	very dusty	70%
Lime Bin	Enclosure	no visible dust	90%
No. 3 Lime Kiln			
Kiln Discharge	Enclosure	some dust observed	80%
Pan elevator transfer to bucket elevator	Enclosure	very dusty	70%
Bucket elevator transfer to lime bin load chute	Enclosure	some dust observed	80%
Lime bin	Enclosure	no visible dust	90%
Purchased lime loading to lime bin	Enclosure	no visible dust	90%

The estimated control efficiencies presented above are based upon several literature sources which report that enclosures applied to material transfer operations result in control efficiencies ranging from 70% to 90% (refer to "Workbook on Estimation of Emissions and Dispersion Modeling for Fugitive Particulate Sources," Environmental Research & Technology, Inc., 1981).

Where no visible dust was observed, the control efficiency was assumed to be 90%; where some dust was observed, an efficiency of 80% was assumed; and for sources which were observed to be very dusty, a 70% efficiency was assumed.

Estimation of PM fugitive dust emissions from the lime transfer operations were performed using the generalized emission factor equation for a continuous drop operation contained in AP-42, Section 11.2.3, Aggregate Handling and Storage Piles.

The recommended equation for a continuous drop operation is as follows:

$$E = k\ (0.0018)\ \frac{\frac{s}{5}\ \frac{U}{5}\ \frac{H}{10}}{\left(\frac{M}{2}\right)^2}\ \text{lb/ton}$$

where,

E = emission factor
k = particle size multiplier
s = material silt content (%)
U = mean wind speed (mph)
H = drop height (ft)
M = material moisture content (%)

The particle size multiplier, k, is 1.0 for total suspended particulate [PM(TSP)], and 0.37 for PM10. The moisture content (M) and silt content(s) of lime produced from the kilns is 0.5% and 60%, respectively. The mean wind speed, U, in Jacksonville is 8.6 mph. For each of the transfer operations, a drop height of 5 feet was used. This is appropriate for all of the transfer points except the discharge from the load chute to the lime bin, where the drop height is on the order of 15 feet. However, the 5 foot height was used to conservatively estimate fugitive dust emission from this source.

Utilizing the above data, fugitive dust emission factors are calculated as follows:

$$PM(TSP) = 1.0\ (0.0018)\ \frac{\frac{60}{5}\ \frac{8.6}{5}\ \frac{5}{10}}{\left(\frac{0.5}{2}\right)^2} = 0.30\ \text{lb/ton}$$

$$PM10 = 0.37\ (0.0018)\ \frac{\frac{60}{5}\ \frac{8.6}{5}\ \frac{5}{10}}{\left(\frac{0.5}{2}\right)^2} = 0.11\ \text{lb/ton}$$

Fugitive PM and PM10 emissions from the existing causticizing system, based upon these factors and actual lime processed in 1986, are documented in Table C-3.

OLDFUGEM

Table C-3. Fugitive PM and PM10 Emissions From Existing Causticizing System

Source	Uncontrolled Emission Factor (lb/ton)	Control Efficiency (%)	Controlled Emission Factor (lb/ton)	Lime Processsed (TPY)	Fugitive Emissions (TPY)
			PM Emissions		
No. 2 Lime Kiln					
Kiln Discharge	0.30	80	0.0600	60,530	1.82
Pan elevator transfer to bucket elevator	0.30	80	0.0600	60,530	1.82
Bucket elevator transfer to Lime Bin load chute	0.30	70	0.0900	60,530	2.72
Lime Bin	0.30	90	0.0300	60,530	0.91
No. 3 Lime Kiln					
Kiln Discharge	0.30	80	0.0600	74,797	2.24
Pan elevator transfer to bucket elevator	0.30	70	0.0900	74,797	3.37
Bucket elevator transfer to Lime Bin load chute	0.30	80	0.0600	74,797	2.24
Lime Bin	0.30	90	0.0300	74,797	1.12
Purchased lime loading to Lime Bin	0.30	90	0.0300	14,641	0.22
				Total =	16.46
			PM10 Emissions		
No. 2 Lime Kiln					
Kiln Discharge	0.11	80	0.0220	60,530	0.67
Pan elevator transfer to bucket elevator	0.11	80	0.0220	60,530	0.67
Bucket elevator transfer to Lime Bin load chute	0.11	70	0.0330	60,530	1.00
Lime Bin	0.11	90	0.0110	60,530	0.33
No. 3 Lime Kiln					
Kiln Discharge	0.11	80	0.0220	74,797	0.82
Pan elevator transfer to bucket elevator	0.11	70	0.0330	74,797	1.23
Bucket elevator transfer to Lime Bin load chute	0.11	80	0.0220	74,797	0.82
Lime Bin	0.11	90	0.0110	74,797	0.41
Purchased lime loading to Lime Bin	0.11	90	0.0110	14,641	0.08
				Total =	6.03

ATTACHMENT D

CONTROL EQUIPMENT INFORMATION

I. PARTICULATE CONTROL

An electrostatic precipitator (ESP) has been chosen as the particulate control device because it can provide greater particulate control efficiency with much lower energy consumption than a venturi wet scrubber. Also, dry recycle of particulate fines from the ESP will reduce fossil fuel consumption in the kiln. The reduction in power consumption by the ESP will result in a reduction in pollutants generated to produce power. Operating costs will also be reduced.

Operating experience is provided from a lime kiln which recently began operating at Buckeye Cellulose in Perry, Florida. This 650-TPD lime kiln has an ESP for particulate control. Test results have demonstrated actual PM emissions to be well below the NSPS level, and demonstrates that such a control device can achieve the emission levels stated in this application.

The ESP vendor has not been selected. However, specific ESP design information will be submitted to FDER prior to beginning installation on the ESP. The following design specifications have been developed as the basis for vendor bids:

Fuel: No. 6 fuel oil with 3.0% (max) sulfur
Capacity: 630 TPD lime product

Flue Gas Flow (acfm)	79,500
(dscfm)	40,105
Flue Gas Temperature (^{o}F)	325
$\%H_2O$	25
$\%O_2$ (at stack)	4-6
Inlet Dust Loading (gr/dscf)	26

Construction: The ESP structure will be one chamber, three fields minimum, dry bottom, rigid frame, trough hopper and insulated to minimize condensation and prevent corrosion.

Control Efficiency:

The control efficiency calculation is based on not exceeding the maximum outlet mass emission rate with maximum inlet loading to the ESP.

Maximum outlet PM loading = 43.5 lb/hr
Maximum inlet loading = 26 gr/dscf.
Maximum inlet mass emissions based upon maximum flue gas flow rate:
40,105 dscfm x 60 min/hr x 26 gr/dscf / 7,000 gr/lb = 8,938 lb/hr
Efficiency = [(inlet-outlet)/inlet] x 100
= [(8,938 - 43.5)/8,938] x 100 = 99.5%

Guarantees:

Performance guarantees will assure control of particulate emissions not to exceed emissions as shown in this permit application. Test methods will be as specified in the current FAC Chapter 17-2.

II. TRS CONTROL

Control of TRS is based on good design and control of the causticizing process. Critical process parameters for TRS control are: good kiln combustion and good mud washing. This system design will provide the process control necessary to assure compliance with the 8 ppm-TRS standard, corrected to 10% O_2, on a continuing basis.

MUD WASHING

The existing two stage lime mud clarification system will be used for mud washing. This two stage process allows for sequential dilution and thickening of the lime mud solids to provide for reduced residual chemical content in the mud.

LIME MUD FILTERS

The new lime mud filters will be sized to assure good oxidation of the sulfides. Wash water will be clean hot water. Recycled fines from the ESP will bypass the lime mud filters and will go directly to the kiln feed in dry form. This reduces plugging of the filter caused by fine particles, thereby improving filter effectiveness. Also, some load is removed from the filter.

The filters will be designed for approximately 1,000 ft^2 surface area each. At the maximum lime production rate of 26.25 TPH, the lime mud feed rate to each filter will be approximately 22.2 TPH. This results in a maximum filter loading of about 0.5 tons/day/sq.ft.

INERTS

The new lime mud filters will free-up one existing tank which will be used to double the green liquor clarifier capacity and provide storage. Improved green liquor from filtering will contain a lower level of inerts and result in improved lime mud filterability. A lower level of inerts in the lime mud feed to the kiln results in lower TRS emissions from the kiln.

KILN COMBUSTION

Kiln design will include cold end temperature measurement. Improved seals will provide better control of air in-leakage resulting in better kiln combustion control. The new kiln is the latest energy efficient design.

OPERATING EXPERIENCE

Operating experience in good TRS control through process controls and good combustion in the lime kiln has been obtained at Buckeye Cellulose in Perry, Florida. Buckeye has recently installed a new causticizing system and lime kiln. Test data from this kiln show that the proposed control technology of good process controls and a lime kiln with ESP can achieve levels below the 8 ppm standard on a continuing basis.

Subcode 05

Receipt # 76195
V# 1214409
$100.00
AC 45-141878

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

DER
NOV 12 1987
BAQM

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Causticizing System/Lime Handling [X] New[1] [ ] Existing[1]

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

COMPANY NAME: Container Corporation of America COUNTY: Nassau

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) Lime Slakers/Lime Bins

SOURCE LOCATION: Street North 8th Street City Fernandina Beach

UTM: East (17) 456.2 North 3394.2

Latitude 30 ° 40 ' 53 "N Longitude 81 ° 27 ' 26 "W

APPLICANT NAME AND TITLE: Paul J. Magnell, General Manager

APPLICANT ADDRESS: North 8th Street, Fernandina Beach, Florida 32034

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Container Corporation of America

I certify that the statements made in this application for a ______ 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: Paul Magnell

Paul J. Magnell, General Manager
Name and Title (Please Type)

Date: 11-11-87 Telephone No. (904) 261-5551

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.

DAVID A. BUFF

Signed David A. Buff

David A. Buff
Name (Please Type)

KBN Engineering and Applied Sciences, Inc.
Company Name (Please Type)

P.O. Box 14288, Gainesville, Fla. 32604
Mailing Address (Please Type)

Florida Registration No. 19011 Date: 11/9/87 Telephone No. (904) 375-8000

SECTION II: GENERAL PROJECT INFORMATION

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

See Attachment A

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

Start of Construction March 1988 Completion of Construction November 1990

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.)

$4,000,000

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

Not Applicable

E. Requested permitted equipment operating time: hrs/day 24; days/wk 7; wks/yr 52;

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

F. 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. No
3. Does the State "Prevention of Significant Deterioriation" (PSD) requirement apply to this source? If yes, see Sections VI and VII. No
4. Do "Standards of Performance for New Stationary Sources" (NSPS) apply to this source? No
5. Do "National Emission Standards for Hazardous Air Pollutants" (NESHAP) apply to this source? No

H. 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.

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		
Lime to Slakers	Particulate	100	31,667	6,7
Green Liquor	NA	NA	59,941 (dry)	8,9
Lime to Lime Bin #1	Particulate	100	52,500	3
Lime to Lime Bin #2	Particulate	100	88,000	4,5

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

1. Total Process Input Rate (lbs/hr): Slakers - 91,608 lb/hr(dry) Lime Bins - 52,500 lb/hr
2. Product Weight (lbs/hr): Slakers - 91,608 lb/hr(dry) Lime Kiln - 52,500 lb/hr

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~~ hr	T/yr	
PM*	2.0	8.8	**	2.0	2.0	8.8	10,11
PM10*	1.9	8.3	NA	NA	1.9	8.3	10,11
PM	1.2	5.3	**	1.2	1.2	5.3	13
PM10	1.2	5.3	NA	NA	1.2	5.3	13
PM	0.74	3.2	**	0.74	0.74	3.2	12
PM10	0.74	3.2	NA	NA	0.74	3.2	12

[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).

* Total of both slaker scrubbers

** Maximum emission rate proposed by applicant is less than that allowed by 17-2 based on Process Weight Table regulation.

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)
Lime Bin Filter	Particulate	99%	Submicron and above	See Att. C.
Lime Bin Filter	Particulate	99%	Submicron and above	See Att. C
Slakers Scrubber	Particulate	90%	Submicron and above	See Att. C

E. Fuels Not Applicable

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

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

Fuel Analysis:

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 Not Applicable Maximum ______

G. Indicate liquid or solid wastes generated and method of disposal.

Dust captured by lime bin filters is discharged back into lime bin.

Scrubber water from slaker scrubbers is recycled into the second stage lime mud washer.

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

Stack Height: See Attachment C ft. Stack Diameter: ____ ft.

Gas Flow Rate: ____ ACFM ____ DSCFM Gas Exit Temperature: ____ °F.

Water Vapor Content: ____ % Velocity: ____ FPS

SECTION IV: INCINERATOR INFORMATION

Not Applicable

Type of Waste	Type O (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq.& Gas By-prod.)	Type VI (Solid By-prod.)
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

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)]
   SEE ATTACHMENT A
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach propose 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 use 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 wa made.
   SEE ATTACHMENT B
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
   SEE ATTACHMENT B
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.)
   SEE ATTACHMENT C
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).
   SEE ATTACHMENT C
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.
   ATTACHED
7. 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).
   ATTACHED
8. 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.
   ATTACHED

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

Not Applicable

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

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 operat
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:

F. 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

Not Applicable

A. Company Monitored Data

1. ________ no. sites ________ TSP ________ ( ) SO2* ________ 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. ____ 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^2	____________________	grams/sec

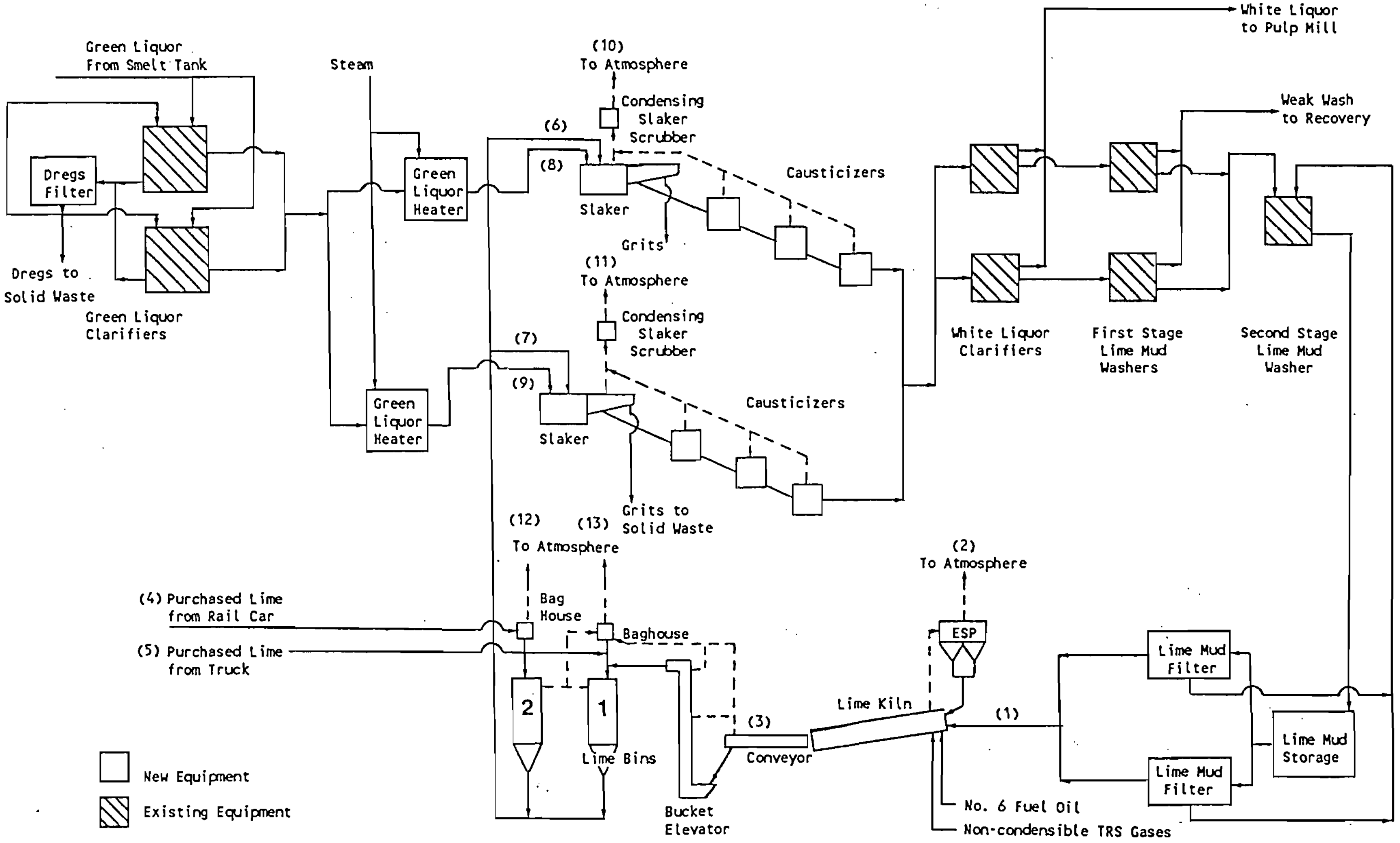
E. Emission Data Used in Modeling

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.

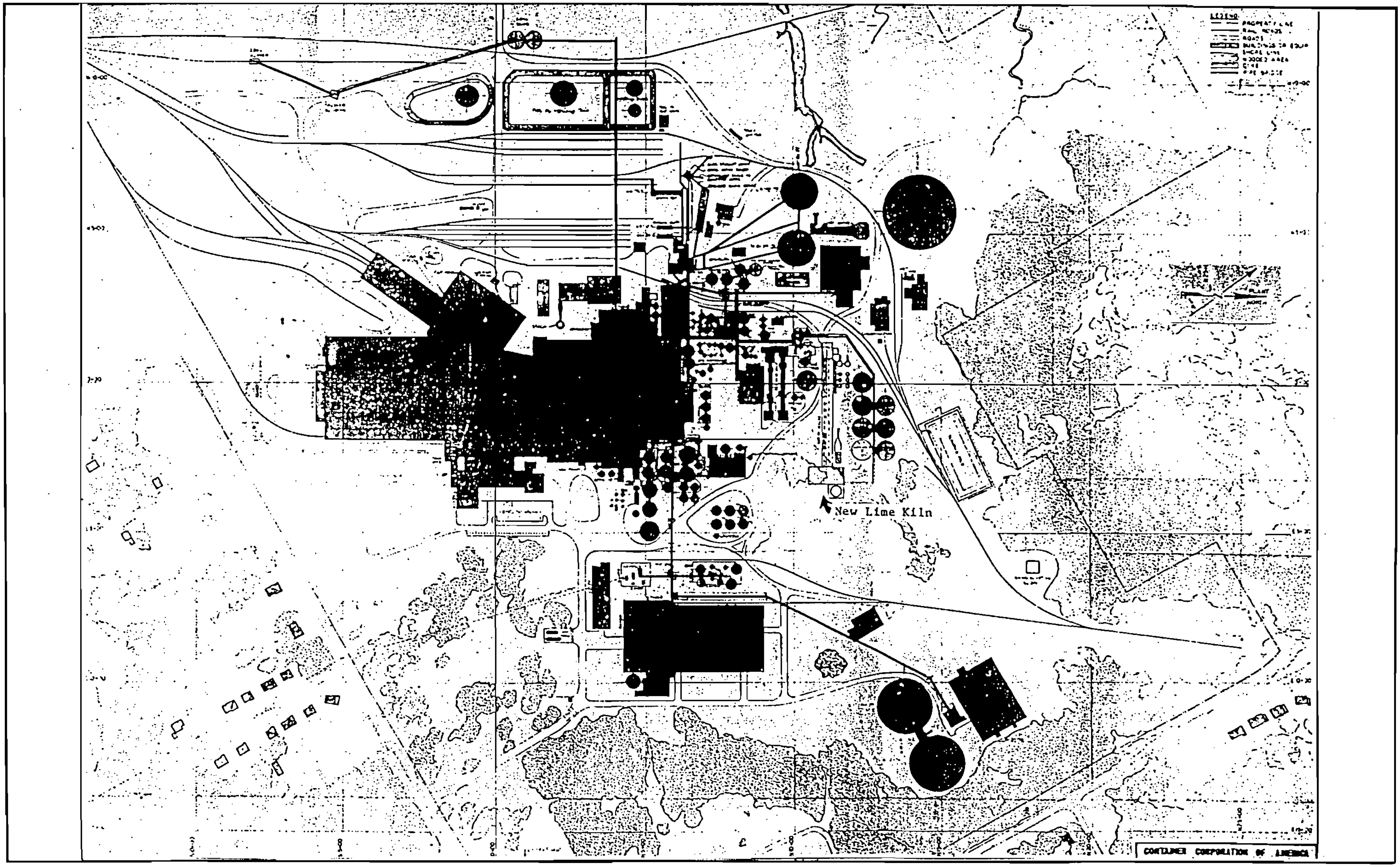
G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

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



Flow Diagram of Proposed CCA Causticizing System

BEST AVAILABLE COPY



Plot Plan of CCA Mill

KBN

ATTACHMENT A

PROCESS DESCRIPTION

Two new lime slakers will be constructed to replace the existing lime slakers at the CCA mill. The two slakers will be operated in parallel (see flow diagram Figure A-1). Lime product from the new lime bins will be conveyed to the slakers in an enclosed system. Green liquor from the existing green liquor clarifiers is added in the slakers.

