STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

July 7, 1983

Max Woehle, General Manager
Container Corporation of America
North Eighth Street
Fernandina Beach, Florida 32034

Dear Mr. Woehle:

Enclosed is Permit Number AC 45-61751 dated July 7, 1983, to Container Corporation of America, issued pursuant to Section 403, Florida Statutes.

Acceptance of the permit constitutes notice and agreement that the Department will periodically review this permit for compliance, including site inspections where applicable, and may initiate enforcement actions for violation of the conditions and requirements thereof.

Sincerely,

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

CHF/bjm

Enclosure

cc: Roland L. Allen, Jr., Paper Industry Engineers, Inc.
John Ketteringham, Northeast District

Final Determination

Container Corporation of America
Fernandina Beach, Florida

Application Number:
AC 45-61751

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

Final Determination
Container Corporation of America
New Multiple Effect Evaporator Set and Concentrator Nos. 6

The construction permit application has been reviewed by the department. Public notice of the department's intent to issue was published in the Florida Times-Union on April 1, 1983. The preliminary determination and technical evaluation was available for public inspection at the DER's Northeast District office and the DER's Bureau of Air Quality Management (BAQM) office.

Comments (Attachment No. 6) were received from Mr. Eric J. Schmidt with Container Corporation of America, Fernandina Beach, Nassau County, Florida, on April 25, 1983. A meeting was held in the BAQM conference room on June 3, 1983, to discuss the referenced comments (Attachment No. 6). As a result of this meeting (see Attachment No. 7), the bureau agrees with certain revisions to the "Specific Conditions" and they shall read (Note: Attachment No. 7 will explain the revamping of the Specific Condition numbering system):

Specific Conditions:

No. 4: The total maximum input of black liquor solids (BLS) into the multiple effect evaporator sets Nos. 3, 4, 5 and 6 shall not exceed 274,089 pounds per hour (calculated at 100% BLS, dry).

No. 6: The allowable emissions for all pollutants in compliance with 40 CFR 60.283(a)(1)(iii) shall be below the minimum detectable limit and within normal variability. Due to this constraint, stack mass emission tests shall be conducted on the Lime Kilns, No. 3 and No. 2, before and after start-up of the multiple effect evaporator set #6 for the pollutants PM (particulate matter), SO_2, and TRS. For TRS, the maximum emissions increase shall not exceed 5 ppm (parts per million). Stack tests for PM conducted as a requirement of operating permit conditions will be acceptable as a before test requirement. Test methods shall be EPA Methods 1, 2, 3, 4, 5 or 17, 6, and 16 in accordance with the NSPS, 40 CFR 60.285, Subpart BB and as described in Appendix A of this part (EPA Method 16A may be performed upon approval from the Region IV EPA via a written request to and through the DER's Bureau of Air Quality Management (BAQM)).

At least 30 days prior to the date of compliance testing, the DER's Northeast District office and the DER's BAQM shall be notified in writing in order to witness the test(s).

The compliance tests shall be conducted at 90 to 100 percent of the permitted maximum total input of black liquor solids into the multiple effect evaporator sets Nos. 3, 4, 5 and 6. Once this Specific Condition has been satisfactorily performed and approved by the DER's BAQM, this Specific Condition will not become a part of the operating permit.

No. 11: An annual report, by month, of the daily product yield in air dried unbleached pulp (ADUP; based on the applicant's yield of 2850 lbs BLS/ton ADUP) from the multiple effect evaporator sets Nos. 3, 4, 5 and 6 shall be submitted by the 14th of January of each calendar year to the DER's Northeast District office.

No. 12: The applicant will demonstrate compliance with the conditions of this construction permit and submit a complete application for an operating permit to the DER's Northeast District office prior to 90 days before the expiration date of this permit. The Certificate of Completion of Construction, DER Form 17-1.202(3), Florida Administrative Code, may be submitted in lieu of an application for a permit to operate. The applicant may continue to operate in compliance with all terms of this construction permit until its expiration date or the issuance of an operating permit.

Attachments to be incorporated are:

6. Eric J. Schmidt's letter dated April 20, 1983.

7. Memo to file dated July 5, 1983.

It is recommended that the construction permit be issued as drafted, with the above revisions and attachments incorporated.

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

PERMITTEE:

Container Corporation
North Eighth Street
Fernandina Beach,
Florida 32034

Permit Number: AC 45-61751
Date of Issue:
Expiration Date: January 31, 1984
County: Nassau
Latitude/Longitude: 30° 40' 53" N/ 81° 27' 26" W
Project: Multiple-Effect Evaporator Set #6 (set includes the multiple effect evaporators, the associated condenser(s) and hotwell(s), and a concentrator).

This permit is issued under the provisions of Chapter(s) 403, Florida Statutes, and Florida Administrative Code Rule(s) 17-2 and 17-4. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents attached hereto or on file with the department and made a part hereof and specifically described as follows:

This permit is for the construction of the multiple-effect evaporator set #6 at the applicant's existing kraft pulp mill in Nassau County. The pollution control devices will be the existing Lime Kilns Nos. 3 and 4. The UTM coordinates are Zone 17-456.213 km East and 3394.186 km North.

Construction shall be in accordance with the permit application and plans, documents, amendments, and drawings except as otherwise noted on pages 5-7 of the "Specific Conditions".

Attachments are as follows:

1. Application to Construct Air Pollution Sources, DER Form 1.122(16).
2. C. H. Fancy's Letter of Incompleteness dated November 22, 1982.
3. Eric J. Schmidt's letter dated December 1, 1982.
4. Eric J. Schmidt's letter dated December 17, 1982.
5. Eric J. Schmidt's letter dated January 27, 1983.
6. Eric J. Schmidt's letter dated April 20, 1983.
7. Memo to file dated July 5, 1983.

PERMITTEE:	**I. D. Number:**
	Permit Number: AC 45-61751
Container Corporation	**Date of Issue:**
	Expiration Date: January 31, 1984

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

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

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit does not constitute a waiver of or approval of any other department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express state opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, plant or aquatic life or property and penalties therefor caused by the construction or operation of this permitted source, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and department rules, unless specifically authorized by an order from the department.

GENERAL CONDITIONS:

6. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized department personnel, upon presentation of credentials or other documents as may be required by law, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

   a. Having access to and copying any records that must be kept under the conditions of the permit;

   b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and

   c. Sampling or monitoring any substances or parameters at any location reasonably necessary to assure compliance with this permit or department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately notify and provide the department with the following information:

   a. a description of and cause of non-compliance; and

   b. the period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the department for penalties or revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, which are submitted to the department, may be used by the department as evidence in any enforcement case arising under the Florida Statutes or department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes.

10. The permittee agrees to comply with changes in department rules and Florida Statutes after a reasonable time for compliance, provided however, the permittee does not waive any other rights granted by Florida Statutes or department rules.

11. This permit is transferable only upon department approval in accordance with Florida Administrative Code Rules 17-4.12 and 17-30.30, as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

13. This permit also constitutes:

( ) Determination of Best Available Control Technology (BACT)
( ) Determination of Prevention of Significant Deterioration (PSD)
(X) Compliance with New Source Performance Standards.

14. The permittee shall comply with the following monitoring and record keeping requirements:

a. Upon request, the permittee shall furnish all records and plans required under department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the department, during the course of any unresolved enforcement action.

GENERAL CONDITIONS:

b. The permittee shall retain at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be at least three years from the date of the sample, measurement, report or application unless otherwise specified by department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the date(s) analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the department, such facts or information shall be submitted or corrected promptly.

SPECIFIC CONDITIONS:

1. Construction/installation should reasonably conform to the application, plans, documents, and amendments submitted for the multiple-effect evaporator system #6 (MEE #6; system includes the multiple-effect evaporators, the associated condenser(s) and hotwell(s), and a concentrator).

2. The applicant should report any delays in construction/installation and completion to the DER's Northeast District office.

3. Annual hours of operation will be 8760.

SPECIFIC CONDITIONS:

4. The total maximum input of black liquor solids (BLS) into the multiple effect evaporator sets Nos. 3, 4, 5 and 6 shall not exceed 274,089 pounds per hour (calculated at 100% BLS, dry).
5. Combustion temperature and retention time in the pollutant control device(s), Lime Kilns Nos. 3 and 2 (back-up device to No. 3), must be a minimum of 1200° F and 0.5 seconds respectively.

6. The allowable emissions for all pollutants in compliance with 40 CFR 60.283(a)(1)(iii) shall be below the minimum detectable limit and within normal variability. Due to this constraint, stack mass emission tests shall be conducted on the Lime kilns, No. 3 and No. 2, before and after start-up of the multiple effect evaporator set #6 for the pollutants PM (particulate matter), SO_2, and TRS. For TRS, the maximum emissions increase shall not exceed 5 ppm (parts per million). Stack tests for PM conducted as a requirement of operating permit conditions will be acceptable as a before test requirement. Test methods shall be EPA Methods 1, 2, 3, 4, 5 or 17, 6, and 16 in accordance with the NSPS, 40 CFR 60.285, Subpart BB and as described in Appendix A of this part (EPA Method 16A may be performed upon approval from the Region IV via a written request to and through the DER's Bureau of Air Quality Management (BAQM)).

   At least 30 days prior to the date of compliance testing, the DER's Northeast District office and the DER's BAQM shall be notified in writing in order to witness the test(s).

   The compliance tests shall be conducted at 90 to 100 percent of the permitted maximum total input of black liquor solids into the multiple effect evaporator sets Nos. 3, 4, 5 and 6. Once this Specific Condition has been satisfactorily performed and approved by the DER's BAQM, this Specific Condition will not become a part of the operating permit.

7. The primary pollutant control device is the Lime Kiln No. 3. The operating permit for the Lime Kiln No. 3, AO 45-10035, shall be amended to reflect its operational change by the addition of the pollutants from the multiple effect evaporator set #6; however, no additional pollutant allowable emissions from the lime kiln or its control device, an alkaline venturi scrubber, shall be permitted.

8. The back-up pollutant control device to Lime Kiln No. 3 is Lime Kiln No. 2. The operating permit for the Lime Kiln No. 2, AO 45-10034, shall be amended to reflect its operational

PERMITTEE:

Container Corporation

I. D. Number:
Permit Number: AC 45-61751
Date of Issue:
Expiration Date: January 31, 1984

SPECIFIC CONDITIONS:

change by the addition of the pollutants from the multiple effect evaporator set #6; however, no additional pollutant allowable emissions from the lime kiln or its control device, an alkaline venturi scrubber, shall be permitted.

9. A monitoring device which measures the combustion temperature at the point of incineration of effluent gases shall be installed and operated in accordance with the NSPS, 40 CFR 60.284(b)(1), Subpart BB.

10. Reports of periods of time in excess of 5 minutes and their duration during which the combustion temperature at the point of incineration is less than 1200°F must be documented and promptly reported to the DER's Northeast District office.