Three new causticizers will also be constructed to serve each slaker. White liquor product from the new causticizers will be sent to the existing white liquor clarifiers.

Sources of air emissions associated with the causticizing system are the lime kiln, lime slakers, causticizers, lime bins and the bucket elevator associated with the lime kiln. Air emissions for the new lime kiln are addressed in a companion air permit application. The exhaust vents on the slaker and three causticizers within each line will be ducted to a scrubber for particulate control. The new lime bins will be controlled by filters.

The two new lime bins replace the existing lime bins and will support the new lime kiln. Lime Bin #1 will receive lime from the new lime kiln via a bucket elevator. This lime bin can also receive purchased lime by truck through pneumatic conveying. A filter on top of the lime bin will control particulate emissions from the silo as well as the bucket elevator and lime conveyor. Three air pickup points along the bucket elevator and lime conveyor will maintain a negative pressure on the lime conveying system to control particulate emissions.

The second lime bin constructed (Lime Bin #2) will receive only purchased lime by rail or truck. A filter located on top of the lime bin will control particulate emissions.

Dust collected by the filters on each lime bin will be placed back into the lime bins.

Emission calculations for the slaker scrubbers and lime bin filters are presented in Attachment B. Presented in Attachment C is control equipment information.

Process Rate Derivation

A. Lime Slakers

All figures are per slaker

Maximum design lime feed rate = 380 TPD

= 31,667 lb/hr

Green liquor solids rate:

Available lime = 88% of lime input

Based on molecular weights, 56 lb of available lime requires 106 lb of Na_2CO_3

Na_2CO_3 required = 31,667 lb/hr x 0.88 x 106/56

= 52,748 lb/hr

Total green liquor solids to slakers assumes 12% inerts =

52,748 / (1-0.12) = 59,941

Total input (dry) = 31,667 + 59,941 = 91,608 lb/hr

= 45.80 TPH

B. Lime Bins

1. Lime Bin #1

Maximum input rate is maximum production rate of kiln

= 26.25 TPH = 52,500 lb/hr

2. Lime Bin #2

Maximum lime loading rate from rail or truck

= 88,000 lb/hr

= 44.0 TPH

ATTACHMENT B

EMISSION CALCULATIONS

PROPOSED LIME SLAKERS AND LIME BINS

I. LIME BIN #1 FILTER

A. PM(TSP)

Maximum air flow through filter = 6,500 acfm @ 300°F
= 4,516 scfm

Maximum outlet grain loading = 0.03 gr/dscf

Maximum emissions = 4,516 scfm x 0.03 gr/dscf / 7,000 gr/lb x 60 min/hr
= 1.2 lb/hr

1.2 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 5.3 TPY

B. PM10

Based upon information presented in AP-42, Appendix C.2 (10/86), PM10 emissions from fabric filters represent at least 99.5% of total PM(TSP) emissions. To be conservative, it was assumed that all PM(TSP) are of the PM10 size category.

PM10 = 1.2 lb/hr, 5.3 TPY

II. LIME BIN #2 FILTER

A. PM(TSP)

Maximum air flow through filter = 3,000 acfm @ 90°F
= 2,880 scfm

Maximum outlet grain loading = 0.03 gr/dscf

Maximum emissions = 2,880 scfm x 0.03 gr/dscf / 7,000 gr/lb x 60 min/hr
= 0.74 lb/hr

0.74 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 3.2 TPY

B. PM10

As for the lime bin filter, the PM(TSP) emissions were assumed to be composed totally of the PM10 size category.

PM10 = 0.74 lb/hr = 3.2 TPY

III. LIME SLAKERS

A. PM(TSP)

Maximum PM(TSP) emissions will be 1.0 lb/hr per slaker

1.0 lb/hr x 8,760 hr/yr / 2,000 lb/ton = 4.4 TPY per slaker
= 8.8 TPY both slakers

B. PM10

Information regarding the particle size distribution of PM emissions from lime slakers was not found in the available literature. Appendix C.2 of AP-42 (10/86), Generalized Particle Size Distributions, contains general particle size distribution data for hydration processes (Category 9). This AP-42 section indicates that PM10 emissions constitute approximately 94% of total PM emissions from hydration processes. These data are considered to be the best currently available to estimate PM10 emissions from the new lime slakers. The calculation of PM10 emissions, based upon the total PM emissions, is presented below:

1.0 lb/hr x 0.94 = 0.94 lb/hr per slaker

8.8 TPY x 0.94 = 8.3 TPY both slakers

ATTACHMENT C

CONTROL EQUIPMENT INFORMATION AND STACK PARAMETERS

I. SLAKERS WET SCRUBBER DESIGN DATA

The vendor for the lime slakers scrubbers has not yet been selected. Therefore, generic (typical) design information is presented below for the scrubbers. The selected control equipment will be equal to or better than the generic design.

Scrubber type: direct contact condenser
Water pressure: 20-40 psig
Number of nozzles: 3 minimum
Water flow rate: 55 to 120 gpm
Water temperature: less than 90°F
Removal efficiency = 90% minimum
Maximum PM emissions from each slaker = 1.0 lb/hr

Slaker internal design will minimize dust carryover. Features which will be considered in the design include:

* Distance between lime feed chute and vent follow good engineering practice.

* Use of an internal dust baffle suspended from roof between lime feed chute and vent stack to reduce dust loading to vent.

* Maintain a submerged slaker impeller.

* Slaker design to minimize the vent volume required to keep the slaker under negative pressure.

* Low face velocity at the plenum of the slaker vent to minimize entrainment of dust in the exhaust gas stream.

After a specific vendor is chosen, and prior to construction of the scrubber, specific design information on the scrubber will be submitted to FDER.

II. LIME BIN FILTERS

The vendor for the two lime bin filters has not yet been selected. The selected filters will meet the design specifications presented below, or equivalent.

A. Lime Bin #1

Design flow rate = 6,500 acfm @ 300°F
= 4,516 scfm
Maximum out let grain loading = 0.03 gr/dscf
Filter area = 956 ft^2
Air to cloth ratio = 6.8:1
Cleaning method - pulse jet
Removal efficiency = >99%

B. Lime Bin #2

Design flow rate = 3,000 acfm @ 90°F
= 2,880 scfm
Maximum outlet grain loading = 0.03 gr/dscf
Filter area = 440 ft^2
Air to cloth ratio = 6.8 to 1
Cleaning method - pulse jet
Removal efficiency = >99%

Table C-1. Emission Stack Geometry and Flow Characteristics*

Emission Point	Stack Height (ft)	Stack Diameter (ft)	Gas Flow Rate (ACFM)	Gas Flow Rate (DSCFM)	Exit. Temp. (°F)	Water Vapor (%)	Exit Velocity (ft/s)
Slakers Stack	140	2.00	1,700	1,000	175	Saturated	9.0
Lime Bin #1	110	2.00	6,500	4,516	300	Ambient	34.5
Lime Bin #2	110	1.5	3,000	2,880	90	Ambient	28.3

* Final stack design for all stacks will be provided after vendor selection and prior to construction of the stack.

REFERENCES

EXCERPTS FROM AP-42 SECTIONS

10.1 CHEMICAL WOOD PULPING

10.1.1 General

Chemical wood pulping involves the extraction of cellulose from wood by dissolving the lignin that binds the cellulose fibers together. The four processes principally used in chemical pulping are kraft, sulfite, neutral sulfite semichemical (NSSC), and soda. The first three display the greatest potential for causing air pollution. The kraft process alone accounts for over 80 percent of the chemical pulp produced in the United States. The choice of pulping process is determined by the desired product, by the wood species available, and by economic considerations.

10.1.2 Kraft Pulping

Process Description[1] - The kraft pulping process (See Figure 10.1-1) involves the digesting of wood chips at elevated temperature and pressure in "white liquor", which is a water solution of sodium sulfide and sodium hydroxide. The white liquor chemically dissolves the lignin that binds the cellulose fibers together.

There are two types of digester systems, batch and continuous. Most kraft pulping is done in batch digesters, although the more recent installations are of continuous digesters. In a batch digester, when cooking is complete, the contents of the digester are transferred to an atmospheric tank usually referred to as a blow tank. The entire contents of the blow tank are sent to pulp washers, where the spent cooking liquor is separated from the pulp. The pulp then proceeds through various stages of washing, and possibly bleaching, after which it is pressed and dried into the finished product. The "blow" of the digester does not apply to continuous digester systems.

The balance of the kraft process is designed to recover the cooking chemicals and heat. Spent cooking liquor and the pulp wash water are combined to form a weak black liquor which is concentrated in a multiple effect evaporator system to about 55 percent solids. The black liquor is then further concentrated to 65 percent solids in a direct contact evaporator, by bringing the liquor into contact with the flue gases from the recovery furnace, or in an indirect contact concentrator. The strong black liquor is then fired in a recovery furnace. Combustion of the organics dissolved in the black liquor provides heat for generating process steam and for converting sodium sulfate to sodium sulfide. Inorganic chemicals present in the black liquor collect as a molten smelt at the bottom of the furnace.

The smelt is dissolved in water to form green liquor, which is transferred to a causticizing tank where quicklime (calcium oxide) is added to convert the solution back to white liquor for return to the digester system. A lime mud precipitates from the causticizing tank, after which it is calcined in a lime kiln to regenerate quicklime.

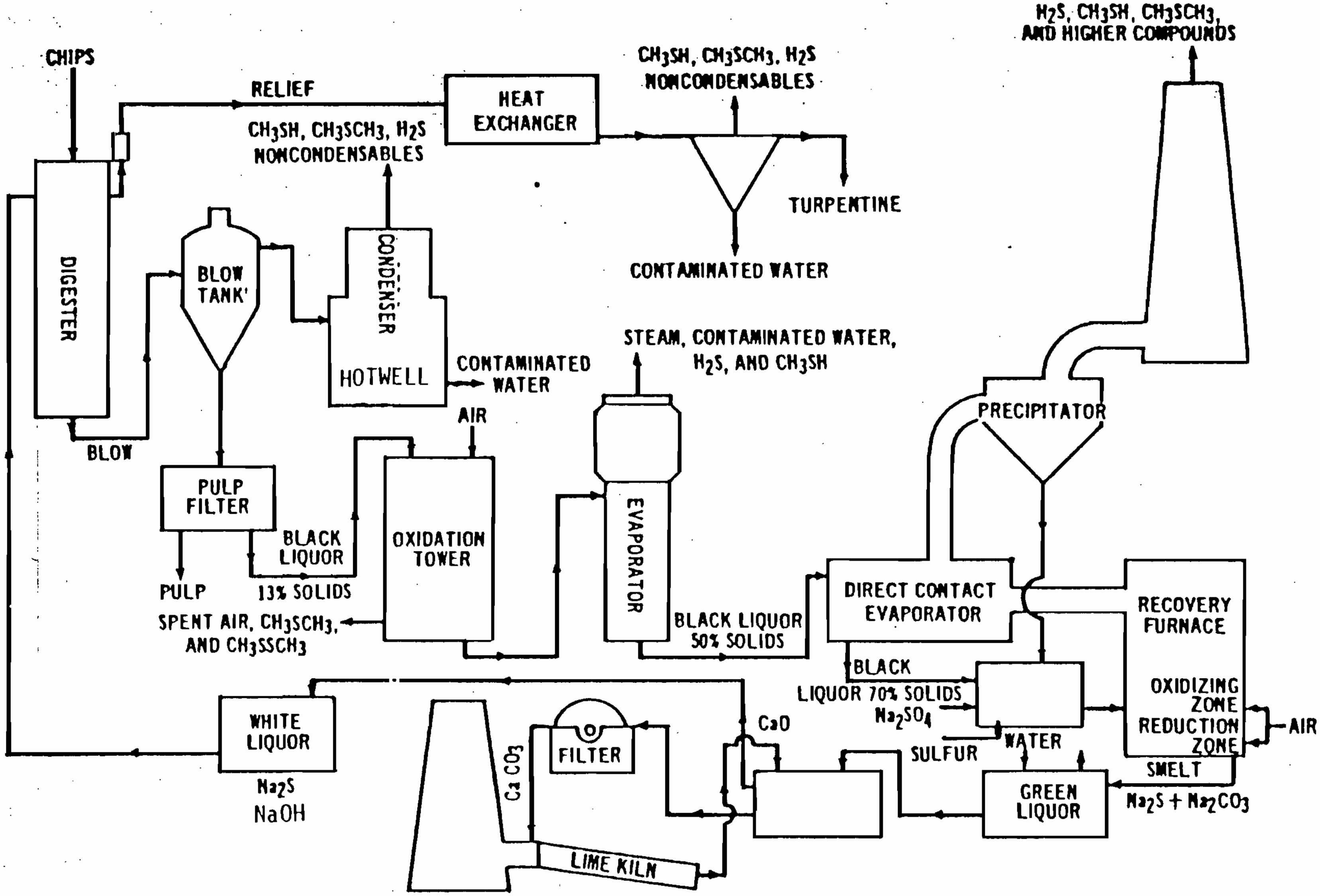


Figure 10.1-1. Typical kraft sulfate pulping and recovery process.

For process heating, for driving equipment, for providing electric power, etc., many mills need more steam than can be provided by the recovery furnace alone. Thus, conventional industrial boilers that burn coal, oil, natural gas, or bark and wood are commonly used.

Emissions And Controls[1-7] - Particulate emissions from the kraft process occur largely from the recovery furnace, the lime kiln and the smelt dissolving tank. These emissions are mainly sodium salts, with some calcium salts from the lime kiln. They are caused mostly by carryover of solids and sublimation and condensation of the inorganic chemicals.

Particulate control is provided on recovery furnaces in a variety of ways. In mills with either a cyclonic scrubber or cascade evaporator as the direct contact evaporator, further control is necessary, as these devices are generally only 20 to 50 percent efficient for particulates. Most often in these cases, an electrostatic precipitator is employed after the direct contact evaporator, for an overall particulate control efficiency of from 85 to more than 99 percent. Auxiliary scrubbers may be added at existing mills after a precipitator or a venturi scrubber to supplement older and less efficient primary particulate control devices.

Particulate control on lime kilns is generally accomplished by scrubbers. Electrostatic precipitators have been used in a few mills. Smelt dissolving tanks usually are controlled by mesh pads, but scrubbers can provide further control.

The characteristic odor of the kraft mill is caused by the emission of reduced sulfur compounds, the most common of which are hydrogen sulfide, methyl mercaptan, dimethyl sulfide and dimethyl disulfide, all with extremely low odor thresholds. The major source of hydrogen sulfide is the direct contact evaporator, in which the sodium sulfide in the black liquor reacts with the carbon dioxide in the furnace exhaust. Indirect contact evaporators can significantly reduce the emission of hydrogen sulfide. The lime kiln can also be a potential source of odor, as a similar reaction occurs with residual sodium sulfide in the lime mud. Lesser amounts of hydrogen sulfide are emitted with the noncondensible offgasses from the digesters and multiple effect evaporators.

Methyl mercaptan and dimethyl sulfide are formed in reactions with the wood component, lignin. Dimethyl disulfide is formed through the oxidation of mercaptan groups derived from the lignin. These compounds are emitted from many points within a mill, but the main sources are the digester/blow tank systems and the direct contact evaporator.

Although odor control devices, per se, are not generally found in kraft mills, emitted sulfur compounds can be reduced by process modifications and improved operating conditions. For example, black liquor oxidation systems, which oxidize sulfides into less reactive thiosulfates, can considerably reduce odorous sulfur emissions from the direct contact evaporator, although the vent gases from such systems become minor odor sources themselves. Also, noncondensible odorous gases vented from the digester/blow tank system and multiple effect evaporators can be destroyed by thermal oxidation, usually by passing them through the lime kiln. Efficient operation of the recovery furnace, by avoiding overloading and by maintaining sufficient oxygen, residence time and turbulence, significantly reduces emissions of reduced sulfur compounds from this source as well. The use of fresh water instead of contaminated condensates in the scrubbers and pulp washers further reduces odorous emissions.

Several new mills have incorporated recovery systems that eliminate the conventional direct contact evaporators. In one system, heated combustion air, rather than fuel gas, provides direct contact evaporation. In another, the multiple effect evaporator system is extended to replace the direct contact evaporator altogether. In both systems, sulfur emissions from the recovery furnace/direct contact evaporator can be reduced by more than 99 percent.

Sulfur dioxide is emitted mainly from oxidation of reduced sulfur compounds in the recovery furnace. It is reported that the direct contact evaporator absorbs about 75 percent of these emissions, and further scrubbing can provide additional control.

Potential sources of carbon monoxide emissions from the kraft process include the recovery furnace and lime kilns. The major cause of carbon monoxide emissions is furnace operation well above rated capacity, making it impossible to maintain oxidizing conditions.

Some nitrogen oxides also are emitted from the recovery furnace and lime kilns, although amounts are relatively small. Indications are that nitrogen oxide emissions are on the order of 0.5 and 1.0 kilograms per air dried megagrams (1 and 2 lb/air dried ton) of pulp produced from the lime kiln and recovery furnace, respectively.[5-6]

A major source of emissions in a kraft mill is the boiler for generating auxiliary steam and power. The fuels used are coal, oil, natural gas or bark/wood waste. See Chapter 1 for emission factors for boilers.

Table 10.1-1 presents emission factors for a conventional kraft mill. The most widely used particulate control devices are shown, along with the odor reductions through black liquor oxidation and incineration of noncondensible offgases. Tables 10.1-2 through 10.1-7 present cumulative size distribution data and size specific emission factors for particulate emissions from sources within a conventional kraft mill. Uncontrolled and controlled size specific emission factors[7] are presented in Figures 10.1-2 through 10.1-7. The particle sizes presented are expressed in terms of the aerodynamic diameter.

10.1.3 Acid Sulfite Pulping

Process Description - The production of acid sulfite pulp proceeds similarly to kraft pulping, except that different chemicals are used in the cooking liquor. In place of the caustic solution used to dissolve the lignin in the wood, sulfurous acid is employed. To buffer the cooking solution, a bisulfite of sodium, magnesium, calcium or ammonium is used. A diagram of a typical magnesium base process is shown in Figure 10.1-8.

Digestion is carried out under high pressure and high temperature, in either batch mode or continuous digesters, and in the presence of a sulfurous acid/bisulfite cooking liquid. When cooking is completed, either the digester is discharged at high pressure into a blow pit, or its contents are pumped into a dump tank at a lower pressure. The spent sulfite liquor (also called red liquor) then drains through the bottom of the tank and is treated and discarded,

TABLE 10.1-1. EMISSION FACTORS FOR SULFITE PULPING[a]

EMISSION FACTOR RATING: A

Source	Type of control	Particulate		Sulfur dioxide (SO_2)		Carbon monoxide (CO)		Hydrogen sulfide ($S^=$)		RSH, RSR, RSSR ($S^=$)	
		kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton
Digester relief and blow tank	Untreated[b]	-	-	-	-	-	-	0.02	0.03	0.6	1.2
Brown stock washer	Untreated[b]	-	-	-	-	-	-	0.01	0.02	0.2^c	0.4^c
Multiple effect evaporator	Untreated[b]	-	-	-	-	-	-	0.55	1.1	0.05	0.1
Recovery boiler and direct evaporator	Untreated[d]	90	180	3.5	7	5.5	11	6^e	12^e	1.5^e	3^e
	Venturi scrubber[f]	24	48	3.5	7	5.5	11	6^e	12^e	1.5^e	3^e
	ESP	1	2	3.5	7	5.5	11	6^e	12^e	1.5^e	3^e
	Auxiliary scrubber	$1.5-7.5^g$	$3-15^g$					6^e	12^e	1.5^e	3^e
Noncontact recovery boiler without direct contact evaporator	Untreated	115	230	-	-	5.5	11	0.05^h	0.1^h	-	-
	ESP	1	2	-	-	5.5	11	0.05^h	0.1^h	-	-
Smelt dissolving tank	Untreated	3.5	7	0.1	0.2	-	-	0.1^j	0.2^j	0.15^j	0.3^j
	Mesh pad	0.5	1	0.1	0.2	-	-	0.1^j	0.2^j	0.15^j	0.3^j
	Scrubber	0.1	0.2	-	-	-	-	0.1^j	0.2^j	0.15^j	0.3^j
Lime kiln	Untreated	28	56	0.15	0.3	0.05	0.1	0.25^m	0.5^m	0.1^m	0.2^m
	Scrubber or ESP	0.25	0.5	-	-	0.05	0.1	0.25^m	0.5^m	0.1^m	0.2^m
Turpentine condenser	Untreated	-	-	-	-	-	-	0.005	.01	0.25	0.5
Miscellaneous[n]	Untreated	-	-	-	-	-	-	-	-	0.25	0.5

[a] References 8-10. Factors expressed in unit weight of air dried unbleached pulp (ADP). RSH = Methyl mercaptan. RSR = Dimethyl sulfide. RSSR = Dimethyl disulfide. ESP = Electrostatic precipitator. Dash = No data.