11. An annual report, by month, of the daily product yield in air dried unbleached pulp (ADUP; based on the applicant's yield of 2850 lbs BLS/ton ADUP) from the multiple effect evaporator sets Nos. 3, 4, 5 and 6 shall be submitted by the 14th of January of each calendar year to the DER's Northeast District office.

12. The applicant will demonstrate compliance with the conditions of the construction permit and submit a complete application for an operating permit to the DER's Northeast District office prior to 90 days of the expiration date of this permit. The Certificate of Completion of Construction, DER Form 17-1.202(3), Florida Administrative Code, may be submitted in lieu of an application for a permit to operate. The applicant may continue to operate in compliance with all terms of this construction permit until its expiration date or the issuance of an operating permit.

Issued this 7 day of July, 1983

STATE OF FLORIDA DEPARTMENT OF
ENVIRONMENTAL REGULATION

Terry Cole for
VICTORIA J. TSCHINKEL, Secretary

____ pages attached.

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices
And/Or To Other Than The Addressee

To:		Loctn.:	
To:		Loctn.:	
To:		Loctn.:	
From:		Date:	

Reply Optional [ ] Reply Required [ ] Info. Only [ ]
Date Due: Date Due:

RECEIVED
JUL 7 1983
Office of the Secretary

TO: Victoria J. Tschinkel

FROM: Clair Fancy Clair Fancy

DATE: July 6, 1983

SUBJ: Approval of Attached Air Construction Permit

Attached for your approval and signature is one Air Construction Permit for which the applicant is Container Corporation of America. The proposed project is for the construction of a multiple-effect evaporator system #6 at the applicant's existing facility in Fernandina Beach, Nassau County, Florida.

The waiver date, after which the permit would be issued by default, is July 8, 1983.

The Bureau recommends your approval and signature.

CF/pa

Attachment

→P 4/4

Check Sheet

Company Name: Container Corp. of America
Permit Number: AC45-61751
PSD Number:
County:
Permit Engineer:
Others involved:

Application:
- ☑ Initial Application
- ☑ Incompleteness Letters
- ☑ Responses
- ☐ Final Application (if applicable)
- ☐ Waiver of Department Action
- ☐ Department Response

Intent:
- ☑ Intent to Issue
- ☑ Notice to Public
- ☑ Technical Evaluation
- ☐ BACT Determination
- ☑ Unsigned Permit
  Attachments:
  - ☐
  - ☐
  - ☐
- ☐ Correspondence with:
  - ☐ EPA
  - ☐ Park Services
  - ☐ County
  - ☐ Other
- ☑ Proof of Publication
- ☐ Petitions - (Related to extensions, hearings, etc.)

Final Determination:
- ☑ Final Determination
- ☑ Signed Permit
- ☐ BACT Determination

Post Permit Correspondence:
- ☑ Extensions
- ☑ Amendments/Modifications
- ☐ Response from EPA
- ☐ Response from County
- ☐ Response from Park Services

In the folder labeled as follows there are documents, listed below, which were not reproduced in this electronic file. Those documents can be found in the supplementary documents file drawer. Folders in that drawer are arranged alphabetically, then by permit number.

Folder Name: Container Corporation of America Evaporator #6
AC 45-61751

Period During Which DOCUMENT WAS SUBMITTED (APPLICATION, PD & TE, FINAL DETERMINATION, POST PERMIT)	Detailed Description
APP 10/25/82	1. 34"x44" BLUEPRINT NO. 6 EVAPORATOR ADDITION PIPING AND INSTRUMENT DIAGRAM SHEET 1 of 2 DWG NO. 60B-1002 2. (Same as above) SHEET 2 of 2 DWG NO. 60B-1003

No. 0157908

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—NOT FOR INTERNATIONAL MAIL

(See Reverse)

SENT TO
Mr. Tom V. Brown

STREET AND NO.

P.O., STATE AND ZIP CODE

POSTAGE			$
CONSULT POSTMASTER FOR FEES	CERTIFIED FEE		¢
	OPTIONAL SERVICES	SPECIAL DELIVERY	¢
		RESTRICTED DELIVERY	¢
	RETURN RECEIPT SERVICE	SHOW TO WHOM AND DATE DELIVERED	¢
		SHOW TO WHOM, DATE, AND ADDRESS OF DELIVERY	¢
		SHOW TO WHOM AND DATE DELIVERED WITH RESTRICTED DELIVERY	¢
		SHOW TO WHOM, DATE AND ADDRESS OF DELIVERY WITH RESTRICTED DELIVERY	¢
TOTAL POSTAGE AND FEES			$

POSTMARK OR DATE

10/5/84

PS Form 3800, Apr. 1976

PS Form 3811, Jan. 1979

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

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

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

   (CONSULT POSTMASTER FOR FEES)

2. **ARTICLE ADDRESSED TO:**

Mr. Tom V. Brown
CCA, North Eighth Street
Fernandina Beach, FL 32034

3. **ARTICLE DESCRIPTION:**

REGISTERED NO.	CERTIFIED NO.	INSURED NO.
	0157908	

(Always obtain signature of addressee or agent)

I have received the article described above.

SIGNATURE ☐Addressee ☐Authorized agent

4. **DATE OF DELIVERY** 10/9/84

POSTMARK

FERNANDINA BEACH, FL 32034
OCT 9 AM 1984

5. **ADDRESS** (Complete only if requested)

6. **UNABLE TO DELIVER BECAUSE:**

CLERK'S INITIALS

☆GPO : 1979-300-459

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

October 4, 1984

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Tom V. Brown
Vice President and Resident Manager
Container Corporation of America
Paper Mill Division
North Eight Street
Fernandina Beach, Florida 32034

Dear Mr. Brown:

Re: Expiration Date Extension for the Construction Permit
No. AC 45-61751 : MEE#6

The department is in receipt of Ms. Cynthia L. Sawyer's letter dated September 27, 1984, requesting an extension of the expiration date of the above referenced permit. The department is in agreement with the request and the following shall be added or changed:

Expiration Date:

From: September 30, 1984
To: March 1, 1985

Attachment to be Incorporated:

11. Ms. Cynthia L. Sawyer's letter dated September 27, 1984.

This letter must be attached to your construction permit, No. AC 45-61751, and shall become a part of that permit.

Sincerely,

Terry Cole for
Victoria J. Tschinkel
Secretary

VJT/ks

cc: Doug Dutton
Nancy Wright
Cynthia Sawyer

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

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

TO: Victoria J. Tschinkel

FROM: C. H. Fancy, Deputy Bureau Chief, BAQM

DATE: October 2, 1984

SUBJ: Approval and signature of an amendment to the construction permit, No. AC 45-61751, for Container Corporation of America, issued July 7, 1983, and amended August 8, 1983 and July 12, 1984 (expiration date extensions).

Enclosed is an amendment to the referenced construction permit and the bureau recommends approval.

CHF/BM/s

enclosure

CCA

Container Corporation of America

Paper Mill Division
North Eighth Street
Fernandina Beach, Florida 32034
Phone: 904 261-5551

DER
SEP 28 1984
BAQM

September 27, 1984

C. H. Fancy, P.E.
Bureau of Air Quality Management
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

RE: Container Corporation of America
Fernandina Beach Mill - Evaporator System No. 6
Permit/Certification No. AL45-61751

Dear Mr. Fancy:

On September 13, 1984 I had a telephone conversation with Bruce Mitchell requesting an extension of our No. 6 Evaporator Permit from September 30, 1984 to March 1, 1985. This letter is a formal request for that extension. The extension is needed because the required source testing has not yet been completed due to a cyclonic flow in the No. 3 Lime Kiln Stack. The Northeast Subdistrict would not accept the stack test until a straightening vane has been added.

We are in the process of fabricating and installing the straightening vane. The time extension will allow the stack test to be completed with the specified sixty days remaining for review and issuance of an operating permit.

Sincerely,

CONTAINER CORPORATION OF AMERICA

Cynthia L. Sawyer

Cynthia L. Sawyer
Environmental Group Leader

CLS/jrb

July 12, 1984

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Tom V. Brown
Vice President and Resident Manager
Container Corporation of America
Paper Mill Division
North Eighth Street
Fernandina Beach, Florida 32034

Dear Mr. Brown:

Amendment to the Construction Permit: No. AC 45-61751
Multiple Effect Evaporator Set No. 6

The bureau is in receipt of a letter with attachments dated May 23, 1984, requesting deletion of the TRS testing requirements contained in Specific Condition No. 6 of the above referenced construction permit. The bureau is also in receipt of a letter dated June 22, 1984, requesting an extension of the expiration date.

The applicant has provided sufficient data to document that the existing Lime Kilns, Nos. 3 and 2, are capable of achieving the temperature (1200°) and retention time (1/2 second) requirements in the primary combustion zone, pursuant to 40 CFR 60.283(a)(1)(iii). Therefore, the bureau feels that further testing for TRS should not be required.

Since the bureau agrees with the applicant's requests, the following conditions will be changed and added:

Expiration Date:

From: July 31, 1984
To: September 30, 1984

Specific Condition No. 6:

From: The allowable emissions for all pollutants in compliance with 40 CFR 60.283(a)(1)(iii) shall be below the minimum detectable limit and within normal variability. Due to this constraint, stack mass emission tests shall be conducted on the Lime Kilns, No. 3 and No. 2, before and after start-up of the multiple effect evaporator set #6 for the pollutants PM (particulate matter), SO_2, and TRS. For TRS, the maximum emissions increase shall not exceed 5 ppm (parts per million). Stack tests for PM conducted as a requirement of operating permit conditions will be acceptable as a before test requirement. Test methods shall be EPA Methods 1, 2, 3, 4, 5 or 17, 6, and 16 in accordance with the NSPS, 40 CFR 60.285, Subpart BB and as described in Appendix A of this part (EPA Method 16A may be performed upon approval from the Region IV EPA via a written request to and through the DER's Bureau of Air Quality Management (BAQM)).

At least 30 days prior to the date of compliance testing, the DER's Northeast District office and the DER's BAQM shall be notified in writing in order to witness the test(s).

The compliance tests shall be conducted at 90 to 100 percent of the permitted maximum total input of black liquor solids into the multiple effect evaporator sets Nos. 3, 4, 5 and 6. Once this Specific Condition has been satisfactorily performed and approved by the DER's BAQM, this Specific Condition will not become a part of the operating permit.

To: Stack mass emissions tests shall be conducted on the Lime Kilns, No. 3 and No. 2, before and after start-up of the multiple effect evaporator set No. 6 for the pollutants PM (particulate matter) and SO_2. Test methods shall be EPA Methods 1, 2, 3, 4, 5 and 6 as described in Appendix A, Reference Methods.

Clair Fancy

At least 30 days prior to the date of compliance testing, the DER's Northeast District office and the DER's BAQM shall be notified in writing in order to witness the test(s).

The compliance tests shall be conducted at 90 to 100 percent of the permitted maximum total input of black liquor solids into the multiple effect evaporator sets Nos. 3, 4, 5 and 6. Once this Specific Condition has been satisfactorily performed and approved by the DER's BAQM, this Specific Condition will not become a part of the operating permit.