[b] If noncondensible gases from these sources are vented to lime kiln, recovery furnace or equivalent, the reduced sulfur compounds are destroyed.

[c] Apply with system using condensate as washing medium. When using fresh water, emissions are 0.05 (0.1).

[d] Apply when cyclonic scrubber or cascade evaporator is used for direct contact evaporation, with no further controls.

[e] Usually reduced by 50% with black liquor oxidation and can be cut 95 - 99% when oxidation is complete and recovery furnace is operated optimally.

[f] Apply when venturi scrubber is used for direct contact evaporation, with no further controls.

[g] Use 7.5 (15) when auxiliary scrubber follows venturi scrubber, and 1.5 (3) when it follows ESP.

[h] Apply when recovery furnace is operated optimally to control total reduced sulfur (TRS) compounds.

[j] Usually reduced to 0.01 g/kg (0.02 lb/ton) ADP when water low in sulfides is used in smelt dissolving tank and associated scrubber.

[m] Usually reduced to 0.015 g/kg (0.03 lb/ton) ADP with efficient mud washing, optimal kiln operation and added caustic in scrubbing water. With only efficient mud washing and optimal process control, TRS compounds reduced to 0.04 g/kg (0.08 lb/ton) ADP.

[n] Includes knotter vents, brownstock seal tanks, etc. When black liquor oxidation is included, emissions are 0.3 (0.6).

TABLE 10.1-2. CUMULATIVE PARTICLE SIZE DISTRIBUTION AND SIZE SPECIFIC EMISSION FACTORS FOR A RECOVERY BOILER WITH A DIRECT CONTACT EVAPORATOR AND AN ESP[a]

EMISSION FACTOR RATING: C

Particle size (um)	Cumulative mass % ≤ stated size		Cumulative emission factor (kg/Mg of air dried pulp)	
	Uncontrolled	Controlled	Uncontrolled	Controlled
15	95.0	-	86	-
10	93.5	-	84	-
6	92.2	68.2	83	0.7
2.5	83.5	53.8	75	0.5
1.25	56.5	40.5	51	0.4
1.00	45.3	34.2	41	0.3
0.625	26.5	22.2	24	0.2
Total	100	100	90	1.0

[a]Reference 7. Dash = no data.

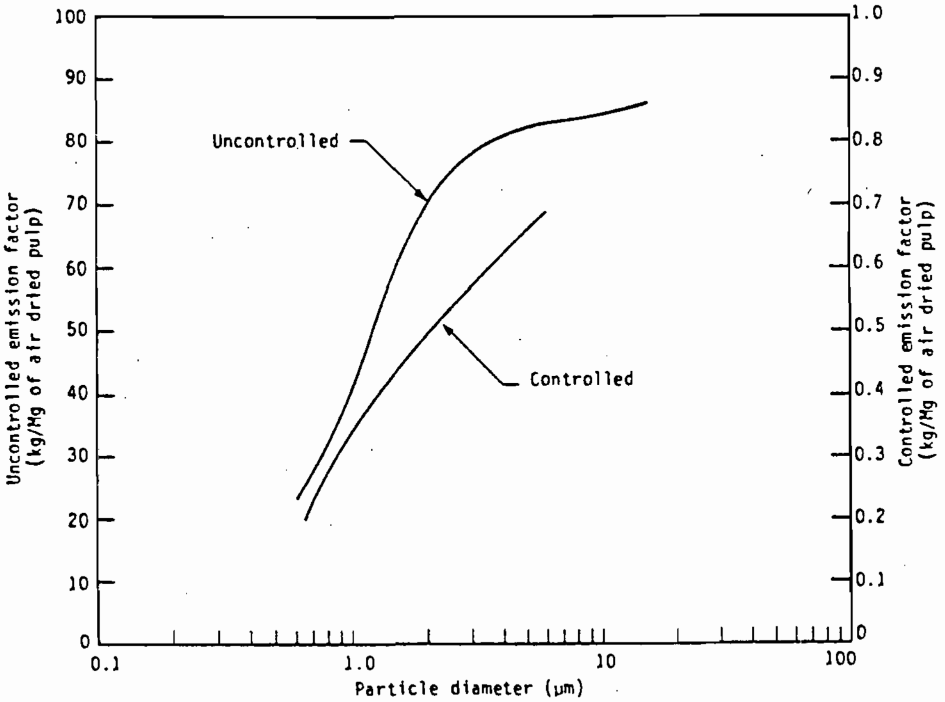


Figure 10.1-2. Cumulative particle size distribution and size specific emission factors for recovery boiler with direct contact evaporator and ESP.

TABLE 10.1-3. CUMULATIVE PARTICLE SIZE DISTRIBUTION AND SIZE SPECIFIC EMISSION FACTORS FOR A RECOVERY BOILER WITHOUT A DIRECT CONTACT EVAPORATOR BUT WITH AN ESP[a]

EMISSION FACTOR RATING: C

Particle size (um)	Cumulative mass % ≤ stated size		Cumulative emission factor (kg/Mg of air dried pulp)	
	Uncontrolled	Controlled	Uncontrolled	Controlled
15	-	78.8	-	0.8
10	-	74.8	-	0.7
6	-	71.9	-	0.7
2.5	78.0	67.3	90	0.6
1.25	40.0	51.3	46	0.5
1.00	30.0	42.4	35	0.4
0.625	17.0	29.6	20	0.3
Total	100	100	115	1.0

[a] Reference 7. Dash = no data.

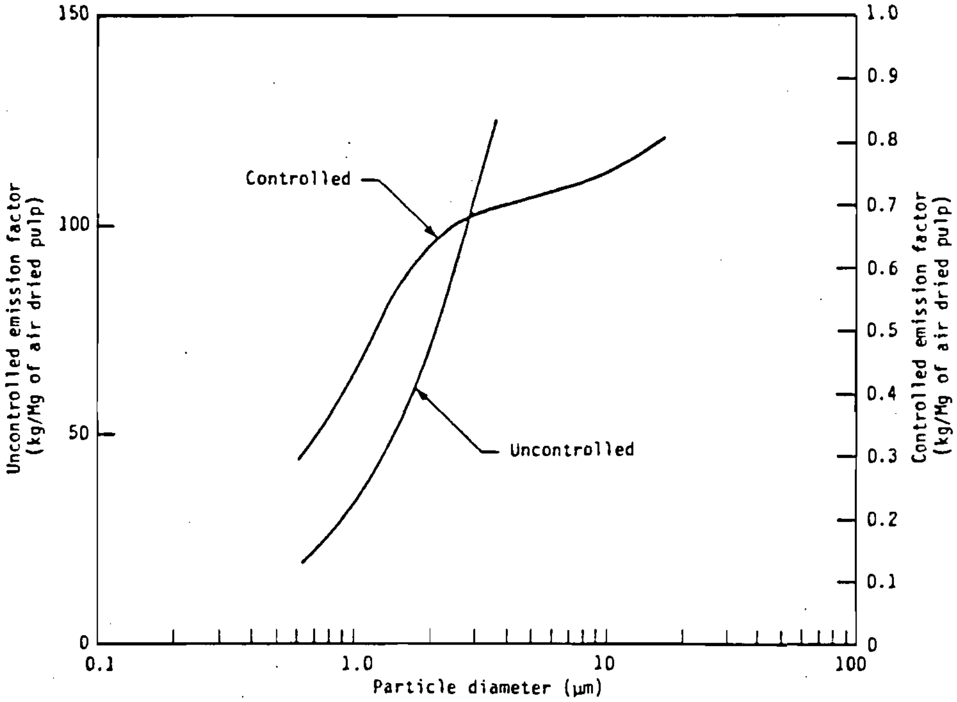


Figure 10.1-3. Cumulative particle size distribution and size specific emission factors for recovery boiler without direct contact evaporator but with ESP.

TABLE 10.1-4. CUMULATIVE PARTICLE SIZE DISTRIBUTION AND SIZE SPECIFIC EMISSION FACTORS FOR A LIME KILN WITH A VENTURI SCRUBBER[a]

EMISSION FACTOR RATING: C

Particle size (um)	Cumulative mass % ≤ stated size		Cumulative emission factor (kg/Mg of air dried pulp)	
	Uncontrolled	Controlled	Uncontrolled	Controlled
15	27.7	98.9	7.8	0.24
10	16.8	98.3	4.7	0.24
6	13.4	98.2	3.8	0.24
2.5	10.5	96.0	2.9	0.24
1.25	8.2	85.0	2.3	0.21
1.00	7.1	78.9	2.0	0.20
0.625	3.9	54.3	1.1	0.14
Total	100	100	28.0	0.25

[a] Reference 7.

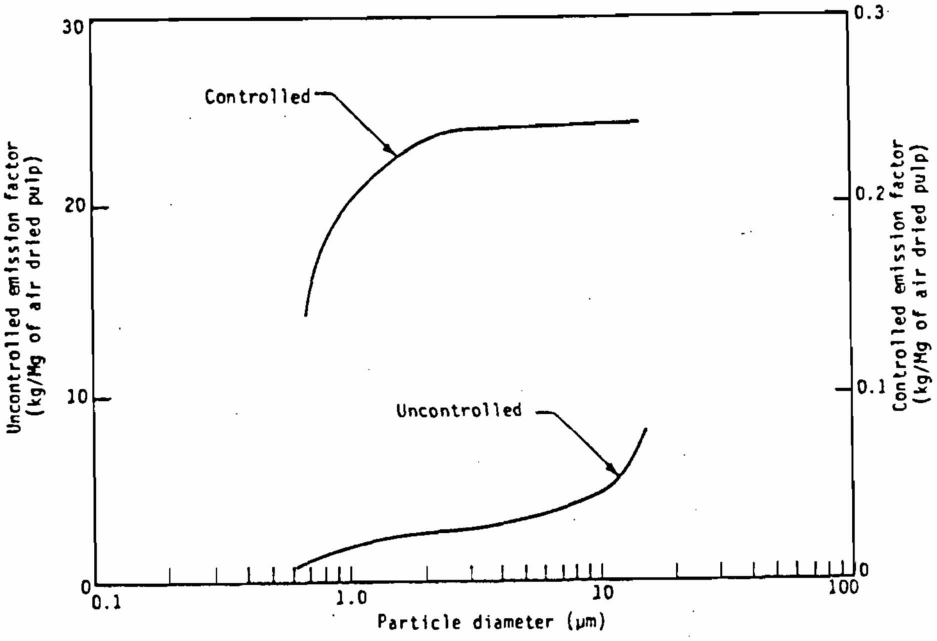


Figure 10.1-4. Cumulative particle size distribution and size specific emission factors for lime kiln with venturi scrubber.

TABLE 10.1-5. CUMULATIVE PARTICLE SIZE DISTRIBUTION AND SIZE SPECIFIC EMISSION FACTORS FOR A LIME KILN WITH AN ESP[a]

EMISSION FACTOR RATING: C

Particle size (um)	Cumulative mass % ≤ stated size		Cumulative emission factor (kg/Mg of air dried pulp)	
	Uncontrolled	Controlled	Uncontrolled	Controlled
15	27.7	91.2	7.8	0.23
10	16.8	88.5	4.7	0.22
6	13.4	86.5	3.8	0.22
2.5	10.5	83.0	2.9	0.21
1.25	8.2	70.2	2.3	0.18
1.00	7.1	62.9	2.0	0.16
0.625	3.9	46.9	1.1	0.12
Total	100	100	28.0	0.25

[a] Reference 7.

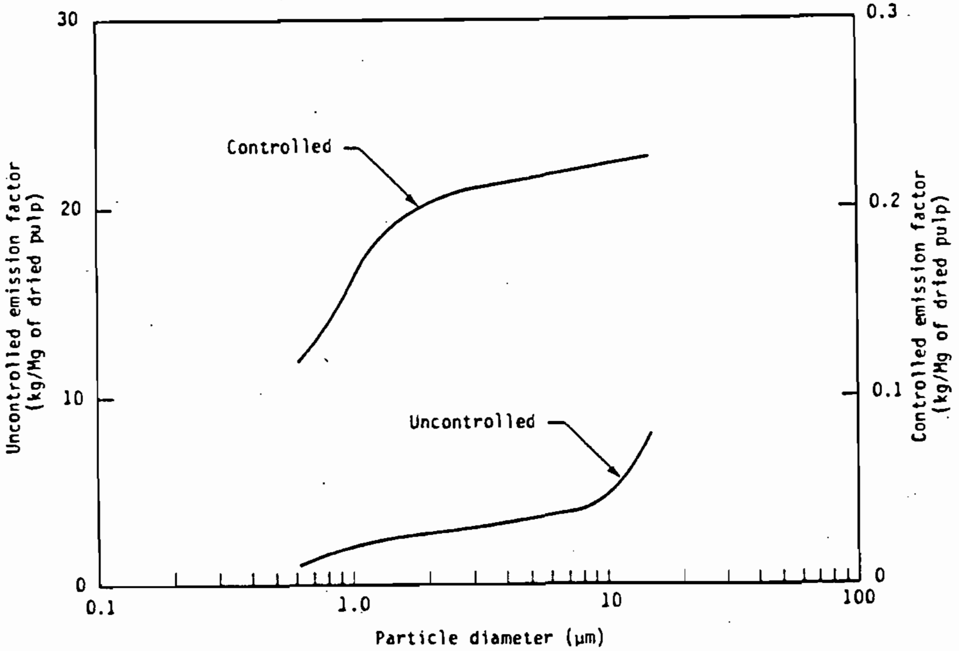


Figure 10.1-5. Cumulative particle size distribution and size specific emission factors for lime kiln with ESP.

TABLE 10.1-6. CUMULATIVE PARTICLE SIZE DISTRIBUTION AND SIZE SPECIFIC EMISSION FACTORS FOR A SMELT DISSOLVING TANK WITH A PACKED TOWER[a]

EMISSION FACTOR RATING: C

Particle size (um)	Cumulative mass % ≤ stated size		Cumulative emission factor (kg/Mg of air dried pulp)	
	Uncontrolled	Controlled	Uncontrolled	Controlled
15	90.0	95.3	3.2	0.48
10	88.5	95.3	3.1	0.48
6	87.0	94.3	3.0	0.47
2.5	73.0	85.2	2.6	0.43
1.25	47.5	63.8	1.7	0.32
1.00	40.0	54.2	1.4	0.27
0.625	25.5	34.2	0.9	0.17
Total	100	100	3.5	0.50

[a] Reference 7.

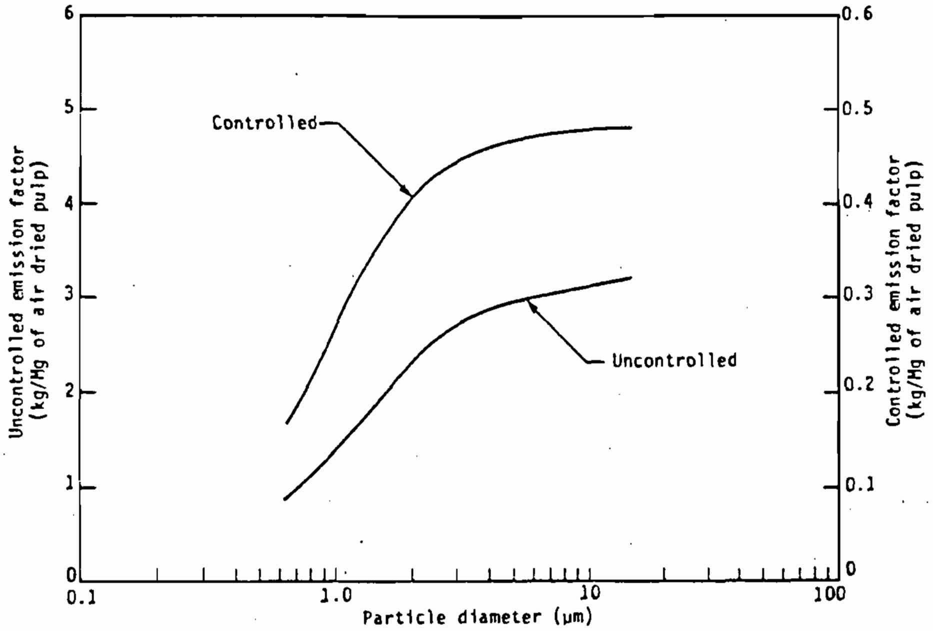


Figure 10.1-6. Cumulative particle size distribution and size specific emission factors for smelt dissolving tank with packed tower.

TABLE 10.1-7. CUMULATIVE PARTICLE SIZE DISTRIBUTION AND SIZE SPECIFIC EMISSION FACTORS FOR A SMELT DISSOLVING TANK WITH A VENTURI SCRUBBER[a]

EMISSION FACTOR RATING: C

Particle size (um)	Cumulative mass % ≤ stated size		Cumulative emission factor (kg/Mg of air dried pulp)	
	Uncontrolled	Controlled	Uncontrolled	Controlled
15	90.0	89.9	3.2	0.09
10	88.5	89.5	3.1	0.09
6	87.0	88.4	3.0	0.09
2.5	73.0	81.3	2.6	0.08
1.25	47.5	63.5	1.7	0.06
1.00	54.0	54.7	1.4	0.06
0.625	25.5	38.7	0.9	0.04
Total	100	100	3.5	0.09

[a] Reference 7.

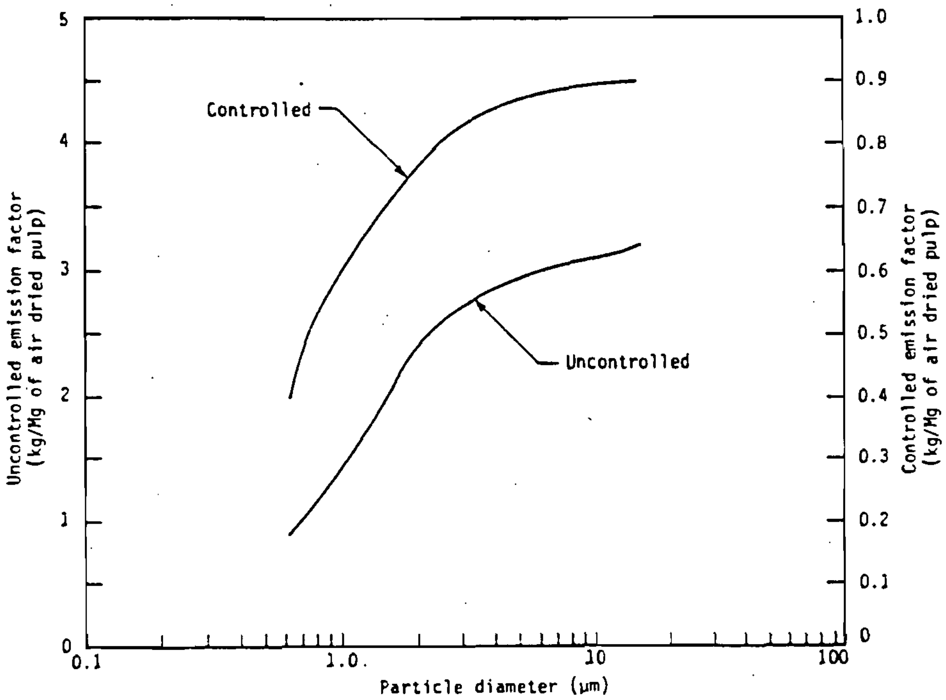


Figure 10.1-7. Cumulative particle size distribution and size specific emission factors for smelt dissolving tank with venturi scrubber.