Attachments to be incorporated:

9. Mr. Paul F. Magnell's letter dated May 23, 1984.

10. Ms. Cynthia L. Sawyer's letter dated June 22, 1984.

This letter must be attached to your construction permit, No. AC 45-61751, and shall become a part of that permit.

Sincerely,

/s/Victoria J. Tschinkel

Victoria J. Tschinkel
Secretary

VJT/agh

cc: James T. Wilburn
Doug Dutton
Nancy Wright

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

**For Routing To District Offices
And/Or To Other Than The Addressee**

To: ______________ Loctn.: ______________
To: ______________ Loctn.: ______________
To: ______________ Loctn.: ______________
From: ______________ Date: ______________
Reply Optional [ ] Reply Required [ ] Info. Only [ ]
Date Due: __________ Date Due: __________

TO: Victoria J. Tschinkel

FROM: C. H. Fancy, Deputy Chief, BAQM

DATE: July 10, 1984

SUBJ: Approval and signature of an amendment to the construction permit, No. AC 45-61751, for Container Corporation of America, issued July 7, 1983, and amended August 8, 1983 (expiration date extension).

Enclosed is an amendment to the referenced construction permit and the bureau recommends approval.

Enclosure:

DER
JUL 16 1984
BAQM

RECEIVED
JUL 12 1984
Office of the Secretary

CCA

Container Corporation of America

Paper Mill Division
North Eighth Street
Fernandina Beach, Florida 32034
Phone: 904 261-5551

June 22, 1984

DER
JUN 26 1984
BAQM

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

RE: Container Corporation of America
Fernandina Beach Mill - Evaporator
System No. 6
Permit/Certification No. AC4S-61751

Dear Mr. Fancy:

In response to my phone conversation this morning with Bruce Mitchell, I would like to request that the expiration date be changed from July 31, 1984 to September 30, 1984. This extention will allow us to perform the necessary SO_2 and particulate test before the construction permit expires.

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

Sincerely,
CONTAINER CORPORATION OF AMERICA

Cynthia L. Sawyer

Cynthia L. Sawyer
Environmental Group Leader

CLS/jrb

cc: John Brown - DER - Jacksonville

CCA

Container Corporation of America

Paper Mill Division
North Eighth Street
Fernandina Beach, Florida 32034
Phone: 904 261-5551

DER
MAY 25 1984
BAQM

May 23, 1984

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

Dear Mr. Fancy:

In response to your letter of April 23, 1984, we have enclosed an alternate proposal to prove compliance with New Source Performance Standard.

If there are any questions, please call Cindy Sawyer at (904)261-5551 or write me at the above address.

Sincerely,

Paul Magnell

Paul J. Magnell
Vice President and
Resident Manager

PJM/ma

cc: G. Doug Dutton - DER, Jacksonville
James T. Wilburn, USEPA, Atlanta

ALTERNATE PROPOSAL

for

#6 MULTIPLE EFFECT EVAPORATOR

TO SHOW COMPLIANCE WITH

NEW SOURCE PERFORMANCE STANDARD

Container Corporation of America received a permit to construct the Multiple Effect Evaporator Set #6. On July 7, 1983 construction was begun and then delayed 10 weeks due to a strike from August 4, 1983 to October 16, 1983. Construction was resumed after the strike. Initial TRS testing using Method 16A was begun in January of 1984. The pre-startup test was scheduled for March 26, 1984. Bruce Mitchell and Mike Harley toured the mill in early March. At this time they were told of the large (200 to 600 ppm) variability in the Method 16A tests results from the kilns. We did not anticipate this variability to be a problem. The Friday before the testing was to start, Dave James called Bruce Mitchell to notify him that we were having problems with Method 16A and this would delay testing for a day or two. At this time Bruce indicated his concern that the high variability of the lime kiln emission would negate the value of the before and after test for TRS called for in the #6 Evaporator construction. In response to this concern and as suggested in your April 23, 1984 letter, we would like to make an alternate proposal to show compliance with new source performance standards. We are enclosing all the publications mentioned in developing the compliance demonstration proposal.

Code of Federal Regulations

Our proposal is to demonstrate compliance with 40 CFR 60.283(a)(1)(iii). This states that no multiple effect evaporator system shall discharge TRS in excess of 5 ppm unless the gases are combusted in a lime kiln where the gases will be subjected to a minimum temperature of 1200°F for at least 0.5 second. 40 CFR 60.284(b)(1) requires that the kiln temperature be continuously monitored.

Historical Information on TRS

Historical information on combustion of noncondensable gases dates back over 35 years. In 1950, the Chemical Engineers' Handbook by John Perry lists a minimum ignition temperature for H_2S of 558°F. The Technical Association of the Pulp and Paper Industry (TAPPI) had a number of articles about TRS destruction in the 1950's. One published in 1955 by DeHaas and Hansen reported almost 100% destruction of all reduced sulfur compound, in draft relief gas, to SO_2 at a temperature of 1100°F to 1400°F. In 1958 Weyerhaeuser Timber Co. started burning digester reliefs in a furnace. They were able to destroy TRS but had operational problems with the furnace. To overcome these problems, they switched to the lime kiln with great success. The NCASI gathered this information together in Technical Bulletin 34 titled Current Practices in Thermal Oxidation of Noncondensable Gases in the Kraft Industry. This technical bulletin presented a historical review of the practice through 1967 and the successful development of systems for burning gases in lime kilns. They also conducted lab investigations which showed no TRS compounds were detected after being passed through a quartz tube at 1400°F. In 1973 at a NCASI meeting, one company reported no measurable difference in TRS emissions from kiln when noncondensables went to kiln or to atmosphere. In 1980 a special report by NCASI noted that lime kilns are the most commonly used device for thermal oxidation of noncondensable gases.

Standard Operating Procedures for Lime Kilns

Both research and practical application have shown that TRS is destroyed at temperatures around 1200°F and that lime kilns are especially effective at accomplishing this. Why a kiln is such an effective device is apparent from the conditions essential for a lime kiln to function. As stated in The Pulping of Wood, Volume 1, prepared under the direction of the Joint Textbook Committee of the Paper Industry, a minimum temperature of 1500°F is needed in a kiln for calcium carbonate to dissociate. However, dissociation is accelerated by maintaining higher temperatures. For this reason a short kiln, such as ours, is kept at about 2300°F to calcine the lime. The hot zone of our kilns is considered to be the first 50 to 60 feet and is above 1500°F throughout this zone. These high temperatures and long residence times greatly exceed the requirements of the above CFR standard and demonstrate why a kiln is an effective control device.

EPA Material on TRS Incineration and Monitoring

As described in "Modern TRS Control in the Kraft Pulping Industry", a U.S. EPA study, TRS destruction in an incinerator demonstrated that TRS was dramatically reduced by combustion. It concludes that "Combustion in a lime kiln is probably even more complete because of higher temperatures and longer residence times. A kiln was not chosen for testing because of the greater difficulty in measuring combustion residual (in a kiln stack, noncondensable TRS residuals are difficult to distinguish from TRS compounds generated by the kiln itself.)" This same comment was also made in the Standards Support and Environmental Impact Statement, Volume 1: Proposed Standards of Performance for Kraft Pulp Mills. Along with this, the Code of Federal Regulations states if the TRS emissions are burned in a kiln the only demonstration required is a continuous monitor for temperature in the kiln. The proposed rule changes published on January 19, 1984 proposed removal of the temperature monitoring requirement. The Findings and Conclusions stated that the temperature and residence time required to operate a kiln generally exceed the 1200°F and .5 second retention time required for TRS incineration.

Demonstration of Compliance

Our #6 set of evaporators meets the EPA New Sources Performance Standard by venting the off gas to the kiln with temperatures greater than 1200°F and .5 second retention time. However, we proposed to demonstrate compliance by running a temperature traverse of the first 15' of the kiln hot end with and without the emissions from the new evaporator set. We have already run a temperature traverse for the first 15' of the hot end of the kiln. The Technical Report of this demonstration is enclosed. It was known that if the temperature exceeded 1200°F for 15', the required retention time would be met. A further distance was not measured because of space restrictions and the equipment was subjected to such extreme heat. From the data it can be seen that the temperatures are in excess of 1200°F for at least the first 15' in each kiln and thereby meet the required temperature and retention time in 40 CFR 60.283(a)(1)(iii). We will measure the temperatures again if you would like to be present. We also propose to do this temperature traverse after the new evaporator set is in service to show this small flow from No. 6 MEE does not affect the temperatures in the kiln. We are willing to meet the requirements of condition 6 of the DER permit by measuring particulate matter and SO_2, but we feel the above proposal verifies that our kiln is more than adequate for incineration of TRS emissions from #6 Multiple Effect Evaporator. We are also willing to perform the Method 16A test even with its great variability. However, as indicated by U.S. EPA in its development document, and also as expressed by Bruce Mitchell, DER, we believe the TRS residual from the lime kiln operation itself would completely mask any TRS emissions from the evaporator. Even though this distinction cannot be made, this does not reflect on the incineration capability in the kiln. If you have any questions on our proposal, please do not hesitate to call.

CONTAINER CORPORATION OF AMERICA
Fernandina Beach - Mill Division
TECHNICAL DEPARTMENT REPORT

PROJECT TITLE: TRS Combustion in a lime kiln.

REPORT TITLE: Determination of temperature and retention time of gases in No. 2 and No. 3 lime kilns.

SUMMARY, TEST DATA, REMARKS:

In order to demonstrate compliance with New Source Performance Standards, as stated in 40 CFR, Part 60, Subpart BB 60.283(a) (iii), we are required to show that the noncondensable gases from our No. 6 multiple effect evaporator are exposed to a temperature of 1200°F for 0.5 seconds.

Temperature traverses were performed on No. 2 and No. 3 lime kilns on May 10 and 11, 1984 respectively. The results obtained from these traverses clearly indicate that we are in compliance with the above standard.

TEMPERATURE DATA:

°F at	1'	5'	15'	Into Hot End
No. 2 lime kiln	1532	1925	2320	
No. 3 lime kiln	1298	2280	2400	

PROJECT: ____________
REPORT NO: ____________
DATE: 5-17-84
WORK BY: Dave James and Nancy Thomasson

APPROVED BY:
W. M. Kendrick WMK
Cynthia L. Sawyer CLS

REFERENCE DATA:

DISTRIBUTION:

RETENTION TIME DATA:

	LENGTH ft	DIAM. ft.	TOTAL ACFM	No. 6 MEE ACFM	LINEAR FT. OF KILN FOR 0.5 SEC. RETEN. TOTAL FLOW	No. 6 MEE FLOW
No. 2 Kiln	175	10	100344@2320°F	394@2320°F	10.65'@2320°F	0.042'@2320°F
			59918@1200°F	235@1200°F	6.36'@1200°F	0.025'@1200°F
No. 3 Kiln	185	12.5	188178@2400°F	405@2400°F	12.78'@2400°F	0.027'@2400°F
			109222@1200°F	235@1200°F	7.42'@1200°F	0.016'@1200°F

From the above data, it can be seen that temperatures are in excess of 1200°F for at least the first 15 feet in each kiln and thereby meets the required temperature and retention time criteria as outlined in the standard cited above.