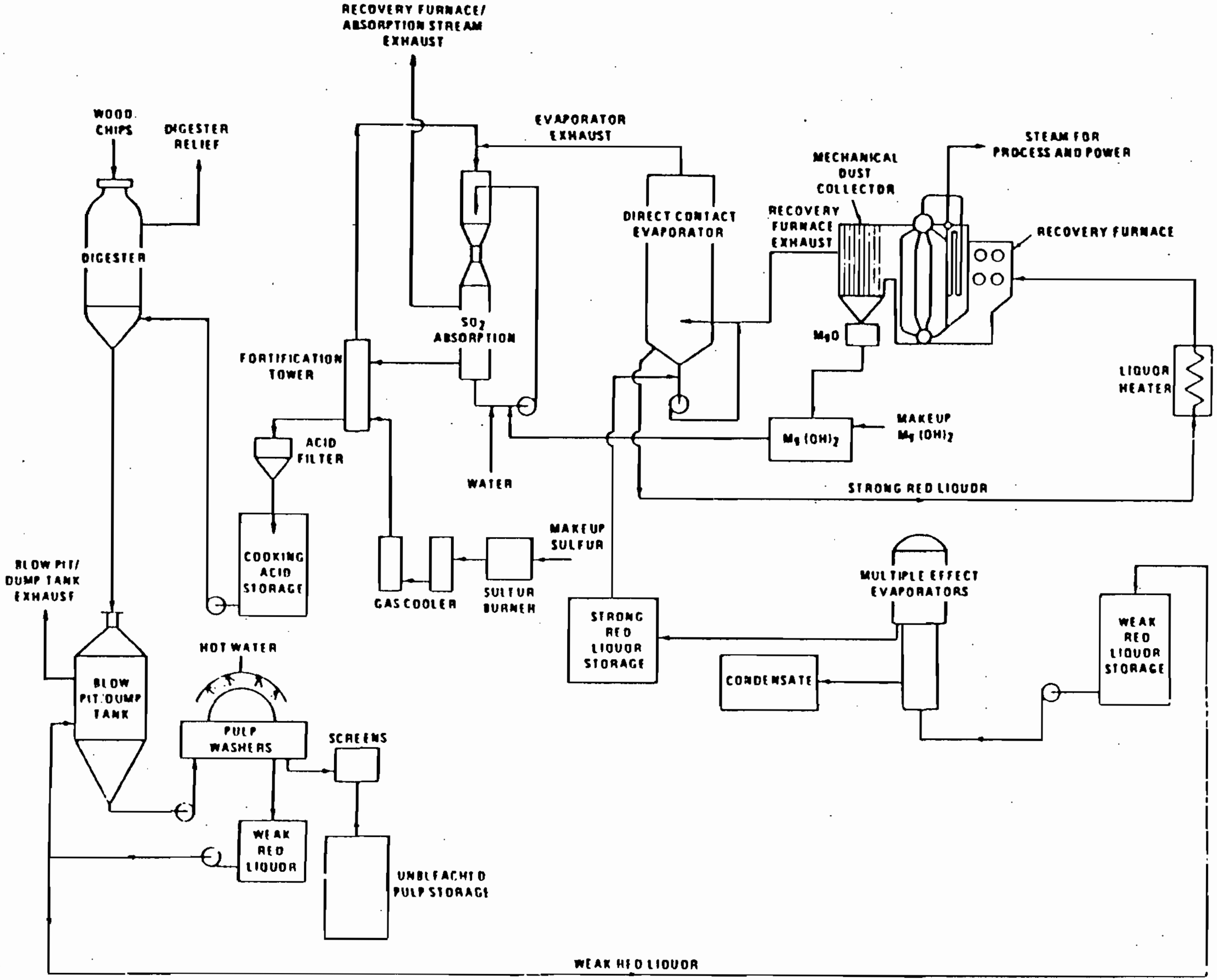


Figure 10.1-8. Simplified process flow diagram of magnesium-base process employing chemical and heat recovery.

incinerated, or sent to a plant for recovery of heat and chemicals. The pulp is then washed and processed through screens and centrifuges to remove knots, bundles of fibers and other material. It subsequently may be bleached, pressed and dried in papermaking operations.

Because of the variety of cooking liquor bases used, numerous schemes have evolved for heat and/or chemical recovery. In calcium base systems, found mostly in older mills, chemical recovery is not practical, and the spent liquor is usually discharged or incinerated. In ammonium base operations, heat can be recovered by combusting the spent liquor, but the ammonium base is thereby consumed. In sodium or magnesium base operations, the heat, sulfur and base all may be feasibly recovered.

If recovery is practiced, the spent (weak) red liquor (which contains more than half of the raw materials as dissolved organic solids) is concentrated in a multiple effect evaporator and a direct contact evaporator to 55 to 60 percent solids. This strong liquor is sprayed into a furnace and burned, producing steam to operate the digesters, evaporators, etc. and to meet other power requirements.

When magnesium base liquor is burned, a flue gas is produced from which magnesium oxide is recovered in a multiple cyclone as fine white power. The magnesium oxide is then water slaked and is used as circulating liquor in a series of venturi scrubbers, which are designed to absorb sulfur dioxide from the flue gas and to form a bisulfite solution for use in the cook cycle. When sodium base liquor is burned, the inorganic compounds are recovered as a molten smelt containing sodium sulfide and sodium carbonate. This smelt may be processed further and used to absorb sulfur dioxide from the flue gas and sulfur burner. In some sodium base mills, however, the smelt may be sold to a nearby kraft mill as raw material for producing green liquor.

If liquor recovery is not practiced, an acid plant is necessary of sufficient capacity to fulfill the mill's total sulfite requirement. Normally, sulfur is burned in a rotary or spray burner. The gas produced is then cooled by heat exhangers and a water spray and is then absorbed in a variety of different scrubbers containing either limestone or a solution of the base chemical. Where recovery is practiced, fortification is accomplished similarly, although a much smaller amount of sulfur dioxide must be produced to make up for that lost in the process.

Emissions And Controls[11] - Sulfur dioxide is generally considered the major pollutant of concern from sulfite pulp mills. The characteristic "kraft" odor is not emitted because volatile reduced sulfur compounds are not products of the lignin/bisulfite reaction.

A major SO_2 source is the digester and blow pit (dump tank) system. Sulfur dioxide is present in the intermittent digester relief gases, as well as in the gases given off at the end of the cook when the digester contents are discharged into the blow pit. The quantity of sulfur dioxide evolved and emitted to the atmosphere in these gas streams depends on the pH of the cooking liquor, the pressure at which the digester contents are discharged, and the effectiveness of the absorption systems employed for SO_2 recovery. Scrubbers can be installed that reduce SO_2 from this source by as much as 99 percent.

Another source of sulfur dioxide emissions is the recovery system. Since magnesium, sodium, and ammonium base recovery systems all use absorption systems to recover SO_2 generated in recovery furnaces, acid fortification towers, multiple effect evaporators, etc., the magnitude of SO_2 emissions depends on the desired efficiency of these systems. Generally, such absorption systems recover better than 95 percent of the sulfur so it can be reused.

The various pulp washing, screening, and cleaning operations are also potential sources of SO_2. These operations are numerous and may account for a significant fraction of a mill's SO_2 emissions if not controlled.

The only significant particulate source in the pulping and recovery process is the absorption system handling the recovery furnace exhaust. Ammonium base systems generate less particulate than do magnesium or sodium base systems. The combustion productions are mostly nitrogen, water vapor and sulfur dioxide.

Auxiliary power boilers also produce emissions in the sulfite pulp mill, and emission factors for these boilers are presented in Chapter 1.

Table 10.1-8 contains emission factors for the various sulfite pulping operations.

10.1.4 Neutral Sulfite Semichemical (NSSC) Pulping

Process Description[9, 12-14] - In this method, wood chips are cooked in a neutral solution of sodium sulfite and sodium carbonate. Sulfite ions react with the lignin in wood, and the sodium bicarbonate acts as a buffer to maintain a neutral solution. The major difference between all semichemical techniques and those of kraft and acid sulfite processes is that only a portion of the lignin is removed during the cook, after which the pulp is further reduced by mechanical disintegration. This method achieves yields as high as 60 to 80 percent, as opposed to 50 to 55 percent for other chemical processes.

The NSSC process varies from mill to mill. Some mills dispose of their spent liquor, some mills recover the cooking chemicals, and some, when operated in conjunction with kraft mills, mix their spent liquor with the kraft liquor as a source of makeup chemcials. When recovery is practiced, the involved steps parallel those of the sulfite process.

Emissions And Controls[9,12-14] - Particulate emissions are a potential problem only when recovery systems are involved. Mills that do practice recovery but are not operated in conjunction with kraft operations often utilize fluidized bed reactors to burn their spent liquor. Because the flue gas contains sodium sulfate and sodium carbonate dust, efficient particulate collection may be included for chemical recovery.

A potential gaseous pollutant is sulfur dioxide. Absorbing towers, digester/blower tank system, and recovery furnace are the main sources of SO_2, with amounts emitted dependent upon the capability of the scrubbing devices installed for control and recovery.

Hydrogen sulfide can also be emitted from NSSC mills which use kraft type recovery furnaces. The main potential source is the absorbing tower, where a

TABLE 10.1-8. EMISSION FACTORS FOR SULFITE PULPING[a]

Source	Base	Control	Emission factor[b]				Emission Factor Rating
			Particulate		Sulfur dioxide		
			kg/ADUMg	lb/ADUT	kg/ADUMg	lb/ADUT	
Digester/blow pit or dump tank[c]	All	None	Neg	Neg	5 to 35	10 to 70	C
	MgO	Process change[d]	Neg	Neg	1 to 3	2 to 6	C
	MgO	Scrubber	Neg	Neg	0.5	1	B
	MgO	Process change and scrubber	Neg	Neg	0.1	0.2	B
	MgO	All exhaust vented through recovery system	Neg	Neg	0	0	A
	NH_3	Process change	Neg	Neg	12.5	25	D
	NH_3	Process change and scrubber	Neg	Neg	0.2	0.4	B
	Na	Process change and scrubber	Neg	Neg	1	2	C
	Ca	Unknown	Neg	Neg	33.5	67	C
Recovery system[e]	MgO	Multicyclone and venturi scrubbers	1	2	4.5	9	A
	NH_3	Ammonia absorption and mist eliminator	0.35	0.7	3.5	7	B
	Na	Sodium carbonate scrubber	2	4	1	2	C
Acid plant[f]	NH_3	Scrubber	Neg	Neg	0.2	0.3	C
	Na	Unknown[g]	Neg	Neg	0.1	0.2	D
	Ca	Jenssen scrubber	Neg	Neg	4	8	C
Other[h]	All	None	Neg	Neg	6	12	D

[a] Reference 11. All factors represent long term average emissions. ADUMg = Air dried unbleached megagram. ADUT = Air dried unbleached ton. Neg = negligible.

[b] Expressed as kg (lb) of pollutant/air dried unbleached ton (mg) of pulp.

[c] Factors represent emissions after cook is completed and when digester contents are discharged into blow pit or dump tank. Some relief gases are vented from digester during cook cycle, but these are usually transferred to pressure accumulators and SO_2 therein reabsorbed for use in cooking liquor. In some mills, actual emissions will be intermittent and for short periods.

[d] May include such measures as raising cooking liquor pH (thereby lowering free SO_2), relieving digester pressure before contents discharge, and pumping out digester contents instead of blowing out.

[e] Recovery system at most mills is closed and includes recovery furnace, direct contact evaporator, multiple effect evaporator, acid fortification tower, and SO_2 absorption scrubbers. Generally only one emission point for entire system. Factors include high SO_2 emissions during periodic purging of recovery systems.

[f] Necessary in mills with insufficient or nonexistent recovery systems.

[g] Control is practiced, but type of system is unknown.

[h] Includes miscellaneous pulping operations such as knotters, washers, screens, etc.

significant quantity of hydrogen sulfite is liberated as the cooking liquor is made. Other possible sources, depending on the operating conditions, include the recovery furnace, and in mills where some green liquor is used in the cooking process, the digester/blow tank system. Where green liquor is used, it is also possible that significant quantities of mercaptans will be produced. Hydrogen sulfide emissions can be eliminated if burned to sulfur dioxide before the absorbing system.

Because the NSSC process differs greatly from mill to mill, and because of the scarcity of adequate data, no emission factors are presented for this process.

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8.15 LIME MANUFACTURING

8.15.1 General[1-4]

Lime is the high temperature product of the calcination of limestone. There are two kinds, high calcium lime (CaO) and dolomitic lime (CaO · MgO). Lime is manufactured in various kinds of kilns by one of the following reactions:

$$CaCO_3 + \text{heat} \rightarrow CO_2 + CaO \text{ (high calcium lime)}$$
$$CaCO_3 \cdot MgCO_3 + \text{heat} \rightarrow CO_2 + CaO \cdot MgO \text{ (dolomitic lime)}$$

In some lime plants, the resulting lime is reacted (slaked) with water to form hydrated lime.

The basic processes in the production of lime are 1) quarrying raw limestone; 2) preparing limestone for the kilns by crushing and sizing; 3) calcining limestone; 4) processing the lime further by hydrating; and 5) miscellaneous transfer, storage and handling operations. A generalized material flow diagram for a lime manufacturing plant is given in Figure 8.15-1. Note that some operations shown may not be performed in all plants.

The heart of a lime plant is the kiln. The prevalent type of kiln is the rotary kiln, accounting for about 90 percent of all lime production in the United States. This kiln is a long, cylindrical, slightly inclined, refractory lined furnace, through which the limestone and hot combustion gases pass countercurrently. Coal, oil and natural gas may all be fired in rotary kilns. Product coolers and kiln feed preheaters of various types are commonly used to recover heat from the hot lime product and hot exhaust gases, respectively.

The next most common type of kiln in the United States is the vertical, or shaft, kiln. This kiln can be described as an upright heavy steel cylinder lined with refractory material. The limestone is charged at the top and is calcined as it descends slowly to discharge at the bottom of the kiln. A primary advantage of vertical kilns over rotary kilns is higher average fuel efficiency. The primary disadvantages of vertical kilns are their relatively low production rates and the fact that coal cannot be used without degrading the quality of the lime produced. There have been few recent vertical kiln installations in the United States because of high product quality requirements.

Other, much less common, kiln types include rotary hearth and fluidized bed kilns. Both kiln types can achieve high production rates, and neither can operate with coal. The "calcimatic" kiln, or rotary hearth kiln, is a circular shaped kiln with a slowly revolving donut shaped hearth. In fluidized bed kilns, finely divided limestone is brought into contact with hot combustion air in a turbulent zone, usually above a perforated grate. Because of the amount of lime carryover into the exhaust gases, dust collection equipment must be installed on fluidized bed kilns for process economy.

TABLE 8.15-1. EMISSION FACTORS FOR LIME MANUFACTURING[a]

EMISSION FACTOR RATING: B

Source	Particulate[b]		Nitrogen oxides		Carbon monoxide		Sulfur dioxide	
	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton	kg/Mg	lb/ton
Crushers, screens, conveyors, storage piles, unpaved roads, etc.	c	c	Neg	Neg	Neg	Neg	Neg	Neg
Rotary kilns[d]								
Uncontrolled[e]	180	350	1.4	2.8	1	2	f	f
Large diameter cyclone	81	160	1.4	2.8	1	2	f	f
Multiple cyclone	42	83	1.4	2.8	1	2	f	f
Electrostatic precipitator[g]	2.4	4.8	1.4	2.8	1	2	h	h
Venturi scrubber	2.4	4.8	1.4	2.8	1	2	h	h
Gravel bed filter[g]	0.53[i]	1.1[i]	1.4	2.8	1	2	h	h
Multiclone and venturi scrubber[g]	0.44	0.87	1.4	2.8	1	2	h	h
Baghouse	0.45[j]	0.89[j]	1.4	2.8	1	2	h	h
Cyclone and baghouse	0.055	0.11	1.4	2.8	1	2	h	h
Vertical kilns								
Uncontrolled	4	8	NA	NA	NA	NA	NA	NA
Calcimatic kilns[k]								
Uncontrolled	25	50	0.1	0.2	NA	NA	NA	NA
Multiple cyclone	3	6	0.1	0.2	NA	NA	NA	NA
Secondary dust collection[ℓ]	NA	NA	0.1	0.2	NA	NA	NA	NA
Fluidized bed kilns	m	m	NA	NA	NA	NA	NA	NA
Product coolers								
Uncontrolled	20[n]	40[n]	Neg	Neg	Neg	Neg	Neg	Neg
Hydrators (atmospheric)[p]								
Wet scrubber	0.05	0.1	Neg	Neg	Neg	Neg	Neg	Neg
Crusher, screen, hammermill								
Baghouse	0.0005	0.001	Neg	Neg	Neg	Neg	Neg	Neg
Final screen								
Baghouse	0.0004	0.0008	Neg	Neg	Neg	Neg	Neg	Neg
Uncontrolled truck loading								
Limestone								
Open truck	0.75	1.5	Neg	Neg	Neg	Neg	Neg	Neg
Closed truck	0.38	0.76	Neg	Neg	Neg	Neg	Neg	Neg
Lime - closed truck	0.15[i]	0.30[i]	Neg	Neg	Neg	Neg	Neg	Neg

TABLE 8.15-1 (cont.).

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[a] References 4-7. Factors for kilns and coolers are per unit of lime produced. Divide by two to obtain factors per unit of limestone feed to the kiln. Factors for hydrators are per unit of hydrated lime produced. Multiply by 1.25 to obtain factors per unit of lime feed to the hydrator. Neg = negligible. NA = not available.

[b] Emission Factor Rating = D.

[c] Factors for these operations are presented in Sections 8.20 and 11.2 of this document.

[d] For coal fired rotary kilns only.

[e] No particulate control except for settling that may occur in stack breeching and chimney base.

[f] Sulfur dioxide may be estimated by a material balance using fuel sulfur content.

[g] Combination coal/gas fired rotary kilns only.

[h] When scrubbers are used, < 5% of the fuel sulfur will be emitted as SO_2 even with high sulfur coal. When other secondary collection devices are used, about 20% of the fuel sulfur will be emitted as SO_2 with high sulfur fuels, and < 10% with low sulfur fuels.

[i] Emission Factor Rating = E.

[j] Emission Factor Rating = C.

[k] Calcimatic kilns generally have stone preheaters. Factors are for emissions after the kiln exhaust passes through a preheater.

[ℓ] Fabric filters and venturi scrubbers have been used on calcimatic kilns. No data are available on particulate emissions after secondary control.

[m] Fluidized bed kilns must have sophisticated dust collection equipment for process economics, hence particulate emissions will depend on efficiency of the control equipment installed.

[n] Some or all cooler exhaust typically is used in kiln as combustion air. Emissions will result only from that fraction not recycled to kiln.

[p] Typical particulate loading for atmospheric hydrators following water sprays or wet scrubbers. Limited data suggest particulate emissions from pressure hydrators may be approximately 1 kg/Mg (2 lb/ton) of hydrate produced, after wet collectors.

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11.2.3 AGGREGATE HANDLING AND STORAGE PILES

11.2.3.1 General

Inherent in operations that use minerals in aggregate form is the maintenance of outdoor storage piles. Storage piles are usually left uncovered, partially because of the need for frequent material transfer into or out of storage.

Dust emissions occur at several points in the storage cycle, during material loading onto the pile, during disturbances by strong wind currents, and during loadout from the pile. The movement of trucks and loading equipment in the storage pile area is also a substantial source of dust.

11.2.3.2 Emissions and Correction Parameters

The quantity of dust emissions from aggregate storage operations varies with the volume of aggregate passing through the storage cycle. Also, emissions depend on three correction parameters that characterize the condition of a particular storage pile: age of the pile, moisture content and proportion of aggregate fines.

When freshly processed aggregate is loaded onto a storage pile, its potential for dust emissions is at a maximum. Fines are easily disaggregated and released to the atmosphere upon exposure to air currents from aggregate transfer itself or high winds. As the aggregate weathers, however, potential for dust emissions is greatly reduced. Moisture causes aggregation and cementation of fines to the surfaces of larger particles. Any significant rainfall soaks the interior of the pile, and the drying process is very slow.

Field investigations have shown that emissions from aggregate storage operations vary in direct proportion to the percentage of silt (particles $< 75\ \mu m$ in diameter) in the aggregate material.[1 3] The silt content is determined by measuring the proportion of dry aggregate material that passes through a 200 mesh screen, using ASTM-C-136 method. Table 11.2.3-1 summarizes measured silt and moisture values for industrial aggregate materials.