REFERENCE LITERATURE

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 digester system.

(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.

§ 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.

§ 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, black liquor oxidation 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 black liquor oxidation system or brown stock washer system in an existing facility is technologically or economically not feasible. 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, condensate stripper system, or black liquor oxidation system are controlled by a means other than combustion. In this case, these systems 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.

(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 0.0084 g/kg black liquor solids (dry weight) [0.0168 lb/ton liquor solids (dry weight)].

(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 43 FR 34785, Aug. 7, 1978]

§ 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, black liquor oxidation 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 span(s) 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) A monitoring device which measures 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

BEST AVAILABLE COPY

CHEMICAL ENGINEERS' HANDBOOK - JOHN PERRY

Table 19. Minimum Ignition Temperatures and Flash Points of Combustible Liquids, Gases, and Vapors*

Name	Formula	Ignition temp.		Flash point	
		°F.	°C.	°F.	°C.
Acetal	$C_6H_{14}O_2$	446	230		
Acetaldehyde	C_2H_4O	527	275	−17	−27
Acetanilide	C_8H_9NO	...	...	345	174
Acetic acid	$C_2H_4O_2$	1022	550	107	42
Acetic anhydride	$C_4H_6O_3$	738	392	127	53
Acetone	C_3H_6O	1042	561	0	−18
Acetophenone	C_8H_8O	...	...	221	105
Acetyl chloride	C_2H_3OCl	...	...	40	4
Acetylene	C_2H_2	581	305	Gas	Gas
Acrolein	C_3H_4O	532	278		
Acrylonitrile	C_3H_3N	898	481	23	−5
Aldol	$C_4H_8O_2$	...	...	181	83
Allyl alcohol	C_3H_6O	712	378	70	21
Allyl chloride	C_3H_5Cl	909	487		
Ammonia	NH_3	1204	651	Gas	Gas
Amyl acetate	$C_7H_{14}O_2$	750	399	77	25
Isoamyl acetate	$C_7H_{14}O_2$	714	379	92	33
Amyl alcohol	$C_5H_{12}O$	801	427	100	38
p-Iso-amyl alcohol	$C_5H_{12}O$	650	343	114	45
s-Iso-amyl alcohol	$C_5H_{12}O$	...	...	103	39
tert-Amyl alcohol	$C_5H_{12}O$	...	...	67	19
Amyl benzene	$C_{11}H_{16}$	491†	255†		
Amyl chloride	$C_5H_{11}Cl$	498	259		
tert-Amyl chloride	$C_5H_{11}Cl$	649	343		
Amylene	C_5H_{10}	523	273		
Isoamyl ether	$C_{10}H_{22}O$	802	428		
Amyl propionate	$C_8H_{16}O_2$	...	...	106	41
Aniline	C_6H_7N	986	530	160	71
Anthracene	$C_{14}H_{10}$	882	472		
Benzaldehyde	C_7H_6O	377	192	148	64
Benzene	C_6H_6	1076	580	12	−11
Benzoic acid	$C_7H_6O_2$	1063†	573†	250	121
Benzyl acetate	$C_9H_{10}O_2$	860	460	216	102
Benzyl alcohol	C_7H_8O	802	428	213	101
Benzyl chloride	C_7H_7Cl	1161	627	140	60
Bromo-benzene	C_6H_5Br	1270	688	149	65
Butadiene	C_4H_6	804	429		
Butane	C_4H_{10}	826	441	Gas	Gas
Isobutane	C_4H_{10}	1010	543	Gas	Gas
Di-chloro butane	$C_4H_8Cl_2$	543	284	0	−18
Butyl acetate	$C_6H_{12}O_2$	790	421	84	29
Butyl alcohol	$C_4H_{10}O$	653	345	100	38
Iso-butyl alcohol	$C_4H_{10}O$	813	434	82	28
tert-Butyl alcohol	$C_4H_{10}O$	892	478	52	11
s-Butyl alcohol	$C_4H_{10}O$	777	414	70	21
s-Butyl benzene	$C_{10}H_{14}$	...	...	126	52
Butyl bromide	C_4H_9Br	901	483		
Butyl carbitol	$C_8H_{18}O_3$	442	228	172	78
Butyl cellosolve	$C_6H_{14}O_2$	472	244	141	61
Butyl chloride	C_4H_9Cl	860	460		
Butylene	C_4H_8	829	443	Gas	Gas
Butyl formate	$C_5H_{10}O_2$	635	335	64	18
Butyl propionate	$C_7H_{14}O_2$	799	426	90	32
Butyraldehyde	C_4H_8O	446	230	20	−7
Butyric acid	$C_4H_8O_2$	1026	552	170	77
Carbon disulfide	CS_2	248	120	−22	−30
Carbon monoxide	CO	1128	609	Gas	Gas
Cellosolve	$C_4H_{10}O_2$	460	238	104	40
Cellosolve acetate	$C_6H_{12}O_3$	715	379	124	51
Chlorobenzene	C_6H_5Cl	...	...	85	29
Chloro-ethyl acetate	$C_4H_7O_2Cl$	...	...	129	54
Creosote	...	637	356	165	74
p-Cresol	C_7H_8O	1110	599	178	81
m-Cresol	C_7H_8O	1159	626	187	86
Croton aldehyde	C_4H_6O	450	232	55	13
Cyanamide	CN_2H_2	...	...	285	141
Cyanogen	C_2N_2	1562	850	Gas	Gas
Cyclohexane	C_6H_{12}	565	296	1	−17
Cyclohexanol	$C_6H_{12}O$	...	...	154	68
Cyclohexanone	$C_6H_{10}O$	...	...	93	34
Cyclopropane	C_3H_6	928	498	Gas	Gas
Cymene	$C_{10}H_{14}$	871	466	117	47
Decalin	$C_{10}H_{18}$	504	262	136	58
Decane	$C_{10}H_{22}$	482	250	115	46
Di-chloro-ethyl ether	$C_4H_8OCl_2$	696	369	131	55
Di-chloro-ethylene	$C_2H_2Cl_2$	856	441	57	14
Di-ethanol amine	$C_4H_{11}NO_2$	1224	662	280	133
Di-ethylene glycol	$C_4H_{10}O_3$	775	413	255	184
Di-methyl aniline	$C_8H_{11}N$	700	371	145	63
Dioxan	$C_4H_8O_2$	511	266	54	12
Di-phenyl	$C_{12}H_{10}$	...	...	235	113
Di-phenyl amine	$C_{12}H_{11}N$	...	...	307	153
Di-phenyl methane	$C_{13}H_{12}$	...	...	266	130
Di-phenyl oxide	$C_{12}H_{10}O$	...	...	239	115
Di-vinyl ether	C_4H_6O	680	360	−22	−30
Dodecane	$C_{12}H_{26}$	993	534	165	74
Ethane	C_2H_6	882	472	Gas	Gas
Ethyl acetate	C_4H_8O	903	484	28	−2
Ethyl alcohol	C_2H_6O	738	392	54	12
Ethyl benzene	C_8H_{10}	1027	553	59	15
Ethyl bromide	C_2H_5Br	952	511		
Ethyl butyrate	$C_6H_{12}O_2$	865	463	78	26
Ethyl chloride	C_2H_5Cl	963	517	−58	−50
Ethylene	C_2H_4	914	490	Gas	Gas
Ethylene chlorohydrin	C_2H_5OCl	797	425	140	60
Ethylene dichloride	$C_2H_4Cl_2$	775	413	56	13
Ethylene glycol	$C_2H_6O_2$	775	413	232	111
Ethylene oxide	C_2H_4O	804	429	Gas	Gas
Ethyl ether	$C_4H_{10}O$	379	193	−49	−45
Ethyl formate	C_3H_6O	1071	577	−4	−20
Ethyl mercaptan	C_2H_6S	570	299		
Ethyl propionate	$C_5H_{10}O_2$	889	476	54	12
Furfural	$C_5H_4O_2$	736	391	140	60
Gasoline	Regular	536	280	−47	−44
Gasoline	73 octane	570	299		
Gasoline	92 octane	734	390		
Gasoline	100 octane	804	429		
Glycerin	$C_3H_8O_3$	739	393	320	160
Heptane	C_7H_{16}	451	233	25	−4
Hexane	C_6H_{14}	478	248	−15	−26
Isohexane	C_6H_{14}	543	284		
Hexyl alcohol	$C_6H_{14}O$	572	300	137	58
Hydrocyanic acid	HCN	1000	538	Gas	Gas
Hydrogen	H_2	1065	574	Gas	Gas
Hydrogen sulfide	H_2S	558	292	Gas	Gas
Isoprene	C_5H_8	824	440		
Kerosene	...	491	255	100–165	38–74
Methane	CH_4	1170	632	Gas	Gas
Methyl acetate	$C_3H_6O_2$	936	502	14	−10
Methyl alcohol	CH_4O	878	470	52	11
Methyl bromide	CH_3Br	999	537		
Methyl butyl ketone	$C_6H_{12}O$	991	533	95	35
Methyl butyrate	$C_5H_{10}O_2$	...	...	57	14
Methyl cellosolve	$C_3H_8O_2$	551	288	107	42
Methyl chloride	CH_3Cl	1170	632	Gas	Gas
Methyl cyclo-hexane	C_7H_{14}	545	285	25	−4
Methyl cyclo-hexanol	$C_7H_{14}O$	...	...	154	68
Methyl cyclo-pentane	C_6H_{12}	624	329		
Methyl ethyl ketone	C_4H_8O	957	514	30	−1
Methyl formate	$C_2H_4O_2$	456	236	−2	−19
Methyl propyl ketone	$C_5H_{10}O$	941	505	60	16
Methyl salicylate	$C_8H_8O_3$	850	454	219	104
Methylene chloride	CH_2Cl_2	1224	662		
Naphtha	...	450–531	232–277	20–110	−7–43
Naphthalene	$C_{10}H_8$	1038	559	176	80
Nicotine	$C_{10}H_{14}N_2$	471	244		
Nitrobenzene	$C_6H_5NO_2$	900	482	198	92
Nonane	C_9H_{20}	545	285	88	31
Octane	C_8H_{18}	446	230	56	13
Oil:					
Cable insulating	...	738	392		
Castor	...	840	449	445	229
Coconut	...	...	...	420	216
Cod liver	...	662†	350†		
Corn	...	...	...	490	254
Cottonseed	...	650	343	486	252
Creosote	...	637	336	165	74
Fish	...	531†	277†	420	216
Flax	...	772†	411†		
Gas	...	640	338	150	66
Lard	...	650	343	363	184
Linseed, raw	...	650	343	432	222
Linseed, boiled	...	650	343	403	206
Lubricating	...	711	377		
Lubricating, cylinder	...	783	417	535	279
Lubricating, spindle	...	778	414	169	76
Lubricating, turbine	...	700	371	400	204
Menhaden	...	828	442	435	224
Mineral seal	...	...	...	170	77
Neatsfoot	...	828	442	470	243
Olive	...	650	343	437	225
Palm	...	600	315	323	162
Paraffin	...	...	...	444	229
Peanut	...	833	445	540	282
Pine	...	...	...	172	78
Pine tar	...	...	...	144	62
Rape	...	836	447	464	240
Rosin	...	648	342	266	130
Signal	...	...	...	200	93
Soybean	...	...	...	540	282
Sperm	...	586	308	428	220
Straw	...	...	...	315	157
Tallow	...	...	...	492	256
Transformer	...	...	...	295	146
Tung	...	855	457	552	289
Turkey red	...	833	445	476	247

* Compiled by G. W. Jones, U.S. Bureau of Mines.

† Determinations made in oxygen.

The Combustion of Noncondensable Blow and Relief Gases in the Lime Kiln

ALLEN A. COLEMAN

At the Weyerhaeuser Timber Co.'s Springfield, Ore., mill, a system for destroying odorous digester relief and blow gases has been in operation for several years. This system, described by DeHaas and Hansen (*1*), catches the large surge of gases from each digester blow in a vaporsphere gas collector. Digester noncondensable relief gases are also sent to the collector more or less continuously. The vaporsphere is a 27 ft. diam. steel sphere with a hemispherical cloth and plastic diaphragm attached inside around the equator of the sphere. Gases enter at the bottom of the sphere under the diaphragm. They are withdrawn at a slow continuous rate of flow for elimination of odor by burning.

Originally, the gas was diluted beyond inflammability with air and burned in a small odor destroying furnace. Although this furnace did a satisfactory job of destroying odorous gases, there were several disadvantages. It was continuously fired by a pilot fuel so that the temperature would always be at 1000 to 1200°F. to burn the gas, but there was no means for recovering the heat value of the pilot fuel or the gas. An appreciable amount of fuel was wasted.

Another furnace problem was the complicated electronic temperature control and push button starting arrangement. Much maintenance labor was required to keep the furnace controls in order. The furnace controls were also very sensitive to changes in fuel quality. The pilot fuel for this furnace was crude sulphate turpentine, which occasionally contained small amounts of a turpentine-water emulsion. A slug of this emulsion would cause a low furnace temperature, whereupon the automatic controls would shut down the whole gas burning system. The emulsion then had to be flushed from the fuel line before the furnace could be started.

GAS HANDLING SYSTEM FOR THE LIME KILN

To overcome these problems, a change to another type of gas burning furnace was considered desirable. This change has been made, and the lime kilns are now successfully burning blow and relief gases. The new system, shown in Fig. 1, routes the gas from the vaporsphere through a rock packed scrubber counter-current to water from a shower. From the scrubber the gas line is about 350 ft. long to the kiln. Along a horizontal run in this line is an orifice providing a signal for a recorder-controller which regulates the opening of an automatic valve in the gas line. This controls the gas flow. The gas next passes through a flame arrester and is diluted beyond inflammability with air. The mixture of gas and air is blown into the lime kiln by the kiln primary air fan. Not shown on the sketch are rupture plates along the gas line which will release pressure in case of an explosion. Also omitted are water seals below the vertical runs of piping. These catch any condensate in the gas line.

PLANNING THE LIME KILN GAS BURNING SYSTEM

The advantages of controlling the rate of gas flow to the furnace had been demonstrated by the operation of the separate gas burning furnace and by previous unsuccessful attempts to take surges of digester relief and blow gases directly into the lime kiln. An orifice, a flow controller, and an automatic gas valve were therefore included in the plan for burning gases in the kiln. The rate of gas flow to the separate furnace had been about 60 c.f.m. for 10 to 15 min. for each digester blow. With improved cooling of the gas, it was planned to control the flow to the kilns at about 30 c.f.m. for 15 to 20 min. per blow.

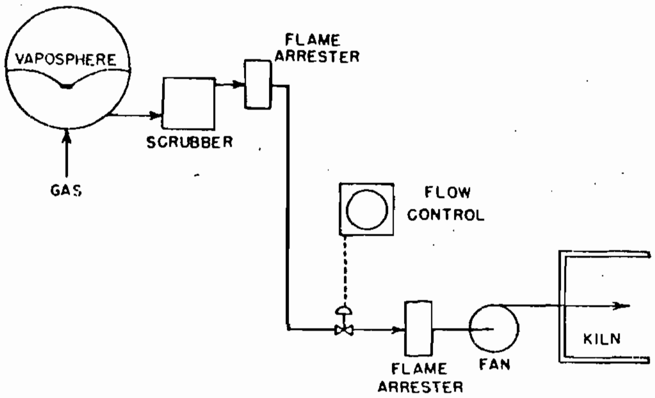


Fig. 1 Gas handling

Several methods of moving the gas from the vaporsphere to the kiln were considered. Of these, the use of the draft on the suction side of the kiln primary air fan appeared to be the simplest and least expensive. Draft on the fan suction is obtained by slight throttling. Throttling must be limited or serious reduction in capacity will result. Pitot tube readings taken with various amounts of throttling showed that a draft of about 5 in. of water could be obtained for no. 1 kiln without serious loss of fan capacity. Number 2 kiln has a larger primary air fan which could provide a draft of 8 to 10 in. of water. Perry's handbook (*2*) shows that 4 in. of water pressure drop in a 4-in. pipe about 400 ft. long is sufficient to move more than 30 c.f.m., allowing half of the pressure drop for fittings. An additional motive force is also given to the gas by the weight of the vaporsphere diaphragm. This force was found to be enough to move 25 c.f.m. through about 100 ft of 4-in. pipe.

Gases from the vaporsphere had been diluted beyond inflammability with air before firing in the separate furnace. This technique is considered one of the safest methods of firing, and was retained for the kiln by extending the primary air fan suction pipe sufficiently to obtain a mixing chamber for gas and air.

After the preliminary studies had been completed, a gas burning flow sheet was drawn and submitted to engineering, operational, and maintenance supervision. With minor modifications, this system was constructed and put into operation in July, 1957.

METHOD OF FIRING GAS

When the vaporsphere starts to fill during a digester blow, an electric switch is turned on by movement of the vaporsphere diaphragm. This switch energizes the gas controller, causing the automatic gas control valve to open sufficiently

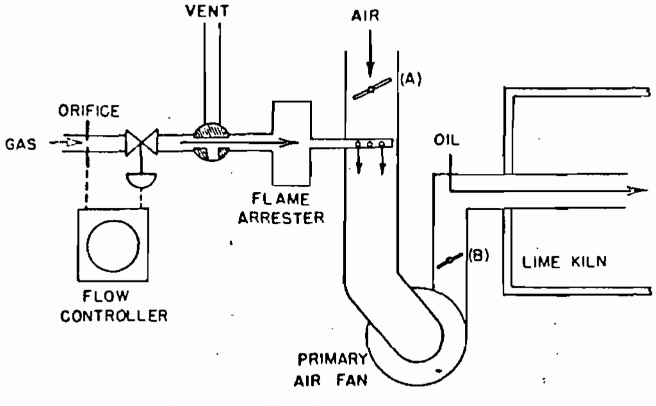


Fig. 2. Gas burning system

Allen A. Coleman, Project Chemist, Weyerhaeuser Timber Co., Pulp Div., Springfield, Ore.

to control the gas flow at a preset level (normally 30 c.f.m.). Gas continues to flow to the kiln until the vaporsphere empties, when the switch on the vaporsphere turns the system off. This cycle is repeated each time a digester blows. The gas flow control and dilution system is shown in detail in Fig. 2. Following the automatic valve is a three-way manual plug valve. This valve shuts off the gas flow and provides a vent for the remainder of the line to the kiln, allowing the air fan to draw air through this part of the system when the manual valve is closed. At this point, gas may be routed to either kiln, but it is burned in only one kiln at a time. A spool and blank piping arrangement (not shown) is used to switch gas from one kiln to another. Next in line is a flame arrester, followed by a distributing nozzle which releases the gas into the primary air fan suction pipe. The distributing nozzle has a large number of small holes so that the gas will be well mixed with air and will not channel into the air fan.

Table I. Calculation of Value of Pilot Fuel for Gas Burning Furnace

I. Data on Record
  1. Number of hours per month that one kiln operates on turpentine alone:
     a. With gas burning furnace using part of turpentine: 34 hr. per month.
     b. Without gas burning furnace (all turpentine to kiln): 70 hr. per month.

  (Both cases are 6 months average.)
  2. Number 1 kiln uses 120 gal. fuel oil per hour and also operates on 120 gal. of turpentine per hour (approximately), therefore, 1 gal. of turpentine is equal to 1 gal. of oil, which costs about 9.6¢ per gal.
  3. Turpentine total production rate (measured by accumulation in the storage tank) is about 0.8 gal. per air-dry ton.
  4. Pulp production rate for the same period as no. 3 is 11200 air-dry ton per month.

II. Value of Pilot Fuel

  Basis: 0.8 gal. of turpentine per air-dry ton at 9.6¢ per gal.
  1. Total turpentine value:

$$\left(\frac{0.8\ \text{gal.}}{\text{air-dry ton}}\right)\left(\frac{0.096\ \$}{\text{gal.}}\right) = 0.08\ \$/\text{air-dry ton}$$

  2. Value of turpentine used in kiln while gas burning furnace was in operation:

$$\left(\frac{0.08\ \$}{\text{air-dry ton}}\right)\left(\frac{34\ \text{hr. then}}{70\ \text{hr. total}}\right) = 0.04\ \$/\text{air-dry ton}$$

  3. Gain due to removal of furnace:

$$\left(\frac{0.04\ \$}{\text{air-dry ton}}\right)\left(\frac{11200\ \text{air-dry ton}}{\text{month}}\right) = 450\ \$/\text{month}$$

In the vertical fan suction pipe one volume of gas is mixed with 19 or more volumes of air, which dilute the gas beyond inflammability.* The necessary suction for pulling gas from the sphere is obtained by partially closing a throttling damper (damper A in Fig. 2) at the top of the primary air fan suction pipe. The damper is set to obtain a minimum of three inches of water draft while the fan is delivering a total flow of 600 c.f.m. A higher draft is obtained at the higher air flow normally used, but the automatic gas controller restricts the gas flow to 30 c.f.m.

For a gas flow of 30 c.f.m, it is necessary to prevent the air flow from being reduced below the minimum of 600 c.f.m. needed for adequate dilution. This is accomplished by adjusting a stop on the air control damper (damper B in Fig. 2) on the discharge side of the primary air fan so that it cannot be closed below a flow of 600 c.f.m.

After the gas has been diluted with air it is blown into the kiln by the primary air fan. The gas and air mixture enters the kiln through the air pipe around the oil nozzle.