11.2.3.3 Predictive Emission Factor Equations

Total dust emissions from aggregate storage piles are contributions of several distinct source activities within the storage cycle:

1. Loading of aggregate onto storage piles (batch or continuous drop operations).
2. Equipment traffic in storage area.
3. Wind erosion of pile surfaces and ground areas around piles.
4. Loadout of aggregate for shipment or for return to the process stream (batch or continuous drop operations).

TABLE 11.2.3-1. TYPICAL SILT AND MOISTURE CONTENT VALUES OF MATERIALS AT VARIOUS INDUSTRIES

Industry	Material	Silt (%)			Moisture (%)		
		No. of test samples	Range	Mean	No. of test samples	Range	Mean
Iron and steel production[a]	Pellet ore	10	1.4 - 13	4.9	8	0.64 - 3.5	2.1
	Lump ore	9	2.8 - 19	9.5	6	1.6 - 8.1	5.4
	Coal	7	2 - 7.7	5	6	2.8 - 11	4.8
	Slag	3	3 - 7.3	5.3	3	0.25 - 2.2	0.92
	Flue dust	2	14 - 23	18.0	0	NA	NA
	Coke breeze	1		5.4	1		6.4
	Blended ore	1		15.0	1		6.6
	Sinter	1		0.7	0	NA	NA
	Limestone	1		0.4	0	NA	NA
Stone quarrying and processing[b]	Crushed limestone	2	1.3 - 1.9	1.6	2	0.3 - 1.1	0.7
Taconite mining and processing[c]	Pellets	9	2.2 - 5.4	3.4	7	0.05 - 2.3	0.96
	Tailings	2	NA	11.0	1		0.35
Western surface coal mining[d]	Coal	15	3.4 - 16	6.2	7	2.8 - 20	6.9
	Overburden	15	3.8 - 15	7.5	0	NA	NA
	Exposed ground	3	5.1 - 21	15.0	3	0.8 - 6.4	3.4

[a] References 2-5. NA = not applicable.
[b] Reference 1.
[c] Reference 6.
[d] Reference 7.

Adding aggregate material to a storage pile or removing it usually involves dropping the material onto a receiving surface. Truck dumping on the pile or loading out from the pile to a truck with a front end loader are examples of batch drop operations. Adding material to the pile by a conveyor stacker is an example of a continuous drop operation.

The quantity of particulate emissions generated by a batch drop operation, per ton of material transferred, may be estimated, with a rating of C, using the following empirical expression[2]:

$$E = k(0.00090)\ \frac{\left(\frac{s}{5}\right)\left(\frac{U}{2.2}\right)\left(\frac{H}{1.5}\right)}{\left(\frac{M}{2}\right)^{2}\left(\frac{Y}{4.6}\right)^{0.33}}\quad (\mathrm{kg/Mg}) \qquad (1)$$

$$E = k(0.0018)\ \frac{\left(\frac{s}{5}\right)\left(\frac{U}{5}\right)\left(\frac{H}{5}\right)}{\left(\frac{M}{2}\right)^{2}\left(\frac{Y}{6}\right)^{0.33}}\quad (\mathrm{lb/ton})$$

where: E = emission factor
k = particle size multipler (dimensionless)
s = material silt content (%)
U = mean wind speed, m/s (mph)
H = drop height, m (ft)
M = material moisture content (%)
Y = dumping device capacity, m^3 (yd^3)

The particle size multipler (k) for Equation 1 varies with aerodynamic particle size, shown in Table 11.2.3-2.

TABLE 11.2.3-2. AERODYNAMIC PARTICLE SIZE MULTIPLIER (k) FOR EQUATIONS 1 AND 2

Equation	< 30 µm	< 15 µm	< 10 µm	< 5 µm	< 2.5 µm
Batch drop	0.73	0.48	0.36	0.23	0.13
Continuous drop	0.77	0.49	0.37	0.21	0.11

The quantity of particulate emissions generated by a continuous drop operation, per ton of material transferred, may be estimated, with a rating of C, using the following empirical expression[3]:

$$E = k(0.00090)\ \frac{\left(\frac{s}{5}\right)\left(\frac{U}{2.2}\right)\left(\frac{H}{3.0}\right)}{\left(\frac{M}{2}\right)^2}\quad (\text{kg/Mg}) \qquad (2)$$

$$E = k(0.0018)\ \frac{\left(\frac{s}{5}\right)\left(\frac{U}{5}\right)\left(\frac{H}{10}\right)}{\left(\frac{M}{2}\right)^2}\quad (\text{lb/ton})$$

where: E = emission factor
k = particle size multiplier (dimensionless)
s = material silt content (%)
U = mean wind speed, m/s (mph)
H = drop height, m (ft)
M = material moisture content (%)

The particle size multiplier (k) for Equation 2 varies with aerodynamic particle size, as shown in Table 11.2.3-2.

Equations 1 and 2 retain the assigned quality rating if applied within the ranges of source conditions that were tested in developing the equations, as given in Table 11.2.3-3. Also, to retain the quality ratings of Equations 1 or 2 applied to a specific facility, it is necessary that reliable correction parameters be determined for the specific sources of interest. The field and laboratory procedures for aggregate sampling are given in Reference 3. In the event that site specific values for correction parameters cannot be obtained, the appropriate mean values from Table 11.2.3-1 may be used, but in that case, the quality ratings of the equations are reduced by one level.

TABLE 11.2.3-3. RANGES OF SOURCE CONDITIONS FOR EQUATIONS 1 AND 2[a]

Equation	Silt content (%)	Moisture content (%)	Dumping capacity		Drop height	
			m^3	yd^3	m	ft
Batch drop	1.3 - 7.3	0.25 - 0.70	2.10 - 7.6	2.75 - 10	NA	NA
Continuous drop	1.4 - 19	0.64 - 4.8	NA	NA	1.5 - 12	4.8 - 39

[a] NA = not applicable.

For emissions from equipment traffic (trucks, front end loaders, dozers, etc.) traveling between or on piles, it is recommended that the equations for vehicle traffic on unpaved surfaces be used (see Section 11.2.1). For vehicle travel between storage piles, the silt value(s) for the areas among the piles (which may differ from the silt values for the stored materials) should be used.

For emissions from wind erosion of active storage piles, the following total suspended particulate (TSP) emission factor equation is recommended:

$$E = 1.9 \left(\frac{s}{1.5}\right) \left(\frac{365-p}{235}\right) \left(\frac{f}{15}\right) \text{ (kg/day/hectare)} \qquad (3)$$

$$E = 1.7 \left(\frac{s}{1.5}\right) \left(\frac{365-p}{235}\right) \left(\frac{f}{15}\right) \text{ (lb/day/acre)}$$

where: E = total suspended particulate emission factor
s = silt content of aggregate (%)
p = number of days with $\geq$ 0.25 mm (0.01 in.) of precipitation per year
f = percentage of time that the unobstructed wind speed exceeds 5.4 m/s (12 mph) at the mean pile height

The coefficient in Equation 3 is taken from Reference 1, based on sampling of emissions from a sand and gravel storage pile area during periods when transfer and maintenance equipment was not operating. The factor from Test Report 1, expressed in mass per unit area per day, is more reliable than the factor expressed in mass per unit mass of material placed in storage, for reasons stated in that report. Note that the coefficient has been halved to adjust for the estimate that the wind speed through the emission layer at the test site was one half of the value measured above the top of the piles. The other terms in this equation were added to correct for silt, precipitation and frequency of high winds, as discussed in Reference 2. Equation 3 is rated C for application in the sand and gravel industry and D for other industries.

Worst case emissions from storage pile areas occur under dry windy conditions. Worst case emissions from materials handling (batch and continuous drop) operations may be calculated by substituting into Equations 1 and 2 appropriate values for aggregate material moisture content and for anticipated wind speeds during the worst case averaging period, usually 24 hours. The treatment of dry conditions for vehicle traffic (Section 11.2.1) and for wind erosion (Equation 3), centering around parameter p, follows the methodology described in Section 11.2.1. Also, a separate set of nonclimatic correction parameters and source extent values corresponding to higher than normal storage pile activity may be justified for the worst case averaging period.

11.2.3.4 Control Methods

Watering and chemical wetting agents are the principal means for control of aggregate storage pile emissions. Enclosure or covering of inactive piles to reduce wind erosion can also reduce emissions. Watering is useful mainly to reduce emissions from vehicle traffic in the storage pile area. Watering of the storage piles themselves typically has only a very temporary slight effect on total emissions. A much more effective technique is to apply chemical wetting agents for better wetting of fines and longer retention of the moisture film. Continuous chemical treatment of material loaded onto piles, coupled with watering or treatment of roadways, can reduce total particulate emissions from aggregate storage operations by up to 90 percent.[8]

References for Section 11.2.3

1. C. Cowherd, Jr., et al., Development of Emission Factors for Fugitive Dust Sources, EPA-450/3-74-037, U. S. Environmental Protection Agency, Research Triangle Park, NC, June 1974.

2. R. Bohn, et al., Fugitive Emissions from Integrated Iron and Steel Plants, EPA-600/2-78-050, U. S. Environmental Protection Agency, Research Triangle Park, NC, March 1978.

3. C. Cowherd, Jr., et al., Iron and Steel Plant Open Dust Source Fugitive Emission Evaluation, EPA-600/2-79-103, U. S. Environmental Protection Agency, Research Triangle Park, NC, May 1979.

4. R. Bohn, Evaluation of Open Dust Sources in the Vicinity of Buffalo, New York, U. S. Environmental Protection Agency, New York, NY, March 1979.

5. C. Cowherd, Jr., and T. Cuscino, Jr., Fugitive Emissions Evaluation, Equitable Environmental Health, Inc., Elmhurst, IL, February 1977.

6. T. Cuscino, et al., Taconite Mining Fugitive Emissions Study, Minnesota Pollution Control Agency, Roseville, MN, June 1979.

7. K. Axetell and C. Cowherd, Jr., Improved Emission Factors for Fugitive Dust from Western Surface Coal Mining Sources, 2 Volumes, EPA Contract No. 68-03-2924, PEDCo Environmental, Inc., Kansas City, MO, July 1981.

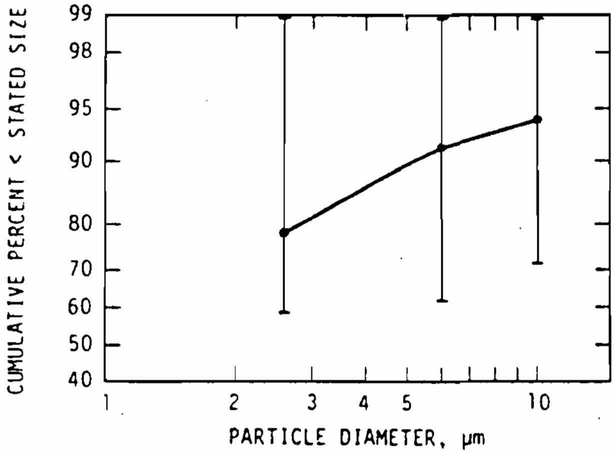
8. G. A. Jutze, et al., Investigation of Fugitive Dust Sources Emissions and Control, EPA-450/3-74-036a, U. S. Environmental Protection Agency, Research Triangle Park, NC, June 1974.

TABLE C.2-2 (continued).

Category: 9
Process: Condensation, Hydration, Absorption, Prilling and Distillation
Material: All

Category 9 covers condensation, hydration, absorption, prilling, and distillation of all materials. These processes involve the physical separation or combination of a wide variety of materials such as sulfuric acid and ammonium nitrate fertilizer. (Coke ovens are included since they can be considered a distillation process which separates the volatile matter from coal to produce coke.)

REFERENCE: 1, 3



Particle size, μm	Cumulative % less than or equal to stated size (uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	60			
2.0[a]	74			
2.5	78	59	99	17
3.0[a]	81			
4.0[a]	85			
5.0[a]	88			
6.0	91	61	99	12
10.0	94	71	99	9

[a] Value calculated from data reported at 2.5, 6.0, and 10.0 μm. No statistical parameters are given for the calculated value.

C.2.3 How To Use The Generalized Particle Size Distributions For Controlled Processes

To calculate the size distribution and the size specific emissions for a source with a particulate control device, the user first calculates the uncontrolled size specific emissions. Next, the fractional control efficiency for the control device is estimated, using Table C.2-3. The Calculation Sheet provided (Figure C.2-2) allows the user to record the type of control device and the collection efficiencies from Table C.2-3, the mass in the size range before and after control, and the cumulative mass. The user will note that the uncontrolled size data are expressed in cumulative fraction less than the stated size. The control efficiency data apply only to the size range indicated and are not cumulative. These data do not include results for the greater than 10 μm particle size range. In order to account for the total controlled emissions, particles greater than 10 μm in size must be included.

C.2.4 Example Calculation

An example calculation of uncontrolled total particulate emissions, uncontrolled size specific emissions, and controlled size specific emission is shown on Figure C.2-1. A blank Calculation Sheet is provided in Figure C.2-2.

TABLE C.2-3 TYPICAL COLLECTION EFFICIENCIES OF VARIOUS PARTICULATE CONTROL DEVICES.[a,b]
(percent)

Type of collector	Particle size, μm		
	0 - 2.5	2.5 - 6	6 - 10
Baffled settling chamber	NR	5	15
Simple (high-throughput) cyclone	50	75	85
High-efficiency and multiple cyclones	80	95	95
Electrostatic precipitator (ESP)	95	99	99.5
Packed-bed scrubber	90	95	99
Venturi scrubber	90	95	99
Wet-impingement scrubber	25	85	95
Fabric filter	99	99.5	99.5

[a] The data shown represent an average of actual efficiencies. The efficiencies are representative of well designed and well operated control equipment. Site specific factors (e.g., type of particulate being collected, varying pressure drops across scrubbers, maintenance of equipment, etc.) will affect the collection efficiencies. The efficiencies shown are intended to provide guidance for estimating control equipment performance when source-specific data are not available.

[b] Reference: 10

NR = Not reported.

EXCERPTS FROM NCASI PUBLICATIONS

ncasi technical bulletin

NATIONAL COUNCIL OF THE PAPER INDUSTRY FOR AIR AND STREAM IMPROVEMENT, INC., 260 MADISON AVENUE, NEW YORK, N.Y. 10016

A STUDY OF NITROGEN OXIDES EMISSIONS FROM LIME KILNS

ATMOSPHERIC QUALITY IMPROVEMENT
TECHNICAL BULLETIN No. 107

APRIL 1980

Encl. #5

$$E_{NO_2} = \frac{w(86) + x(130) + y(210) + z(260)}{100}$$

where:

E_{NO_2} = is the applicable standard for nitrogen oxides when multiple fuels are combusted simultaneously (ng/J heat input);

w = is the percentage of total heat input derived from the combustion of fuels subject to the 86 ng/J heat input standard;

x = is the percentage of total heat input derived from the combustion of fuels subject to the 130 ng/J heat input standard;

y = is the percentage of total heat input derived from the combustion of fuels subject to the 210 ng/J input standard; and

z = is the percentage of total heat input derived from the combustion of fuels subject to the 260 ng/J heat input standard.

Since the NOx emissions on any source are determined as nitrogen dioxide (NO_2) on a parts per million (ppm) concentration basis, the data must be converted to the appropriate units of pounds NOx as NO_2 per million Btu heat input. This can be accomplished through the measurement of (a) excess oxygen, (b) the combustion gas flow rate, and (c) the quantity and heat content of the fuel burned. As specified in the Federal Register (116), the TRS and particulate matter concentrations determined after a kraft mill lime kiln control device must be adjusted to ten percent excess oxygen content whether it is greater or less than ten percent. This adjustment addresses the need to normalize pollutant emission concentration data for various degrees of gas stream dilution through transport ducts, fans and control devices. For this reason, the NOx three-hour average concentration data in this bulletin is presented on both a measured stack concentration and also adjusted to ten percent oxygen. At all sites tested, the stack flue gas oxygen level at the point of measurement was less than ten percent oxygen.

B. Lime Kiln Sites

The oxides of nitrogen emission results for the five kilns sampled are presented in Table 3. As specified in the Federal Register (34), the data was compiled into first, hourly averages and then into three-hour averages. The mean and range for each site are noted in the table. The NOx concentration in parts per million, measured at stack conditions, is directly above the NOx concentration mean adjusted to ten percent excess oxygen. Both the three-hour mean and range are given in Table 3 with units of pounds NOx per million Btu heat input and nanograms NOx per Joule

TABLE 3 OXIDES OF NITROGEN FIELD MEASUREMENTS FOR LIME KILNS SAMPLED

Location & Fuel Type	NOx (3) Hour Average Mean			NOx (3) Hour Average Range		
	(ppm)	(lb/10^6 Btu)	(ng/J)[1]	(ppm)	(lb/10^6 Btu)	(ng/J)[1]
1: Oil	185 (130)*	0.850	365	165- 215	0.750- 0.990	325- 425
2: Oil	80 (55)*	0.155	65	35- 145	0.065- 0.285	30- 120
3: Oil	50 (45)*	0.160	70	25- 65	0.085- 0.215	35- 90
4A: Oil	150 (100)*	0.310	135	110- 260	0.230- 0.545	100- 235
4B: Gas	145 (100)*	0.290	125	95- 195	0.195- 0.390	85- 165
5: Gas	310 (275)*	0.780	335	145- 430	0.334- 1.125	150- 485

---

1. 1 lb/10^6 Btu = 430 nanograms per Joule heat input.

* Adjusted to 10 percent oxygen in the flue gas. The other ppm oxygen concentration data corresponds to actual stack oxygen levels shown in Table 2.

heat input for each of the five sites and six combustion modes studied. These NOx emission values correspond to the time testing interval noted in Table 2. The NOx mean and upper range found for each site in units of pounds NOx per million Btu are depicted in Figure 3. All of the lime kiln sources represented in this figure except Nos. 4B and 5 corresponded to 100 percent oil fuel firing. The two exceptions were kiln sites fired on 100 percent natural gas during the study period.

The dashed line at 0.30 pounds NOx per million Btu in Figure 3 indicates the standard for oil fired boilers. The lower dashed line at 0.20 pounds NOx per million Btu corresponds to the standard for natural gas fired boilers. As shown in the figure, three out of four of the kilns fired on oil had at least one three-hour interval over 0.30 pounds NOx per million Btu. Two of these three sites were found to have data means over the oil fired boiler standard. Both of the kilns which fired natural gas had a majority of their three-hour NOx averages which were above the standard for natural gas fired boilers.

The wide range and high three-hour average NOx emission levels found for the natural gas fired kiln at site No. 5 point toward a potential dependence of NOx concentrations over the normal range of this particular burner operation. A relationship between combustion zone temperature and NOx emission rate was obtained in a study by NCASI personnel with the use of an optical pyrometer and is presented in Figure 4. The relationship in the figure was based on a total of 37 data points. The solid portion of the curve indicates the use of linear regression techniques performed on 33 of these data points which were judged to follow a close linear distribution to give the following equation having a correlation coefficient, R, of 0.965:

$$\frac{\text{lb NOx}}{10^6 \text{ Btu}} = 2.17 \times 10^{-3} \text{ (Temperature, °F)} - 3.58$$

The dashed portion of the center curve was a smooth fit approximation through the remaining four data points. Based on the data collected encompassing various modes of burner operation at this site, there was judged to be a potential for reduction of NOx emissions to less than 0.4 pounds per million Btu. Adjustment of the gas firing rate and the excess air levels supplied to the kiln's burner may enable the combustion zone temperature as measured by the optical pyrometer to be controlled at less than 1850°F. Below this temperature the NOx to combustion zone temperature relationship was judged to be insignificant for the limited amount of data collected. The normal combustion zone temperature for long kilns usually averages about 2000°F with as much as 2375°F required for short kilns. The minimum temperature at which calcium carbonate dissociates and the partial pressure of carbon dioxide reaches one atmosphere is 1670°F (123). Heat and radiation losses of up to 40% in combination with the energy required to evaporate 30 to 40% water carried in the lime mud charged to the kiln, makes the minimum combustion zone temperature somewhat higher than this value.