SAFETY CONSIDERATION

Since digester relief and blow gases form explosive mixtures with air, a number of safety devices were built into the gas burning system. In the case of a mechanical or electrical failure of either the primary air fan or the lime kiln induced draft fan, it is desirable to immediately shut off the flow of gas. These fans are therefore electrically interlocked with the automatic gas control valve. If either fan motor stops, the gas valve will close. After the kiln is running in a normal manner again, and the operator is ready to burn gas, a manual reset button must be pushed before the gas controller will function.

Rupture plates were installed along the gas line so that pressure from a flame in the line could be released without bursting the pipe. Flame arresters and the rock packed scrubber act as restrictions to confine a fire to a particular section of the line.

The method of firing the gas after dilution beyond inflammability with air is considered safer than an alternative of pumping rich gas directly from the vaporsphere because the vaporsphere gas can, at times, be an explosive mixture with air. Air may enter the vaporsphere via the blow tanks during shutdowns, and also during regular digester operation when the digester lid and blow valve are both open at the same time.

The rock scrubber and the condensate traps along the gas line catch any turpentine which might enter the system. Turpentine could cause an overly rich and possibly dangerous mixture if it reached the primary air fan.

RESULTS

From an operational standpoint the results of burning digester relief and blow gases in the kilns have been good. Since July, 1957, satisfactory operation has been obtained with either lime kiln. No maintenance, other than routine instrument inspections and lubrication of valves has been necessary. The only difficulty reported by the kiln operators has been that a small amount of dilute gas leaks out around the shafts of the primary air fans, causing a disagreeable odor in the operating room. This can probably be stopped by installing seals around fan shafts. No backfires or pulling in the kilns due to gas burning has occurred. The amount of heat obtained from gas burning has been small. When the system is turned on or off, no change in kiln temperatures can be detected. The gas-air mixture in the inlet and discharge of the primary air fans has been tested numerous times (at random) with the Mine Safety Appliance Explosimeter. The maximum reading has been about 3% explosive.

The kiln system has improved the elimination of odor because there has been less down time than with the separate furnace. Some down time occurs when switching gas burning from one kiln to another. This normally takes less than one-half hour. Odor may escape to the atmosphere if both kilns are shut down while the digesters are being operated. Average unavoidable down time for the kiln gas burning system has been about 7 hr. per month while the digesters were being operated. In comparison the digesters were in operation an average of about 23 hr. per month while the separate furnace was shut down.

Maintenance labor costs for the gas burning system have been reduced by the change to the lime kilns. Previously, instrument labor amounted to at least 30 hr. per month. In addition, other maintenance labor was about 5 hr. per month. For the past 6 months, maintenance labor on the new system has been negligible.

---

* Ratio of 20:1 established by W. T. Co. Research Dept.

One of the effects of burning gases in the lime kiln has been a savings of the heat value of the pilot fuel (crude sulphate turpentine) formerly required for the separate furnace. Turpentine has also been used to fire one of the lime kilns whenever there was an excess of turpentine accumulated in storage. Records of the number of hours per month that a kiln was fired on turpentine alone are available. These records and calculations in Table I show that one kiln operated an average of 34 hr. per month on turpentine alone while the separate gas burning furnace was in operation, and an average of 70 hr. per month after removal of the separate furnace. This gain amounts to about $450 per month, or about 4¢ per air-dry ton.

It has been mentioned that the separate furnace was very sensitive to slugs of turpentine-water emulsion. This effect has not been a disadvantage with the kiln, probably because the much greater rate of flow of turpentine into the kiln allows such slugs of emulsion to pass too rapidly to affect the fire.

SUMMARY

The burning of digester relief and blow gases in the lime kiln has been found practical from an operational standpoint. Over-all odor reduction has improved because of reduced down time of the gas burning system. Maintenance labor for experienced mechanics has been reduced by at least 35 hours per month. A fuel savings of about $450 per month or 4¢ per air-dry ton has been obtained by the elimination of the separate gas burning furnace.

LITERATURE CITED

1. DeHaas, G. G., and Hansen, G. A., *Tappi* 38: 732–738 (1955).
2. Perry, J. H., "Chemical Engineers' Handbook," 2nd ed., pg. 2414, New York, McGraw-Hill (1941).

A Shibley Award paper presented at the meeting of the Pacific Section held at Longview, Wash. April 1, 1958.

Why Is Water Vapor "Permeability" So Confusing?

F. A. JOY

When two men meet to discuss something and they speak different languages, there is bound to be confusion. Thirty years ago, when the control of moisture by a vapor barrier began to attract interest, there were almost as many languages as laboratories in this field. In 1937, Carson (*1*) listed the work of 28 investigators who were using 19 different test methods and 20 different units for reporting their results. Even today there are too many languages. For example, "permeability" is loosely used, meaning different things to different people. Consistent with good usage, this term, like density, conductivity, elasticity and others with the suffix "ity," refers to a property of the substance, and the measurement properly relates to a unit volume.

Engineers need to know exactly what a term means. To clarify these matter, ASTM in 1953 adopted in Standard C 168 the following definitions:

"*A. Rate of Water Vapor Transmission, or WVT.* The rate of water vapor transmission of a body between two specified surfaces, or WVT, is the time rate of water vapor flow, under steady condition, through unit area, under the conditions of test. An accepted unit of WVT is a grain per sq. ft., hour. The test conditions must be stated.

"*B. Water Vapor Permeance.* The water vapor permeance of a body between two specified surfaces is the ratio of its WVT to the vapor pressure difference between the two surfaces. An accepted unit of permeance is a perm, or 1 grain per sq. ft. hour, inch of mercury. The test conditions must be stated.

"*C. Water Vapor Permeability.* The water vapor permeability of a homogenous material is a property of the substance. This property may vary with conditions of exposure. The average permeability of a specimen is the product of its permeance and thickness. An accepted unit of permeability is a perm-inch, or 1 grain per sq. ft. hour (inch of mercury per inch of thickness). The test conditions must be stated."

The term "permeance" fills a real need. Like conductance and resistance, it applies to a definite thickness such as a sheet of paper, a sheathing board or an assembly. Also like conductance it is a ratio, stating the vapor transfer per unit of vapor pressure difference. Unlike WVT, the permeance is fairly constant over a considerable range of temperature and below 50% R.H. Test results expressed as permeance are condensed and ready-to-use, provided the service and test conditions are compatible. In TAPPI test methods, the results are reported as WVT in "grams per square meter per 24 hr. at 73°F." They are easily converted to permeance of course by dividing by the vapor pressure difference which is nominally 0.4141 in. Hg. If the actual test condition, rather than the nominal, were applied, the result would be so much the better. The language of permeance has found general acceptance in the building industry and is found in the ASHAE Guide.

The units mentioned have also been welcomed, especially the suggested unit of permeance—"perm"—which is natural, simple, and unique. However, it must be said that these units do not forbid or disparage the use of others. Their full adoption would promote understanding throughout the industry.

TAPPI provides two standard WVT test methods; T448 and T464. Both are dry-cup methods, though the latter method provides a high temperature and high relative humidity "tropical" exposure. Both require the specimen to be sealed to the cup with wax. This is commendable.

ASTM Standard E 96–53 T provides four procedures using either dry or wet-cups at 73.4°F. or 90°F. and a fifth procedure which is equivalent to the TAPPI "tropical" test. The results are reported as WVT in grams per square meter per 24 hr. under the specified test conditions. Also shown are factors for conversion into two other WVT units and into the permeance unit, perm. ASTM Standard C 355–54 T is designed for thicker materials. Both dry and wet cup procedures are provided, with any constant temperature between 70 and 90°F., a permissible latitude since the results are reported in perms. The cup size is large—not less than 6 in. diam. The specimen may be cut larger and masked down to the cup mouth size but such masking is strictly limited because of the circuitous vapor path at the edges of a thick specimen.

Both ASTM standards allow any method of sealing the specimen to the cup, provided it is vapor-tight. This latitude of choice is too wide because some "seals" are not dependable and it is no small task to tell how much of the test result is WVT and how much is leakage.

The hazard of unreliable sealing methods has been dramatically shown in a recent ASTM "round robin" series of tests among seven laboratories (*2*), each reporting the average of three dry-cups and of three wet-cups, using any cup and sealing method of its choice. The specimens tested were Mylar, a highly uniform plastic sheet of low permeance which is peculiarly insensitive to high relative humidity. (Even inverting a wet-cup makes little or no change in its WVT.) The results were mostly within a twofold range, but the highest reported permeance was 25 times the lowest. All laboratories using wax seals got lower results than any laboratory not using wax. A check of the seal itself using an

---

F. A. Joy, Professor, Engineering Research, College of Engineering and Architecture, Pennsylvania State University, University Park, Pa.

NCSI technical bulletin

CURRENT PRACTICES IN THERMAL OXIDATION OF NONCONDENSABLE GASES IN THE KRAFT INDUSTRY

RUSSELL O. BLOSSER

AND

HAL B. H. COOPER

ATMOSPHERIC POLLUTION
TECHNICAL BULLETIN NO. 34

National Council For Stream Improvement, Inc.
103 Park Avenue
New York, N. Y. 10017

NATIONAL COUNCIL FOR STREAM IMPROVEMENT
(OF THE PULP, PAPER AND PAPERBOARD INDUSTRIES)
INC.
103 PARK AVENUE
NEW YORK, NEW YORK 10017

ATMOSPHERIC POLLUTION
TECHNICAL BULLETIN NO. 34

November 20, 1967

CURRENT PRACTICES IN THERMAL OXIDATION OF NONCONDENSABLE GASES IN THE KRAFT INDUSTRY

The attached National Council Technical Bulletin represents another in a continuing series of staff reviews of current air pollution control technology in the kraft industry. It provides a summary of available data on noncondensable gas volumes and composition, gas collection and flow equalization systems, safety and control features for thermal oxidation in lime kilns and auxiliary furnaces, and odor control results of thermal oxidation. Available cost data is also summarized, and supplemented in a useful appendix listing commercial sources of thermal oxidation process and control equipment.

The Technical Bulletin was prepared by Russell O. Blosser, West Coast Regional Engineer, and Hal B. H. Cooper, Air Research Engineer. Its preparation would not have been possible without the cooperation and assistance of personnel from Weyerhaeuser Co., Georgia-Pacific Corp., Crown-Simpson Pulp Co., Fibreboard Corp., Mead Corp., New York and Pennsylvania Corp., and Hoerner-Waldorf Corp., who assisted in the field studies and provided technical data on each of their installations.