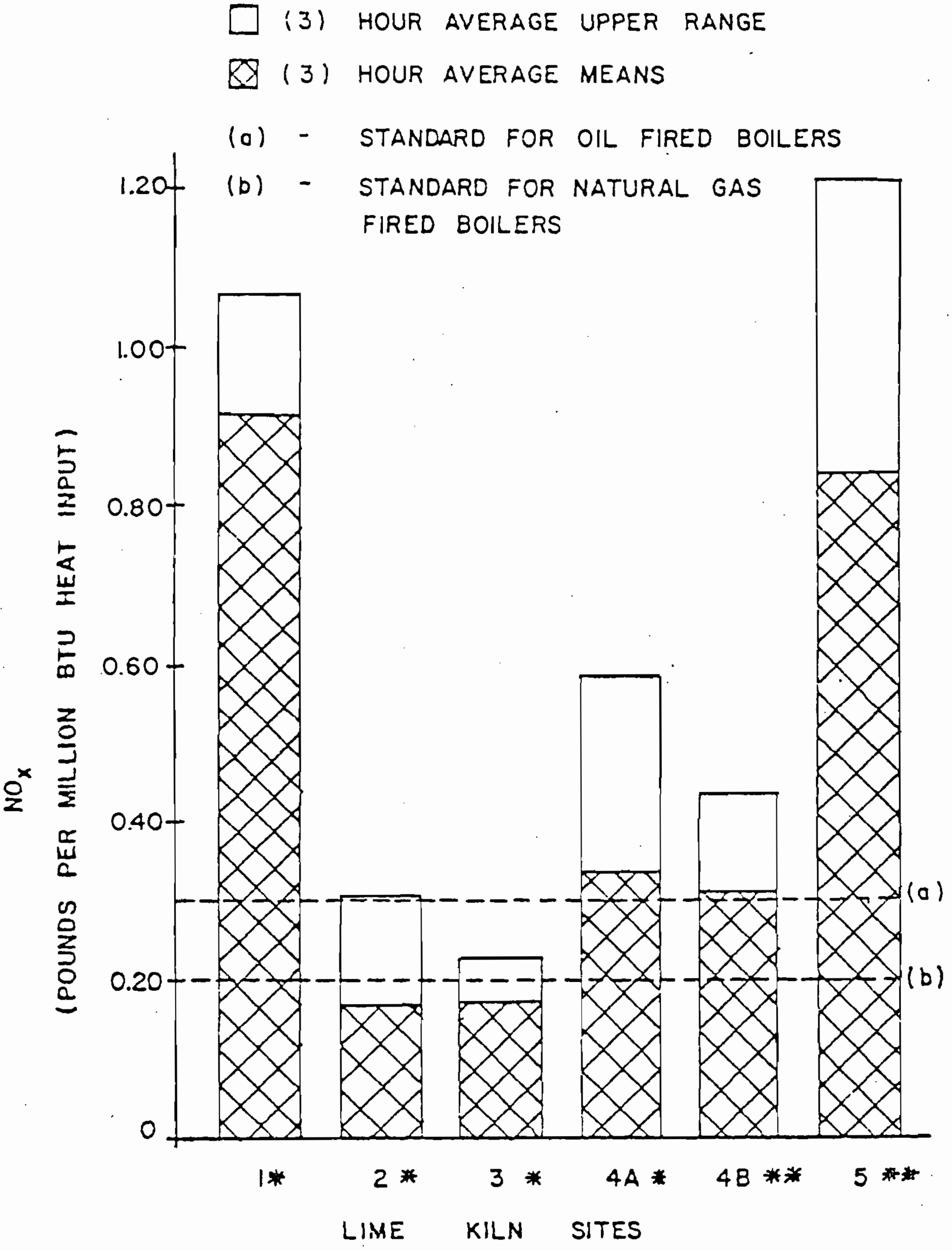


FIGURE 3. NOx EMISSION LEVELS FOR KRAFT MILL LIME KILNS SAMPLED

* OIL FIRED
** NATURAL GAS FIRED

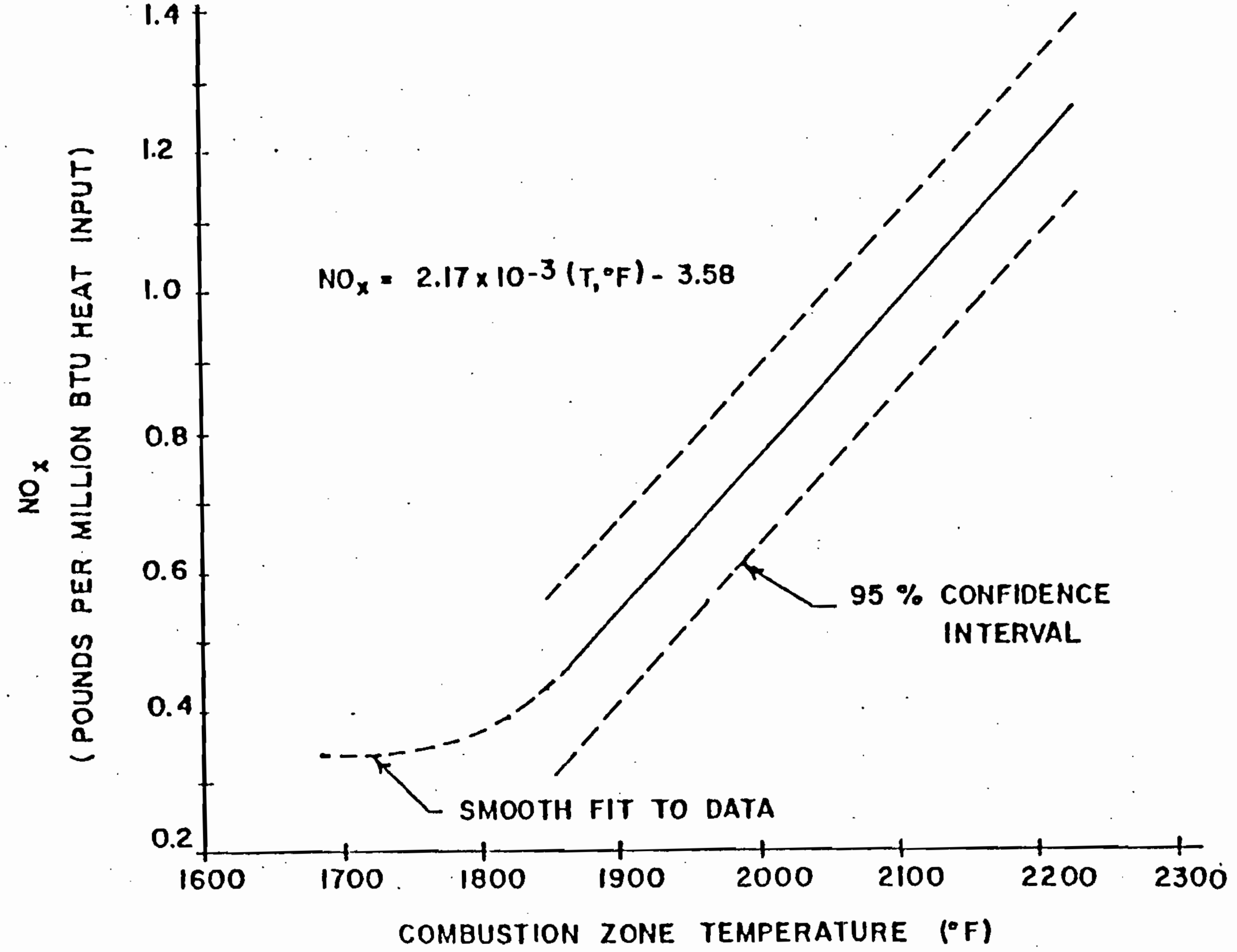


FIGURE 4. THE RELATIONSHIP BETWEEN COMBUSTION ZONE TEMPERATURE AND NOx EMISSIONS

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NATIONAL COUNCIL OF THE PAPER INDUSTRY FOR AIR AND STREAM IMPROVEMENT, INC., 260 MADISON AVENUE, NEW YORK, N.Y. 10016

CARBON MONOXIDE EMISSIONS FROM SELECTED COMBUSTION SOURCES BASED ON SHORT-TERM MONITORING RECORDS

TECHNICAL BULLETIN NO. 416

JANUARY 1984

B. Kraft Recovery Furnaces

Carbon monoxide monitoring records from five kraft recovery furnaces were collected and analyzed. These recovery furnaces represent both DCE and non-DCE units with construction dates ranging from 1964 to 1977. Table 2 lists characteristics of these furnaces.

TABLE 2 RECOVERY FURNACE DESIGN INFORMATION

Furnace	Manufacturer	Installment Date	Type	Rated Black Liquor Firing Rate lb/hr	Average Black Liquor Firing Rate lb/hr	Black Liquor Heat Value Btu/lb Dry Solids
A	CE	1970	NDCE	100,000	80,000	5,717
B	CE	1964	DCE	100,000	103,000	5,955
C	CE	1977	NDCE	190,000	148,000	6,600
D	CE	1975	DCE	137,500	137,000	6,000
E	B & W (short)	1965	DCE	96,000	79,000	--

C. Lime Kilns

Carbon monoxide monitoring data from two recently constructed lime kilns were collected.

(1) Kiln A - Kiln A was a rotary kiln manufactured by Allis Chalmers and began operation in 1968. The kiln has a 9 ft diameter and 250 ft length with provisions for firing on either gas or oil. Noncondensible gases from the pulp mill were not burned in the kiln. The kiln was designed to produce 106 tons lime as CaO per day for the equivalent production of 425 TPD unbleached pulp. Particulate emissions were controlled with a Chemico venturi type scrubber, which used fresh water for makeup.

(2) Kiln B - Kiln B was rotary kiln manufactured by F. L. Smidth and Co., Inc. and began operation in early 1982. The kiln has a diameter of 11.83 ft (less 1.75 ft for the brick lining at the hot end) and a length of 341 ft. The kiln fires No. 6 oil or natural gas and has a lime production capacity of 325 tons per day as CaO. This kiln used lime product coolers to preheat the combustion air. Noncondensible gases from the pulp mill were not burned in this kiln.

increase. This was at about 350 ppm carbon monoxide. The kraft recovery furnaces studied that were equipped with non-direct contact evaporators operated with higher furnace exit gas oxygen concentrations than the NDCE-equipped furnaces. These furnaces maintained carbon monoxide below 400 ppm and TRS emissions were below 5 ppm throughout the study period.

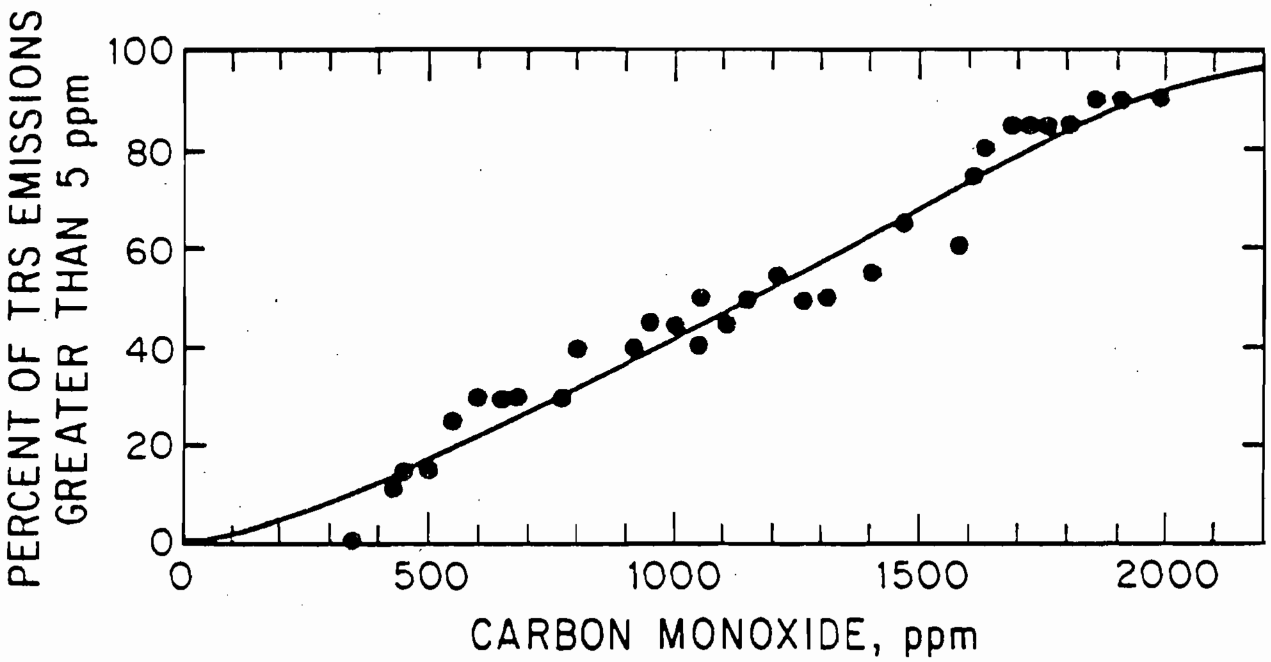

FIGURE 23

PERCENT OF TRS EMISSIONS GREATER THAN 5 ppm AS A FUNCTION OF CARBON MONOXIDE CONCENTRATIONS IN THE STACK GASES AT RECOVERY FURNACE C

Carbon monoxide-TRS emission relationships for these five units were inadequate to determine if carbon monoxide monitoring could serve as a surrogate for TRS monitoring. An additional study is required to determine if this is the case. Carbon monoxide monitoring, however, was indicated to be an effective tool to assist the furnace operator in reducing TRS emissions excursions from the furnace.

E. Lime Kiln Carbon Monoxide Emission

Averages of carbon monoxide emission data collected from two lime kilns during this survey, kilns A and B, representing 200 and 60 hours of data respectively, and two lime kilns during TGNMO emissions survey (5), kilns C and D, are listed in Table 6. Cumulative frequency distributions of 1 hr and 8 hr average carbon monoxide emissions from kilns A and B are shown in Figures 24 and 25. Average 1 hr carbon monoxide emissions from kilns A and B were less than 0.03 lb/10^6 Btu heat input greater than 70 percent of the time. Occasional process upsets, such as too little excess combustion air or unstable flame conditions resulted in occasional short-term, high concentrations of carbon monoxide. Carbon monoxide emissions during these momentary aberrations increased average emissions from baseline levels. Median 1 hr average carbon monoxide emissions were at 0.008 and 0.023 lb/10^6 Btu for kilns A and B respectively. Lime kiln C was an older unit and did not have an operating oxygen monitor when sampled. This may have been in part responsible for the higher carbon monoxide emission rates measured.

TABLE 6 AVERAGE LIME KILN CARBON MONOXIDE EMISSIONS

Kiln	Hours of Data	lb CO/10^6 Btu	lb CO/ton Lime	lb CO/ADT Pulp
A	60	0.038	0.17	0.051
B	200	0.041	0.19	0.058
C	14	0.080	0.41	0.120
D	8	0.020	0.12	0.035

F. Carbon Monoxide Emissions at Optimum Energy Recovery Efficiency

Recovery furnaces and wood-residue fired boilers can be optimized for energy recovery by balancing reduced stack heat losses from low excess combustion air use against energy losses from uncombusted carbon monoxide in the flue gases. Figure 26 shows stack energy losses from three kraft recovery furnaces as a function of the stack gas oxygen concentration and CO concentrations typical of the flue gas oxygen concentration shown for the indicated furnace. Each recovery furnace is indicated to have an optimum operating range. The carbon monoxide emission concentrations in the exit gas at maximum energy recovery were between 300 to 1000 ppm, which corresponded to between 1.1 to 3.8 lb CO/10^3 lb bls. These values will vary somewhat with stack gas temperature. A higher stack gas temperature should result in a narrower range in carbon monoxide emission rates at maximum energy recovery. If recovery furnaces are optimized for energy recovery, it would be expected that carbon monoxide emission rate will be within the range mentioned above. A carbon monoxide concentration of 300 ppm or about 1 lb CO/10^3 lb bls was

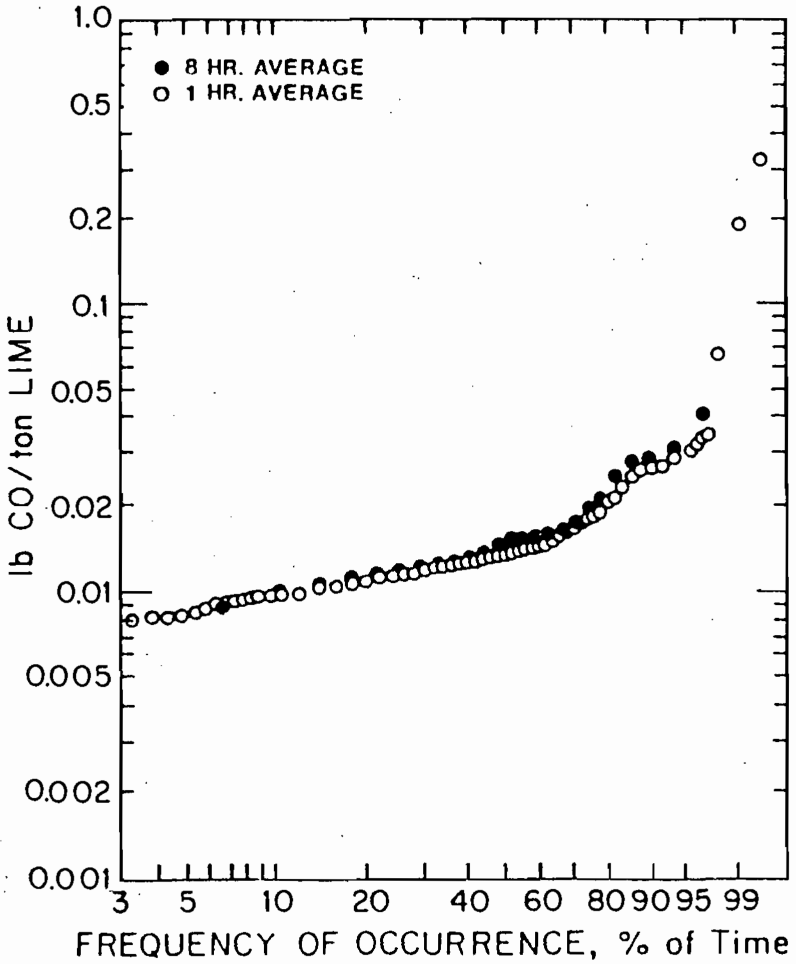

FIGURE 24

FREQUENCY OF OCCURRENCE OF CO EMISSIONS MEASURED AT LIME KILN A

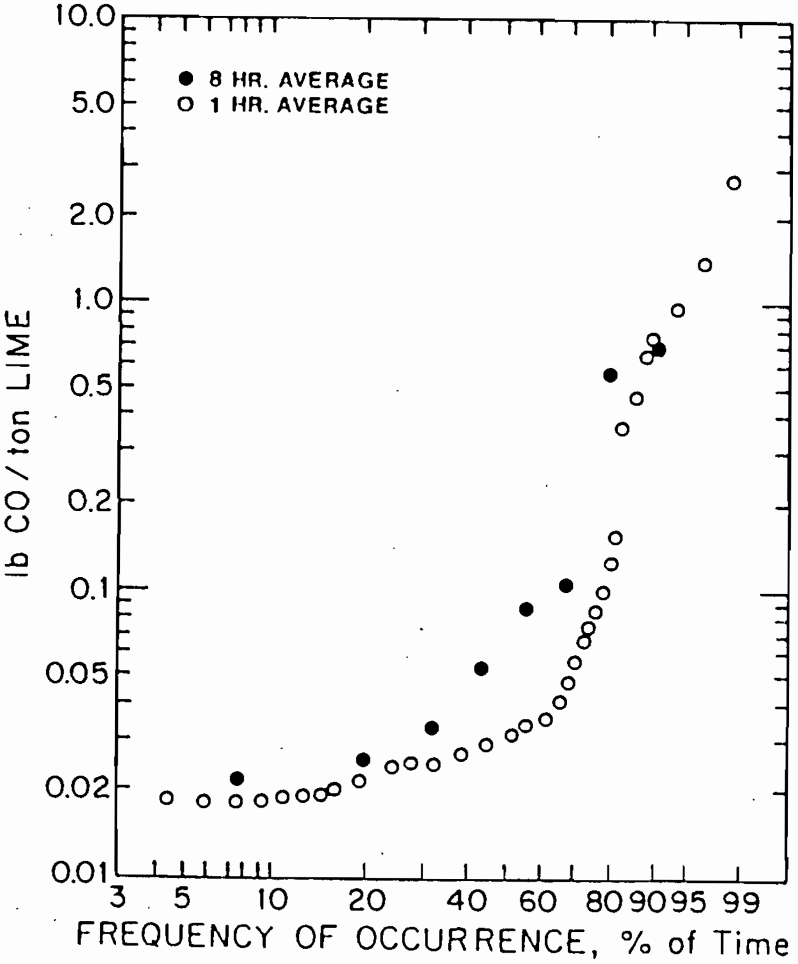

FIGURE 25

FREQUENCY OF OCCURRENCE OF CO EMISSIONS MEASURED AT LIME KILN B

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NATIONAL COUNCIL OF THE PAPER INDUSTRY FOR AIR AND STREAM IMPROVEMENT, INC., 260 MADISON AVENUE, NEW YORK, N.Y. 10016

A STUDY OF KRAFT PROCESS LIME KILN TOTAL GASEOUS NON-METHANE ORGANIC EMISSIONS

TECHNICAL BULLETIN NO. 358

SEPTEMBER 1981

The National Council is currently surveying total gaseous non-methane organic emissions from selected sources in the forest products industry to provide a data base on potential emissions to be expected from various sources. It is the aim of this project to produce data consistent with the EPA reference method to be selected for the measurement of total gaseous non-methane organic compounds (TGNMO). The sampling and analysis procedures used in this study were in accordance with proposed EPA Method 25, published in the Federal Register October 3, 1980 (Appendix A) (2).

The EPA analytical procedure yields values for carbon monoxide, carbon dioxide, methane and total gaseous non-methane organics. The analytical procedure was altered to produce results for ethane and ethylene. Methane and ethane are not photoreactive and were not included in the results. The total gaseous non-methane organics (TGNMO) results are reported as methane. The following presents and discusses the sampling equipment, the procedures used, and results obtained from the kraft process lime kiln portion of this study. The kilns sampled were considered as representative of current kiln design and operating practices.

II KILN DESCRIPTIONS

Three lime kilns were sampled for TGNMO emissions both before and after wet scrubbers.

Kiln A is a rotary kiln manufactured by Allis Chalmers and began operation in 1968. The kiln is 9 ft. in diameter and 250 ft. long and can be fired on either gas or oil. Noncondensible gases from the pulp mill are not burned in the kiln. The kiln was designed to produce lime for production of 106 tons per day CaO (425 TPD of unbleached pulp). Fresh water was used throughout the causticizing system. Particulate emissions were controlled with a Chemico venturi type scrubber, which used fresh water for makeup.

Kiln B is a rotary kiln manufactured by Allis Chalmers and began operation in 1964. The kiln is 8 ft. in diameter and 250 ft. long and can be fired with either gas or oil. Noncondensible gases from the pulp mill were burned in the kiln. The kiln was designed to produce 90 tons per day CaO (360 tons pulp per day) but normally operated at 120 to 140 tons per day CaO. Evaporator condensates are used as makeup water throughout the causticizing system and in the scrubber. Particulate emissions were controlled with a Peabody bubble tray falling film scrubber.

Kiln C is a rotary kiln manufactured by Taylor Co. and began operation in 1980. The kiln is 11 ft. 6 in. in diameter and 330 ft. long. Combustion air was preheated by flowing over the outside of the hot end of the kiln. Noncondensible gases were burned in the kiln. The kiln was designed to produce 245 tons per day product (980 tons pulp per day). Fresh water was used for makeup throughout the causticizing system. Particulate emissions were controlled by an Air Pollution Industries venturi scrubber operating at a 30 to 32 in. pressure drop. Fresh water was used throughout the causticizing system for makeup.

III SAMPLING AND ANALYSIS METHOD

The procedure used for data collection was similar to the one developed by the Southern California Air Pollution Control District and EPA method 25 (Appendix A) procedures. The principle of the procedure is to separate organic compounds at the time of collection into high and low molecular weight fractions using a cold trap (-78°C). The light components are captured in an evacuated tank. The trap containing condensed organics is burned to convert organics to CO_2 for analysis in the laboratory. The light organics captured in the evacuated tank are separated on a chromatographic column yielding concentrations for CO, CH_4, CO_2, C_2H_6 and C_2H_4. All other organics are eluted in one peak. Summation of the trap and tank organic results gives TGNMO stack concentrations. All results are reported as methane.

A. Sampling

Field samples were taken simultaneously in duplicate through separate 1/2 in. stainless steel probes. The stack end of the probes were filled with glass wool before each sample was drawn to prevent collection of particulates in the traps. Six feet of 1/8 in. stainless steel tubing ran from the probes to the traps which were submerged in granular dry ice. The connection between the probe and sampling line was kept inside the stack during sampling. Skematics of the trap construction and sampling assembly are presented in Figures 1 and 2, respectively. Condensible organics and water vapor were captured in the traps. From the traps the gas flowed through a rotometer, a flow control valve, and into a 17-liter evacuated stainless steel tank.

All screw connections in the sampling system were checked for leaks in the field before sampling by pressurizing with air at 30 psi and soaking the joints individually with soapy water. Leaks detected were eliminated prior to sampling.

Sampling flow rates were set at about 230 ml/min so that about 13 liters of sample were collected in the one hour sampling period. When a trap froze due to condensation of stack moisture, the trap inlet was heated momentarily with a propane torch to melt the ice. The sampling system was watched closely to maintain the proper flow rate. After sampling, the trap and 6-foot section of line to the probe were capped and transported to the laboratory packed in dry ice. Tank pressures were measured before and after sampling to determine sample size. Orsat analyses were made for CO_2 and O_2 during sampling.

$$SSc = \frac{Tc^2}{n} - \frac{T^2}{N}.$$

$$SSt = \Sigma x^2 - \frac{T^2}{N}$$

$$SSr = SSt - SSc$$

Shown below is a table to calculate the mean squares and separate estimates of variance due to analytical or wood-residue boiler sources.

Source of Variation	Squares (SS)	Freedom (DF)	Square,(MS) (MS=SS/DF)	Mean Square Ratio (MSR)	Parameters Estimated
Boilers	SSc	c-1		$\frac{MSc}{MSr}$	$\sigma^2 + n\sigma_a^2$
Experimental	SSr	c(n-1)			σ^2

When the MSR is less than the appropriate F statistic from the F distribution tables, the variation appearing in the data is due to the randomness resulting from the analytical procedures and not necessarily from the source.

An estimate of the variance of the TGNMO from the boilers is calculated by:

$$S_a^2 = \frac{SSc/(c-1) - SSr/c(n-1)}{n}$$

An estimate of the variance of the analytical procedure (S_r^2) is given by σ^2.

VI RESULTS

All the TGNMO ppm results were corrected for the CO_2 interference as shown in Appendix B. Average CO_2 interferences were 73, 62, and 34 ppm, which represented 75%, 19%, and 109% of the corrected TGNMO for kilns A-C, respectively. The subsequent data presented in this report has been corrected for the CO_2 interference.

Table 6 presents TGNMO emission data in terms of ppm CH_4, lb/ton lime produced, and lb/ton unbleached pulp, along with kiln operation information. The TGNMO emissions expressed as lb/ton unbleached pulp was calculated by assuming 0.3 tons of lime are required to produce 1 ton of pulp. Average TGNMO emissions from the kilns were 0.41, 1.6, and 0.24 lb/ton CaO produced or 0.12, 0.48, and 0.07 lb/ton pulp produced for kilns A-C, respectively. In terms of energy input to the kilns, the TGNMO emissions were 0.060, 0.30, and 0.037 lb/10^6 Btu, respectively.

Kiln B produced the highest emissions. The high TGNMO emission rate from this kiln likely resulted from organics introduced to the lime mud by the use of evaporator condensates in the lime mud washing system and at the scrubber. These organics were driven into the gas stream at the cold end of the kiln where the lime mud is dried at the scrubber.

Fresh water was being used in sprays to further wash the mud on the lime mud filter for the first 5 data entries for lime kiln B in Table 6. The TGNMO emissions were higher when fresh water was being used than when evaporator condensates were being used on the lime mud filter sprays. This result is contrary to what may be expected if the organic compounds emitted were introduced to the process through the wash water.

The TGNMO emissions from kiln A could also be due in part to organic compounds contained in the water associated with the lime mud rather than from uncombusted fuel. This kiln and causticizing system was operating over capacity and there were green liquor dregs in the lime mud. Dregs are composed of unburned carbon and products of corrosion contained in the smelt from the recovery furnace. Between 40 to 56% of dregs are lost upon ignition (6). It is possible that the unburned carbon contained volatile organic compounds and were emitted at the cold end of the kiln during drying.

To assess if the TGNMO emissions were associated with the lime mud or a product of combustion, a laboratory study on the lime mud organic content was performed. A measured quantity of lime mud from kiln A was heated to drive off water and organic compounds into the sample preparation system in the TGNMO analysis procedure. Results showed a potential emission rate of 0.44 lb TGNMO per ton lime produced when heated. Corrected field sampling results showed emissions of 0.37 lb/ton lime produced at the time the lime mud sample was collected.

It appears that organics present in the lime mud may be responsible for a significant portion of TGNMO emissions from this kiln. More studies of a similar nature on other lime kilns and a variety of lime muds are advisable to better define this potential relationship.

TGNMO emissions from kiln C were the lowest of the three kilns studied. This kiln burned noncondensible gases. It is not known whether burning of noncondensible gases contributes to TGNMO

TABLE 6 LIME KILN TGNMO EMISSIONS AND OPERATING PARAMETERS

	TGNMO		Stack Flow	Lime Produced	Gas Burned	Oil Burned	10^6 Btu Input	TGNMO
ppm CH_4	lb/Ton CaO	lb/Ton Pulp	DSCFM	Tons/hr	cfm	gpm	Ton CaO	lb/10^6 Btu
Kiln A								
112	0.52	0.16	10,700	7.0	650		5.7	0.091
214	0.96	0.29	12,200	8.2	–	–		
82	0.37	0.11	12,200	8.2	–	–		
126	0.49	0.15	9,400	7.2		4.4	5.5	0.089
62	0.24	0.07	9,400	7.2		4.4	5.5	0.043
1	0.01	0.00	13,200	4.8		4.5	8.5	0.001
121	0.52	0.16	8,000	5.6	550		6.1	0.086
56	0.20	0.06	10,300	8.6		3.8	4.0	0.050
Avg. 97	0.41	0.12						0.060
Kiln B								
570	2.5	0.75	8,600	5.9	500		5.2	0.48
360	2.0	0.60	9,700	5.4	470		5.4	0.37
340	1.8	0.54	9,700	5.4	470		5.4	0.33
180	0.8	0.24	8,700	6.0	546		5.6	0.14
360	1.6	0.49	9,000*	6.0	460		4.7	0.34
250	1.6	0.49	10,400*	4.8	470		6.0	0.26
320	1.2	0.36	8,600	6.8	495		4.5	0.27
240	0.9	0.27	7,300	6.2	500		5.0	0.18
Avg. 328	1.6	0.48						0.30
Kiln C								
38	0.35	0.11	16,800	6.1		5.0	7.4	0.047
26	0.15	0.04	22,000	9.9		5.4	4.9	0.031
43	0.33	0.10	17,800	7.4		4.6	5.6	0.045
18	0.14	0.04	18,600	7.4		4.8	5.9	0.024
Avg. 31	0.24	0.07						

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* Flow rates calculated from material balance

emissions. Possible contribution to TGNMO emission from lime mud contaminants was not investigated at this kiln.

TGNMO emission changes across the scrubbers on each lime kiln were monitored by simultaneous sampling before and after the scrubber. Table 7 shows the results. All three kilns showed a slight increase in emissions across the scrubber. The increases found, however, were not statistically significant. A large number of samples would be required to show a definite trend.

TABLE 7 CHANGE IN TGNMO EMISSIONS ACROSS SCRUBBER

	TGNMO Before Scrubber ppm	TGNMO After Scrubber ppm	TGNMO Change
Kiln A	1	63	+62
	122	163	+41
	56	90	+34
Avg.	60	105	+45
Kiln B	195	225	+30
	361	264	-97
	246	263	+17
	198	272	+74
Avg.	250	206	+ 6
Kiln C	20	40	+20
	44	57	+13
Avg.	32	48	+16

The precision of the data as indicated by duplicate samples was obtained from an analysis of variance. Results of the analysis of variance on the TGNMO data in terms of lb/ton CaO produced are listed in Table 8. These results indicated: (1) significant variation in the results not caused by random sampling and analysis error exist in the data from kilns A and B, (2) that the average of a single paired sample is within ±0.14, ±0.64, and ±0.19 lb/ton CaO produced of the true value at the 95% confidence level for kilns A-C respectively, and (3) that the average TGNMO emissions reported for each lime kiln are within ±0.22, ±1.33, and ±0.08 lb/ton lime produced of the true average at the 95% confidence level for kilns A-C respectively.

ADDITIONAL REFERENCES

or operator may use any of the following procedures during a performance test:

(1) Base compliance on control of the combined emissions;

(2) Utilize a method acceptable to the Administrator that compensates for the emissions from the facilities not subject to the provisions of this subpart, or;

(3) Any combination of the criteria of paragraphs (h)(1) and (h)(2) of this section.

(i) Where emissions from any EAF(s) or AOD vessel(s) are combined with emissions from facilities not subject to the provisions of this subpart, determinations of compliance with § 60.272a(a)(3) will only be based upon emissions originating from the affected facility(ies).

(j) Unless the presence of inclement weather makes concurrent testing infeasible, the owner or operator shall conduct concurrently the performance tests required under § 60.8 to demonstrate compliance with § 60.272a(a) (1), (2), and (3) of this subpart.

§ 60.276a Recordkeeping and reporting requirements.

(a) Records of the measurements required in § 60.274a must be retained for at least 2 years following the date of the measurement.

(b) Each owner or operator shall submit a written report of exceedances of the control device opacity to the Administrator semi-annually. For the purposes of these reports, exceedances are defined as all 6-minute periods during which the average opacity is 3 percent or greater.

(c) Operation at a furnace static pressure that exceeds the value established under § 60.274a(g) and either operation of control system fan motor amperes at values exceeding ±15 percent of the value established under § 60.274a(c) or operation at flow rates lower than those established under § 60.274a(c) may be considered by the Administrator to be unacceptable operation and maintenance of the affected facility. Operation at such values shall be reported to the Administrator semiannually.

(d) The requirements of this section remain in force until and unless EPA, in delegating enforcement authority to a State under section 111(c) of the Act, approves reporting requirements or an alternative means of compliance surveillance adopted by such State. In that event, affected sources within the State will be relieved of the obligation to comply with this section, provided that they comply with the requirements established by the State.

(e) When the owner or operator of an EAF or AOD is required to demonstrate compliance with the standard under § 60.275a (h)(2) or (h)(3), the owner or operator shall obtain approval from the Administrator of the procedure(s) that will be used to determine compliance. Notification of the procedure(s) to be used must be postmarked 30 days prior to the performance test.

(Approved by the Office of Management and Budget under control number 2060-0038)

Subpart BB—Standards of Performance for Kraft Pulp Mills

§ 60.280 Applicability and designation of affected facility.

(a) The provisions of this subpart are applicable to the following affected facilities in kraft pulp mills: Digester system, brown stock washer system, multiple-effect evaporator system, recovery furnace, smelt dissolving tank, lime kiln, and condensate stripper system. In pulp mills where kraft pulping is combined with neutral sulfite semichemical pulping, the provisions of this subpart are applicable when any portion of the material charged to an affected facility is produced by the kraft pulping operation.

(b) Except as noted in § 60.283(a)(1)(iv), any facility under paragraph (a) of this section that commences construction or modification after September 24, 1976, is subject to the requirements of this subpart.

[51 FR 18544, May 20, 1986]

§ 60.281 Definitions.

As used in this subpart, all terms not defined herein shall have the same meaning given them in the Act and in Subpart A.

(a) "Kraft pulp mill" means any stationary source which produces pulp from wood by cooking (digesting) wood chips in a water solution of sodium hydroxide and sodium sulfide (white liquor) at high temperature and pressure. Regeneration of the cooking chemicals through a recovery process is also considered part of the kraft pulp mill.

(b) "Neutral sulfite semichemical pulping operation" means any operation in which pulp is produced from wood by cooking (digesting) wood chips in a solution of sodium sulfite and sodium bicarbonate, followed by mechanical defibrating (grinding).

(c) "Total reduced sulfur (TRS)" means the sum of the sulfur compounds hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide, that are released during the kraft pulping operation and measured by Reference Method 16.

(d) "Digester system" means each continuous digester or each batch digester used for the cooking of wood in white liquor, and associated flash tank(s), below tank(s), chip steamer(s), and condenser(s).

(e) "Brown stock washer system" means brown stock washers and associated knotters, vacuum pumps, and filtrate tanks used to wash the pulp following the digestion system. Diffusion washers are excluded from this definition.

(f) "Multiple-effect evaporator system" means the multiple-effect evaporators and associated condenser(s) and hotwell(s) used to concentrate the spent cooking liquid that is separated from the pulp (black liquor).

(g) "Black liquor oxidation system" means the vessels used to oxidize, with air or oxygen, the black liquor, and associated storage tank(s).

(h) "Recovery furnace" means either a straight kraft recovery furnace or a cross recovery furnace, and includes the direct-contact evaporator for a direct-contact furnace.

(i) "Straight kraft recovery furnace" means a furnace used to recover chemicals consisting primarily of sodium and sulfur compounds by burning black liquor which on a quarterly basis contains 7 weight percent or less of the total pulp solids from the neutral sulfite semichemical process or has green liquor sulfidity of 28 percent or less.

(j) "Cross recovery furnace" means a furnace used to recover chemicals consisting primarily of sodium and sulfur compounds by burning black liquor which on a quarterly basis contains more than 7 weight percent of the total pulp solids from the neutral sulfite semichemical process and has a green liquor sulfidity of more than 28 percent.

(k) "Black liquor solids" means the dry weight of the solids which enter the recovery furnace in the black liquor.

(l) "Green liquor sulfidity" means the sulfidity of the liquor which leaves the smelt dissolving tank.

(m) "Smelt dissolving tank" means a vessel used for dissolving the smelt collected from the recovery furnace.

(n) "Lime kiln" means a unit used to calcine lime mud, which consists primarily of calcium carbonate, into quicklime, which is calcium oxide.

(o) "Condensate stripper system" means a column, and associated condensers, used to strip, with air or steam, TRS compounds from condensate streams from various processes within a kraft pulp mill.

[43 FR 7572, Feb. 23, 1978, as amended at 51 FR 18544, May 20, 1986]

§ 60.282 Standard for particulate matter.

(a) On and after the date on which the performance test required to be conducted by § 60.8 is completed, no owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere:

(1) From any recovery furnace any gases which:

(i) Contain particulate matter in excess of 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen.

(ii) Exhibit 35 percent opacity or greater.

(2) From any smelt dissolving tank any gases which contain particulate matter in excess of 0.1 g/kg black liquor solids (dry weight)[0.2 lb/ton black liquor solids (dry weight)].

(3) From any lime kiln any gases which contain particulate matter in excess of:

(i) 0.15 g/dscm (0.067 gr/dscf) corrected to 10 percent oxygen, when gaseous fossil fuel is burned.

(ii) 0.30 g/dscm (0.13 gr/dscf) corrected to 10 percent oxygen, when liquid fossil fuel is burned.

[43 FR 7572, Feb. 23, 1978]

§ 60.283 Standard for total reduced sulfur (TRS).

(a) On and after the date on which the performance test required to be conducted by § 60.8 is completed, no owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere:

(1) From any digester system, brown stock washer system, multiple-effect evaporator system, or condensate stripper system any gases which contain TRS in excess of 5 ppm by volume on a dry basis, corrected to 10 percent oxygen, unless the following conditions are met:

(i) The gases are combusted in a lime kiln subject to the provisions of paragraph (a)(5) of this section; or

(ii) The gases are combusted in a recovery furnace subject to the provisions of paragraphs (a)(2) or (a)(3) of this section; or

(iii) The gases are combusted with other waste gases in an incinerator or other device, or combusted in a lime kiln or recovery furnace not subject to the provisions of this subpart, and are subjected to a minimum temperature of 1200° F. for at least 0.5 second; or

(iv) It has been demonstrated to the Administrator's satisfaction by the owner or operator that incinerating the exhaust gases from a new, modified, or reconstructed brown stock washer system is technologically or economically unfeasible. Any exempt system will become subject to the provisions of this subpart if the facility is changed so that the gases can be incinerated.

(v) The gases from the digester system, brown stock washer system, or condensate stripper system are controlled by a means other than combustion. In this case, this system shall not discharge any gases to the atmosphere which contain TRS in excess of 5 ppm by volume on a dry basis, corrected to the actual oxygen content of the untreated gas stream.

(vi) The uncontrolled exhaust gases from a new, modified, or reconstructed digester system contain TRS less than 0.005 g/kg ADP (0.01 lb/ton ADP).

(2) From any straight kraft recovery furnace any gases which contain TRS in excess of 5 ppm by volume on a dry basis, corrected to 8 percent oxygen.

(3) From any cross recovery furnace any gases which contain TRS in excess of 25 ppm by volume on a dry basis, corrected to 8 percent oxygen.