Very truly yours,

Ernest J. Bolduc, Jr.
Executive Secretary

EJB:lh
Enc. (1)

I. Introduction

A. Character of Kraft Mill Noncondensable Gases

The noncondensable sulfur compounds and terpenes present in digester relief and blow gases, as well as those sulfur compounds released during multiple effect evaporation of black liquor, are significant sources of odor from the kraft industry. The blow and relief gases usually represent potentially the second largest source of sulfur emission in the kraft process and may actually represent a larger sulfur loss than the recovery furnace - contact evaporator combination where high degree black liquor oxidation is practiced. In contrast to the high volume - low concentration effluents found at the recovery boiler stack, blow and relief effluents are reasonably low volume, high sulfur content effluents requiring high dilution to be below detectable limits. The exact amount of dilution required to dilute below the threshold is not firmly established and can be expected to vary to some extent due to fluctuations in concentration. Cederlof et al established the logarithm of the dilution required to approximate odor threshold of digester noncondensables as 107.67, or a threshold dilution factor of 47×10^6 (1). Such dilutions are not usually uniformly or practically obtainable, and some method of treatment is required if this odor source is to be controlled.

B. Review of Noncondensable Gas Burning Literature

While the practice of burning noncondensables is not common at the present time, it has been employed both in the United States and foreign countries for more than a decade. A system for burning black liquor oxidation vent exhausts containing residual noncondensables at a South African mill is described by Hisey, while Ghisoni also reports on a system for burning noncondensables at an Italian mill (2) (3). In both of these installations the gases are burned in existing boilers, the former being a recovery boiler, and the latter a natural gas-fired power boiler. Lindberg has described the use of both the recovery boiler, and an auxilliary furnace (which is exhausted to a conventional gas-fired boiler) for burning noncondensables (4). Adams refers to three other systems in use in Europe, two in France and one in Austria. One French mill burns gases in a waste wood burner and the second uses a recovery furnace, while the Austrian installation uses a specially designed auxiliary burner (5).

DeHaas and Hansen describe the development and successful operation of a digester blow and relief noncondensable burning-system at the Weyerhaeuser mill at Springfield (6). Coleman describes modifications to this system after discontinuing use of an auxiliary furnace for burning noncondensables and substitution of the lime kiln as a thermal oxidation device (7). Chase reported that the noncondensable digester relief gases at the Champion, Pasadena mill are burned in lime kilns. (8). These and subsequent installations at other mills now account for in excess of thirty-five cumulative years of successful burning of noncondensables in the United States kraft industry.

C. Burning of Process Gases for Odor Control

Thermal destruction of organic vapors as an odor control technique has been practiced for many years. It is finding particularly extensive use in California, at the insistence of regulatory bodies, as an odor control technique on a wide variety of emissions containing organic matter, such as those from spray painting and solvent operations.

Laboratory investigations conducted by Council engineers have demonstrated the effectiveness of burning as an odor control technique for reduced sulfur compounds. When kraft blow and relief gases were passed through a quartz tube heated to 1400°F, no reduced sulfur compounds could be detected. When diluted below the odor threshold of SO_2, which was 1 to 3 ppm, no kraft odor was detectable.

DeHaas and Hansen report practically 100 per cent conversion of all reduced sulfur compounds to SO_2 when burning kraft relief gases in an Anthony furnace at 1100°F to 1400°F and a theoretical residence time of about 15 sec (6). At 900°F a considerable amount of reduced sulfur was not converted to SO_2.

Harkness, Murray, and Girard investigated the oxidation of reduced sulfur compounds on an iron oxide catalyst bed (15). The reduced sulfur present in hydrogen sulfide, methyl mercaptan and dimethyl disulfide showed nearly complete conversion to sulfur dioxide at 710°F, 850°F, and 850°F, respectively. Dimethyl sulfide was not as easily oxidized as the other sulfur compounds, and appeared to follow a different oxidation mechanism. At approximately 950°F there was nearly complete conversion of the carbon in CH_3SCH_3 to carbon dioxide, but only a fifty per cent conversion of the sulfur to sulfur dioxide.

II. Noncondensable Gas Emission Volumes and Composition

A. Gas Volumes

The gas volume generated during the relief and blowing of batch digesters is a highly variable quantity during the cook through the blowing cycle, and varies from zero to high instantaneous flows, consisting of high quantities of water vapor. That amount finally discharged or available for treatment is a function of the effectiveness of the blow heat recovery system and subsequent condensation occurring which may be natural or induced by the use of scrubbers. DeHaas and Hansen used war surplus barrage balloons to collect the relief and blow gas from a single cycle and observed an estimated 4000 cu. ft. at the peak of the blow (6). Condensation of water vapor in the blow gas handling system and the associated reduction in volume accounted for a substantial reduction in the gas finally available for treatment. The gas flow from eleven consecutive cooks showed a value of 530 cu. ft. of combined blow and relief gas flow per cook or approximately 65 cu. ft. per ton of pulp.

This volume reduction associated with cooling requires special consideration in the design of gas holders and blow tank modifications and will be discussed later. In addition, several mills use condenser-scrubbers between the gas holder and flow measuring device. The flow data developed at many installations are therefore not representative of that developed during the blow, but that finally available for treatment.

In Table I are listed the flows in several noncondensable handling systems, the sources from which they are derived, and pertinent features of the system which may alter the flow delivered to the burner, such as the use of condensers. The average flow from batch digesters of 1 CFM/16 ton pulp/day is close to the 65 cu. ft./ton pulp reported by DeHaas and Hansen. The flow at mill G of about 1 CFM/ton indicates marginal blow heat recovery capacity, as is also the case at mill J. The flow data at the latter actually reflect flow without the associated volume reduction occurring in the blow tank-gas holding system due to cooling when these are present.

The flow delivered to the burner in each of these several systems varies due to other sources collected in addition to blow and relief gases. These include off gases from condensate stripping, turpentine decanter vents, and evaporator hotwell vents, the latter contributing only small volumes which have been measured at 25 CFM per set of evaporators or less. The average maximum gas flow reaching the burners is just under 2 CFM per ton of pulp produced daily.

TABLE I. NONCONDENSABLE GAS HANDLING SYSTEMS AND GAS FLOWS

Mill	Prod.	Connected Sources			Equipment			Incineration	Gas Flow(5) to burner-cfm	
	TPD	Batch or Continuous Digesters (1)	Evaporator Hotwell	Other	Gas Holder	Auxiliary Fan	Condenser in Line	System	Avg.	Range
A	400	Batch (4)	no	----	Vaposphere	no	yes	Lime Kiln	25	----
B	1,100	Batch (4)	yes (2)	----	none	no	yes	Lime Kiln	28	20-35
C	550	Continuous	yes	----	none	yes	no	Lime Kiln	210	----
D	550	Continuous	yes	(7)	none	yes	no	Lime Kiln	875	----
E	600	Both (4)	yes	(3)	Floating Cover	no	yes	Lime Kiln	30	10-70
F	1,250	Both (4)	yes	----	none	no	yes	Lime Kiln	---	----
G	550	Batch	no	----	Vaposphere	yes	no	Catalytic Furnace	500	----
H	160	Batch	no	----	Vaposphere	yes	no	Catalytic Furnace	10	----
I	700	Continuous (gas burning not practiced) (6)							2.4	----
J	500	Batch (gas burning not practiced)							1410	----

Notes:

(1) Includes both blow and relief gases for all systems.
(2) Evaporator noncondensable gases are burned in a separate system.
(3) Asplund defibrator offgases.
(4) Includes turpentine decanter vent gases.
(5) Gas flows are given at stack conditions.
(6) Average flow at turpentine condenser vent with spray condenser from continuous digester.
(7) Condensate stripping gases.

Table II summarizes observed flows to gas holders during batch digester blows. These range from 480 to 1600 cu. ft. per blow on the average, with a maximum of 4000 cu. ft. per blow under normal operating conditions. These closely parallel the observations of DeHaas and Hansen presented earlier.

Table II.

Digester Blow Gas Flows to Gas Holders

Mill	Ft^3 Gas/Blow		Ft^3 Gas/Ton Pulp		Number of Blows/Day	Blow Time, Minutes
	Avg.	Max.	Avg.	Max.		
A	1,600	4,000	125	312	32	8
E	1,500	10,000(1)	160	1,100(1)	24	12
H	480	----	70	----	24	8

Note:

(1) These volumes occur only when there is a malfunction in the blow heat recovery system.

B. Noncondensable Sulfur Loads

The reduced sulfur compounds most commonly found in noncondensable blow and relief gases are hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide. Thomas reports that other sulfur compounds may be present in minor quantities, and terpenes have been rather consistently identified by several investigators employing chromatographic techniques (9). A summary of sulfur loads found in noncondensable gas streams is presented in Table III.

Sources of these data were (a) published, (b) routine mill monitoring programs, and (c) recent field surveys conducted by National Council engineers in cooperation with member mills. What appear to be wide variations in sulfur loadings are partially explained by the presence of condenser-scrubbers at mills B, A and E, the first using white liquor as a scrubbing media (which will absorb hydrogen sulfide and methyl mercaptan) and the remainder employing a water scrub.

Hansen and DeHaas showed that sulfur loss from pilot cooks was a function of cooking time and others have

TABLE III.

REDUCED SULFUR COMPOUND CONTENT OF NONCONDENSABLE GASES

(expressed as lbs Gas/Ton Pulp)

Source	Analytical Technique	H_2S	CH_3SH	$(CH_3)_2S$	$(CH_3)_2S_2$	Total Sulfur (as S)	Remarks
Batch Digester							
Mill A	Harding(2)	0.00	0.07	0.84	0.19	0.60	After condenser scrubber
Mill J	Harding	0.03	0.52	1.86	1.32	2.24	
Mill K	Harding	0.12	0.79	4.32	3.22	5.07	
Reference (6)	Caustic & Benzene(1)	0.45	2.50	1.37	----	2.80	Pilot plant cook data
Reference (11)	Unknown	0.10	0.88	0.94	----	1.17	
Mill M	Gas Chrom	----	0.36	0.95	0.08	0.78	
Continuous Digester							
Mill I	Harding	0.00	0.001	0.03	0.001	0.02	Turpentine condenser vent
Mill C	Gas Chrom	----	0.99	1.27	0.05	1.35	Includes evap. vent gases
Mill L	Total by Comb.(1)	----	----	----	----	2.90	Includes evaporators, washer and condensate off gases
Batch & Continuous Digester							
Mill B	Harding	0.00	0.00	0.06	0.05	0.06	After condenser scrubber
Mill E	Harding	0.00	0.00	0.16	0.16	0.20	Includes evaporator gases After condenser scrubber
Evaporators							
Mill J	Harding	0.13	0.20	0.14	0.01	0.32	
Mill K	Harding	0.03	0.02	0.04	0.00	0.06	
Reference (11)	Unknown	0.06	0.003	----	----	0.06	

Notes:

(1) See Reference (10).

(2) See Reference (12).

shown that sulfur losses at the digester increases as sulphidity of the cooking liquor increases (6). These factors are further complicated by variable amounts of sulfur which may be removed in the blow heat recovery condensates where high efficiency systems could be expected to remove more of the heavier organic sulfides due to their lower boiling points.