(4) From any smelt dissolving tank any gases which contain TRS in excess of 0.016 g/kg black liquor solids as H_2S (0.033 lb/ton black liquor solids as H_2S).

(5) From any lime kiln any gases which contain TRS in excess of 8 ppm by volume on a dry basis, corrected to 10 percent oxygen.

[43 FR 7572, Feb. 23, 1978, as amended at 50 FR 6317, Feb. 14, 1985; 51 FR 18544, May 20, 1986]

§ 60.284 Monitoring of emissions and operations.

(a) Any owner or operator subject to the provisions of this subpart shall install, calibrate, maintain, and operate the following continuous monitoring systems:

(1) A continuous monitoring system to monitor and record the opacity of the gases discharged into the atmosphere from any recovery furnace. The span of this system shall be set at 70 percent opacity.

(2) Continuous monitoring systems to monitor and record the concentration of TRS emissions on a dry basis and the percent of oxygen by volume on a dry basis in the gases discharged into the atmosphere from any lime kiln, recovery furnace, digester system, brown stock washer system, multiple-effect evaporator system, or condensate stripper system, except where the provisions of § 60.283(a)(1)(iii) or (iv) apply. These systems shall be located downstream of the control device(s) and the spans of these continuous monitoring system(s) shall be set:

(i) At a TRS concentration of 30 ppm for the TRS continuous monitoring system, except that for any cross recovery furnace the span shall be set at 50 ppm.

(ii) At 20 percent oxygen for the continuous oxygen monitoring system.

(b) Any owner or operator subject to the provisions of this subpart shall install, calibrate, maintain, and operate the following continuous monitoring devices:

(1) For any incinerator, a monitoring device which measures and records the combustion temperature at the point of incineration of effluent gases which are emitted from any digester system, brown stock washer system, multiple-effect evaporator system, black liquor oxidation system, or condensate stripper system where the provisions of § 60.283(a)(1)(iii) apply. The monitoring device is to be certified by the manufacturer to be accurate within ±1 percent of the temperature being measured.

(2) For any lime kiln or smelt dissolving tank using a scrubber emission control device:

(i) A monitoring device for the continuous measurement of the pressure loss of the gas stream through the control equipment. The monitoring device is to be certified by the manufacturer to be accurate to within a gage pressure of ±500 pascals (ca. ±2 inches water gage pressure).

(ii) A monitoring device for the continuous measurement of the scrubbing liquid supply pressure to the control equipment. The monitoring device is to be certified by the manufacturer to be accurate within ±15 percent of design scrubbing liquid supply pressure. The pressure sensor or tap is to be located close to the scrubber liquid discharge point. The Administrator may be consulted for approval of alternative locations.

(c) Any owner or operator subject to the provisions of this subpart shall, except where the provisions of § 60.283 (a)(1)(iv) or (a)(4) apply.

(1) Calculate and record on a daily basis 12-hour average TRS concentrations for the two consecutive periods of each operating day. Each 12-hour average shall be determined as the arithmetic mean of the appropriate 12 contiguous 1-hour average total reduced sulfur concentrations provided by each continuous monitoring system installed under paragraph (a)(2) of this section.

(2) Calculate and record on a daily basis 12-hour average oxygen concentrations for the two consecutive periods of each operating day for the recovery furnace and lime kiln. These 12-hour averages shall correspond to the 12-hour average TRS concentrations under paragraph (c)(1) of this section and shall be determined as an arithmetic mean of the appropriate 12 contiguous 1-hour average oxygen concentrations provided by each continuous monitoring system installed under paragraph (a)(2) of this section.

(3) Correct all 12-hour average TRS concentrations to 10 volume percent oxygen, except that all 12-hour average TRS concentration from a recovery furnace shall be corrected to 8 volume percent using the following equation:

$$C_{corr} = C_{meas} \times (21 - X/21 - Y)$$

where:

C_{corr} = the concentration corrected for oxygen.

C_{meas} = the concentration uncorrected for oxygen.

X = the volumetric oxygen concentration in percentage to be corrected to (8 percent for recovery furnaces and 10 percent for lime kilns, incinerators, or other devices).

Y = the measured 12-hour average volumetric oxygen concentration.

(4) Record once per shift measurements obtained from the continuous monitoring devices installed under paragraph (b)(2) of this section.

(d) For the purpose of reports required under § 60.7(c), any owner or operator subject to the provisions of this subpart shall report semiannually periods of excess emissions as follows:

(1) For emissions from any recovery furnace periods of excess emissions are:

(i) All 12-hour averages of TRS concentrations above 5 ppm by volume for straight kraft recovery furnaces and above 25 ppm by volume for cross recovery furnaces.

(ii) All 6-minute average opacities that exceed 35 percent.

(2) For emissions from any lime kiln, periods of excess emissions are all 12-hour average TRS concentration above 8 ppm by volume.

(3) For emissions from any digester system, brown stock washer system, multiple-effect evaporator system, or condensate stripper system periods of excess emissions are:

(i) All 12-hour average TRS concentrations above 5 ppm by volume unless the provisions of § 60.283(a)(1) (i), (ii), or (iv) apply; or

(ii) All periods in excess of 5 minutes and their duration during which the combustion temperature at the point of incineration is less than 1200 °F, where the provisions of § 60.283(a)(1)(iii) apply.

(e) The Administrator will not consider periods of excess emissions reported under paragraph (d) of this section to be indicative of a violation of § 60.11(d) provided that:

(1) The percent of the total number of possible contiguous periods of excess emissions in a quarter (excluding periods of startup, shutdown, or malfunction and periods when the facility is not operating) during which excess emissions occur does not exceed:

(i) One percent for TRS emissions from recovery furnaces.

(ii) Six percent for average opacities from recovery furnaces.

(2) The Administrator determines that the affected facility, including air pollution control equipment, is maintained and operated in a manner which is consistent with good air pollution control practice for minimizing emissions during periods of excess emissions.

(Approved by the Office of Management and Budget under control no. 2060-0021)

[43 FR 7572, Feb. 23, 1978, as amended at 51 FR 18545, May 20, 1986]

§ 60.285 Test methods and procedures.

(a) Reference methods in Appendix A of this part, except as provided under § 60.8(b), shall be used to determine compliance with § 60.282(a) as follows:

(1) Method 5 for the concentration of particulate matter and the associated moisture content,

(2) Method 1 for sample and velocity traverses,

(3) When determining compliance with § 60.282(a)(2), Method 2 for velocity and volumetric flow rate,

(4) Method 3 for gas analysis, and

(5) Method 9 for visible emissions.

(b) For Method 5, the sampling time for each run shall be at least 60 minutes and the sampling rate shall be at least 0.85 dscm/hr (0.53 dscf/min) except that shorter sampling times, when necessitated by process variables or other factors, may be approved by the Administrator. Water shall be used as the cleanup solvent instead of acetone in the sample recovery procedure outlined in Method 5.

(c) Method 17 (in-stack filtration) may be used as an alternate method for Method 5 for determining compliance with § 60.282(a)(1)(i): *Provided*, That a constant value of 0.009 g/dscm (0.004 gr/dscf) is added to the results of Method 17 and the stack temperature is no greater than 205° C (ca. 400° F). Water shall be used as the cleanup solvent instead of acetone in the sample recovery procedure outlined in Method 17.

(d) For the purpose of determining compliance with § 60.283(a) (1), (2), (3), (4), and (5), the following reference methods shall be used:

(1) Method 16 or, at the discretion of the owner or operator, Method 16A for the concentration of TRS.

(2) Method 3 for gas analysis, and

(3) When determining compliance with § 60.283(a)(4), use the results of Method 2, Method 16 or 16A, and the black liquor solids feed rate in the following equation to determine the TRS emission rate on an equivalent hydrogen sulfide (H_2S) basis.

$$E=(C_{TRS})(F)(Q_{sd})/BLS$$

Where:

E=mass of TRS emitted per unit of black liquor solids (g/kg)(lb/ton).

C_{TRS}=average combined concentration of TRS as determined by Method 16 or 16A during the test period, ppm.

F=0.001417 g H_2S/m^3 ppm for metric units.
=0.08844×10^{-4} lb H_2S/ft^3 ppm for English units.

Q_{sd}=dry volumetric stack gas flow rate corrected to standard conditions, dscm/hr (dscf/hr).

BLS=black liquor solids feed rate, kg/hr (ton/hr).

(4) When determining whether a furnace is a straight kraft recovery furnace or a cross recovery furnace, TAPPI Method T.624 (incorporated by reference—see § 60.17) shall be used to determine sodium sulfide, sodium hydroxide, and sodium carbonate. These determinations shall be made three times daily from the green liquor and the daily average values shall be converted to sodium oxide (Na_2O) and substituted into the following equation to determine the green liquor sulfidity:

$$GLS=100\ C_{Na_2S}/(C_{Na_2}+C_{NaOH}+C_{Na_2CO_3})$$

where:

GLS=percent green liquor sulfidity

C_{Na_2S}=average concentration of Na_2O expressed as Na_2O (mg/*l*)

C_{NaOH}=average concentration of NaOH expressed as Na_2O (mg/*l*)

$C_{Na_2CO_3}$=average concentration of Na_2CO_3 expressed as Na_2 (mg/*l*)

(5) When determining compliance with § 60.283(a)(1)(vi), use the results of Method 2, Method 16, and the pulp production rate in the equation specified in § 60.285(d)(3), except substitute the pulp production rate (PPR) [kg/hr (tons/hr)] for the black liquor solids feed rate (BLS).

(e) All concentrations of particulate matter and TRS required to be measured by this section from lime kilns or incinerators shall be corrected 10 volume percent oxygen and those concentrations from recovery furnaces shall be corrected to 8 volume percent oxygen. These corrections shall be made in the manner specified in § 60.284(c)(3).

[43 FR 7572, Feb. 23, 1978, as amended at 48 FR 3738, Jan. 27, 1983; 50 FR 6318, Feb. 14, 1985; 50 FR 9579, Mar. 8, 1985; 50 FR 19022, May 6, 1985]

§ 60.286 Innovative technology waiver.

(a) Pursuant to section 111(j) or the Clean Air Act, 42 U.S.C. 7411(j), the No. 10 batch digester at Owens-Illinois Incorporated's Valdosta kraft pulp mill in Clyattville, Georgia, shall comply with the following conditions:

(1) Owens-Illinois, Incorporated shall obtain the necessary permits as required by section 173 of the Clean Air Act, as amended August 1977, to operate the No. 10 batch digester at the Valdosta mill.

(2) Commencing on February 14, 1985, and continuing for 2 years or to December 31, 1986, or until the displacement heating system that can achieve the standard specified in 40 CFR 60.283 is demonstrated to the Administrator's satisfaction, whichever comes first, Owens Illinois, Incorporated shall limit the discharge of TRS emissions to the atmosphere:

(i) From the No. 10 batch digester at the Valdosta mill to 0.02 lb of TRS per ton of air-dried pulp.

(ii) From the existing multiple-effect evaporators at the Valdosta mill to the TRS level existing prior to the modifications.

(3) Commencing the day after the expiration of the period described in paragraph (a)(2) of this section, and continuing thereafter, emissions of TRS from the No. 10 batch digester shall not exceed the TRS level of 0.005 g/kg ADP (0.01 lb/ton ADP) as specified in § 60.283 of this part.

(4) The No. 10 batch digester system shall comply with the provisions of §§ 60.284 and 60.285.

(5) A technology development report shall be sent to EPA, Emission Standards and Engineering Division (MD-13), Research Triangle Park, North Carolina 27711 and EPA Region IV, 345 Courtland, NE, Atlanta, Georgia 30365, postmarked before 60 days after the promulgation of this waiver and every 6 months thereafter while this waiver is in effect. The technology development report shall summarize the displacement heating system work including the results of tests of the various emission points being evaluated. The report shall include an updated schedule of attainment of 40 CFR 60.283 based on the most current information. Tests will be conducted prior to and after the digester modifications for TRS emissions and air flow rates on all vents to the atmosphere from the No. 10 digester system, the multiple effect evaporator system, and at the existing batch digester system. In addition, tests will be performed to determine the BOD content of the effluents from the multiple effect evaporator system, the brown stock washing

system, and the mill prior to and after the digester modifications.

(b) This waiver shall be a federally promulgated standard of performance. As such, it shall be unlawful for Owens-Illinois, Incorporated to operate the No. 10 batch digester or the multiple-effect evaporators in violation of the requirements established in this waiver. Violations of the terms and conditions of this waiver shall subject Owens-Illinois, Incorporated to enforcement under section 113 (b) and (c), 42 U.S.C. 7412 (b) and (c), and section 120, 42 U.S.C. 7420, of the Act as well as possible citizen enforcement under section 304 of the Act, 42 U.S.C. 7604.

[50 FR 6317, Feb. 14, 1985; 50 FR 7595, Feb. 25, 1985]

Subpart CC—Standards of Performance for Glass Manufacturing Plants

SOURCE: 45 FR 66751, Oct. 7, 1980, unless otherwise noted.

§ 60.290 Applicability and designation of affected facility.

(a) Each glass melting furnace is an affected facility to which the provisions of this subpart apply.

(b) Any facility under paragraph (a) of this section that commences construction or modification after June 15, 1979, is subject to the requirements of this subpart.

(c) This subpart does not apply to hand glass melting furnaces, glass melting furnaces designed to produce less than 4,550 kilograms of glass per day and all-electric melters.

§ 60.291 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act and in Subpart A of this part, unless otherwise required by the context.

"All-electric melter" means a glass melting furnace in which all the heat required for melting is provided by electric current from electrodes submerged in the molten glass, although some fossil fuel may be charged to the furnace as raw material only.

"Borosilicate recipe" means glass product composition of the following approximate ranges of weight proportions: 60 to 80 percent silicon dioxide, 4 to 10 percent total R_2O (e.g., Na_2O and K_2O), 5 to 35 percent boric oxides, and 0 to 13 percent other oxides.

"Container glass" means glass made of soda-lime recipe, clear or colored, which is pressed and/or blown into bottles, jars, ampoules, and other products listed in Standard Industrial Classification 3221 (SIC 3221).

"Experimental furnace" means a glass melting furnace with the sole purpose of operating to evaluate glass melting processes, technologies, or glass products. An experimental furnace does not produce glass that is sold (except for further research and development purposes) or that is used as a raw material for nonexperimental furnaces.

"Flat glass" means glass made of soda-lime recipe and produced into continuous flat sheets and other products listed in SIC 3211.

"Flow channels" means appendages used for conditioning and distributing molten glass to forming apparatuses and are a permanently separate source of emissions such that no mixing of emissions occurs with emissions from the melter cooling system prior to their being vented to the atmosphere.

"Glass melting furnace" means a unit comprising a refractory vessel in which raw materials are charged, melted at high temperature, refined, and conditioned to produce molten glass. The unit includes foundations, superstructure and retaining walls, raw material charger systems, heat exchangers, melter cooling system, exhaust system, refractory brick work, fuel supply and electrical boosting equipment, integral control systems and instrumentation, and appendages for conditioning and distributing molten glass to forming apparatuses. The forming apparatuses, including the float bath used in flat glass manufacturing and flow channels in wool fiberglass and textile fiberglass manufacturing, are not considered part of the glass melting furnace.

"Glass produced" means the weight of the glass pulled from the glass melting furnace.

"Hand glass melting furnace" means a glass melting furnace where the molten glass is removed from the furnace by a glassworker using a blowpipe or a pontil.

"Lead recipe" means glass product composition of the following ranges of weight proportions: 50 to 60 percent silicon dioxide, 18 to 35 percent lead oxides, 5 tm 20 percent total R_2O (e.g., Na_2M and K_2O), 0 to 8 percent total R_2O_3 (e.g., Al_2O_3), 0 to 15 percent total RO (e.g., CaO, MgO), other than lead oxide, and 5 to 10 percent other oxides.

"Pressed and blown glass" means glass which is pressed, blown, or both, including textile fiberglass, noncontinuous flat glass, noncontainer glass, and other products listed in SIC 3229. It is separated into:

(1) Glass of borosilicate recipe.

(2) Glass of soda-lime and lead recipes.

(3) Glass of opal, fluoride, and other recipes.

"Rebricking" means cold replacement of damaged or worn refractory parts of the glass melting furnace. Rebricking includes replacement of the refractories comprising the bottom, sidewalls, or roof of the melting vessel; replacement of refractory work in the heat exchanger; replacment of refractory portions of the glass conditioning and distribution system.

"Soda-lime recipe" means glass product composition of the following ranges of weight proportions: 60 to 75 percent silicon dioxide, 10 to 17 percent total R_2O (e.g., Na_2O and K_2O), 8 to 20 percent total RO but not to include any PbO (e.g., CaO, and MgO), 0 to 8 percent total R_2O_3 (e.g., Al_2O_3), and 1 to 5 percent other oxides.

"Textile fiberglass" means fibrous glass in the form of continuous strands having uniform thickness.

"With modified-processes" means using any technique designed to minimize emissions without the use of add-on pollution controls.

"Wool fiberglass" means fibrous glass of random texture, including fiberglass insulation, and other products listed in SIC 3296.

[45 FR 66751, Oct. 7, 1980, as amended at 49 FR 41035, Oct. 19, 1984]

§ 60.292 Standards for particulate matter.

(a) On and after the date on which the performance test required to be conducted by § 60.8 is completed, no owner or operator of a glass melting furnace subject to the provisions of this subpart shall cause to be discharged into the atmosphere—

(1) From any glass melting furnace fired exclusively with either a gaseous fuel or a liquid fuel, particulate matter at emission rates exceeding those specified in Table CC-1, Column 2 and Column 3, respectively, or

(2) From any glass melting furnace, fired simultaneously with gaseous and liquid fuels, particulate matter at emission rates exceeding STD as specified by the following equation:

$$STD = X\,[1.3(Y) + (Z)]$$

Where:

STD = Particulate matter emission limit, g of particulate/kg of glass produced.

X = Emission rate specified in Table CC-1 for furnaces fired with gaseous fuel (Column 2).

Y = Decimal percent of liquid fuel heating value to total (gaseous and liquid) fuel heating value fired in the glass melting furnaces as determined in § 60.296(*f*). (Joules/joules).

Z = (1-Y).

(b) Conversion of a glass melting furnace to the use of liquid fuel is not considered a modification for the purposes of § 60.14.

(c) Rebricking and the cost of rebricking is not considered a reconstruction for the purposes of § 60.15.

(d) An owner or operator of an experimental furnace is not subject to the requirements of this section.

(e) During routine maintenance of add-on pollution controls, an owner or operator of a glass melting furnace subject to the provisions of paragraph (a) of this section is exempt from the provisions of paragraph (a) of this section if:

(1) Routine maintenance in each calendar year does not exceed 6 days;

(2) Routine maintenance is conducted in a manner consistent with good air pollution control practices for minimizing emissions; and

(3) A report is submitted to the Administrator 10 days before the start of

EPA-450/2-78-003b
OAQPS No. 1.2-091

Kraft Pulping
Control of TRS Emissions from Existing Mills

Emission Standards and Engineering Division

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air, Noise, and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

March 1979

Table 5-2. TRS EMISSIONS FROM THE EXISTING KRAFT PULP INDUSTRY

	Average Uncontrolled Level		Percent Capacity	Typical Controlled Level		Average National Emissions		
Source	ppm	g/kg ADP (lb/T ADP)	Controlled(1)	ppm	g/kg ADP (lb/T ADP)	ppm	g/kg ADP (lb/T ADP)	megagrams
Recovery Furnace	550	7.5 (15.0)	88.7	5-70	0.075-1.05 (0.15-2.1)	92	1.25 (2.5)	39,000
Digester System	9500	0.75 (1.5)	58.4	5	0.01 (0.02)	4050	0.32 (0.64)	10,000
Multiple-Effect Evaporator System	6800	0.5 (1.0)	58.6	5	0.01 (0.02)	2920	0.22 (0.43)	6,700
Lime Kiln	170	0.4 (0.8)	28.2	5-40	0.0125-0.1 (0.025-0.2)	130	0.31 (0.62)	9,700
Brown Stock Washer System	30	0.15 (0.3)	2.8	5	0.01 (0.02)	30	0.15 (0.3)	4,420
Black Liquor Oxidation System	35	0.05 (0.1)	2.1	0-10	0.0-0.01 (0.0-0.02)	35	0.05 (0.1)	1,470
Smelt Dissolving Tank	60	0.1 (0.2)	-	-	-	60	0.1 (0.2)	2,940
Condensate Stripper System	5000	1.0 (2.0)	100	5	0.01 (0.02)	500	0.11 (0.22)	0.4

(1)Percentage based on mills controlled by existing state regulations, plus information collected during previous surveys.