The data available show that the sulfur loss (as sulfur) at the digesters may range from less than 1 lb/ton pulp to as much as 5 lb/ton pulp produced. Sulfur losses at the evaporator hot well have been found to be substantially less, ranging from 0.06 to 0.32 lb/ton pulp. There are indications that continuous digesters may have a sulfur emission somewhat less than batch digesters but there are, as yet, insufficient data to form a firm conclusion.

III. Safety and Operational Features of Thermal Oxidation Systems

A. Safety Considerations

(1) Gas Flammability -- The major concern of many, when considering the burning of noncondensables, is the potential explosion hazard which may be involved. Perry's Handbook gives the flammability limits for hydrogen sulfide as 4.3 and 45.5 percent of total volume and ethyl mercaptan as 2.8 and 18.2 percent of total volume, while turpentine is 0.8 percent at the lower limit (13). DeHaas and Hansen report on work done by Ginodman which considered a dilution of relief gas with 50 volumes of air as necessary for a safe operation when burning relief gases (6). Coleman reports that the Weyerhaeuser Research Department established 20 parts air and 1 part mixture of blow and relief gases for dilution beyond inflammability (7). This information has served as the governing criteria for establishing whether adequate air is available for almost instantaneous mixing at the burning device in existing installations and stresses the need for a handling system free of leaks.

(2) Flame Propagation Speed -- A second major consideration in the design of systems is the flame propagation speed of the mixtures. Ghisoni reported the flame propagation speeds for air-mercaptan mixtures shown in Table IV, and employed an automatic valve next to the burner to provide sufficient dilution air when necessary to assure a minimum velocity of 2.5 ft/sec (3). Practically all existing systems assure minimum velocity of 2.5 ft/sec in the gas line by the use of booster fans or intermittent operation in batch digester systems. Velocity in the primary air line to burners on kilns after mixing of air with the noncondensable gases is over 30 ft/sec.

TABLE IV.

FLAME PROPAGATION SPEEDS FOR AIR-MERCAPTAN MIXTURES (AFTER GHISONI)

Gas in Total Mixture % by volume	Flame Velocity ft/sec.
18.9	1.8
22.8	1.5
23.1	1.3
23.7	1.2
25.5	0.6
25.7	0.5

Universal use is made of flame arresters of the leaf or grid type which are located in the line immediately adjacent to the burning device. Some installations use more than one flame arrester where long lines or protection of isolated portions of the system is desirable.

(3) Explosion Prevention Measures -- Rupture discs of commercial design are commonly used as a means of emergency vent in case of explosion. There does not seem to be any rational approach to the number used, although some systems use 1 for each 100 feet of line. Ghisoni describes the use of water proof paper rupture discs on a hydraulic valve and flanges on lines which rupture in case of an explosion. Ghisoni reports one explosion in two years with only minor damage and this occurred during a power failure when gas flow in the line to the burner stopped. This, to our knowledge, is the only explosion to occur in a noncondensable handling system employing the safety devices described in this paper that are commonly used in the industry today. To avoid the problem reported by Ghisoni, it is a universal practice to use a flame out control. This consists of a detection device which provides the signal for closing a valve in the noncondensable line in case of a power failure or blackout.

The condenser scrubbers installed in some installations were initially used to remove turpentine mist, which had previously caused some moderately severe explosions in the fire box of an auxiliary furnace burning noncondensables (6). The problem was corrected and it is now thought by some that removal of this mist may also be desirable to prevent its interference (through development of false signals) with the flame out control system at a limited number of installations.

B. Physical Features of Existing Gas Handling Systems

(1) General Features -- A basic feature of noncondensable handling systems now in use is the presence of gas holders at all but one installation serving batch digesters. These are essentially nonsteady state flow systems, a typical one being illustrated by line diagram in Figure 1. Details on equipment used, pipe size, and safety features employed in several systems are included in the appendix. The first major equipment item is the gas holder, which acts as a flow equalization device. Following the gas holder, a condenser-scrubber may be used to condense moisture for volume reduction and remove turpentine mist to reduce the possibility of explosion within the burning device. Recovery of sulfur by capture of hydrogen sulfide and mercaptans when a caustic scrubbing liquid is used is possible. White liquor has been found to be well suited for this application and may salvage as much as 1 lb of sulfur per ton pulp produced. Its return to the pulping process with a minimum of handling and exposure renders it preferable to water as a scrubbing medium from an odor release standpoint. In the latter case, considerable odor loss can occur when the scrubbing medium is discharged to the sewer.

(2) Gas Storage and Flow Equalization -- The two types of flow equalization equipment employed for blow gas collection where batch digesters are used are the vaporsphere and floating cover gas holder. The former equipment described by DeHaas and Hansen is a mild steel sphere with a fabric diaphram attached at the equator. The diaphragms now in use consist of a Mylar film sandwiched between two layers of cotton canvas. Fabrication is by local tent and awning companies. A limited number of Tygon painted canvas diaphragms are still in use. The life of the Mylar diaphragms is reported to be up to 27 months (14).

The operation and safety features of the vaporsphere are outlined in Figure 2. Shown is the counterweighted diaphragm which maintains a slight pressure in the system. Also shown is the flow control system which stops the flow of gas between blows to prevent excessive air leakage. A vacuum pressure relief system is also provided for protection against abnormal conditions. DeHaas and Hansen describe these features employed at their Springfield mill and also point out the precautions taken to seal the blow heat condenser system to prevent air leakage (6).

Figure 3 illustrates the floating cover gas holder. This device is similar to those used for storing manufactured gas, as well as digester gas at sewage treatment plants. A water seal is provided to prevent gas leaks between the shell and cover which is displaced upward when gas enters. It features a pressure and vacuum relief system similar to

FIGURE I. UNSTEADY STATE FLOW SYSTEM

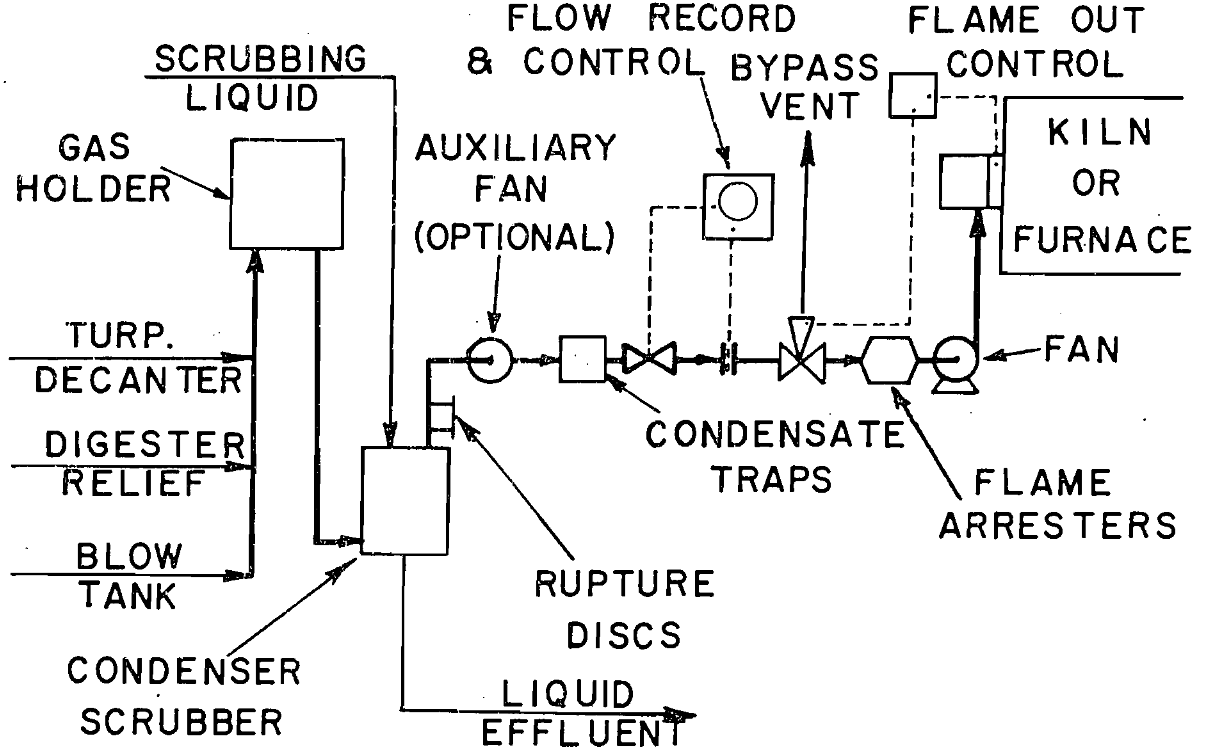


FIGURE 2. VAPORSPHERE GAS HOLDER

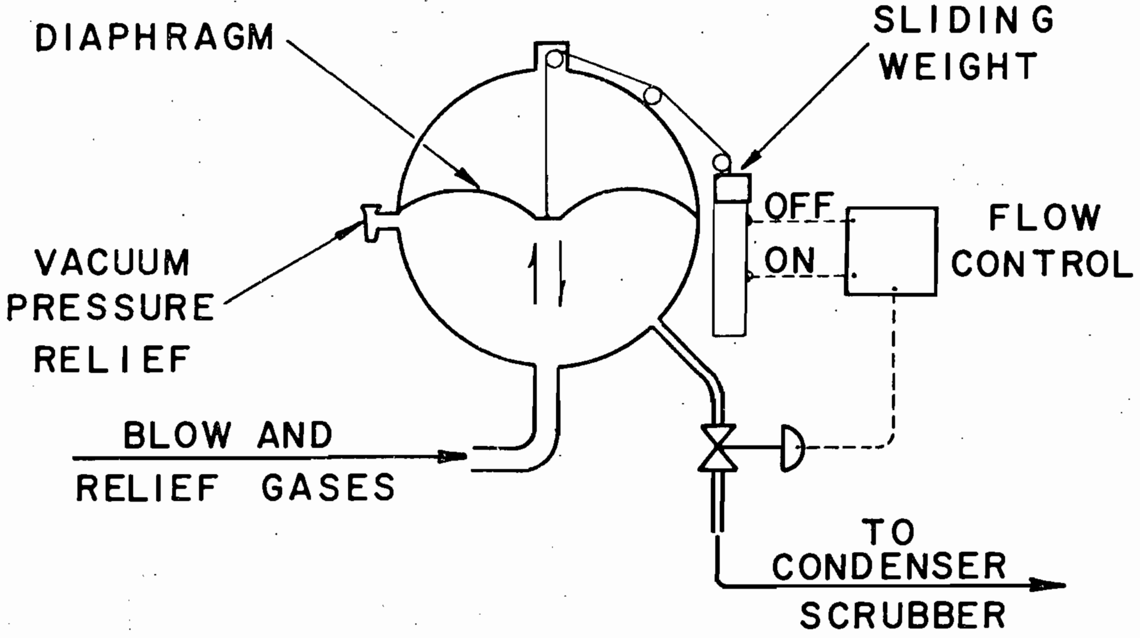


FIGURE 3. FLOATING COVER GAS HOLDER

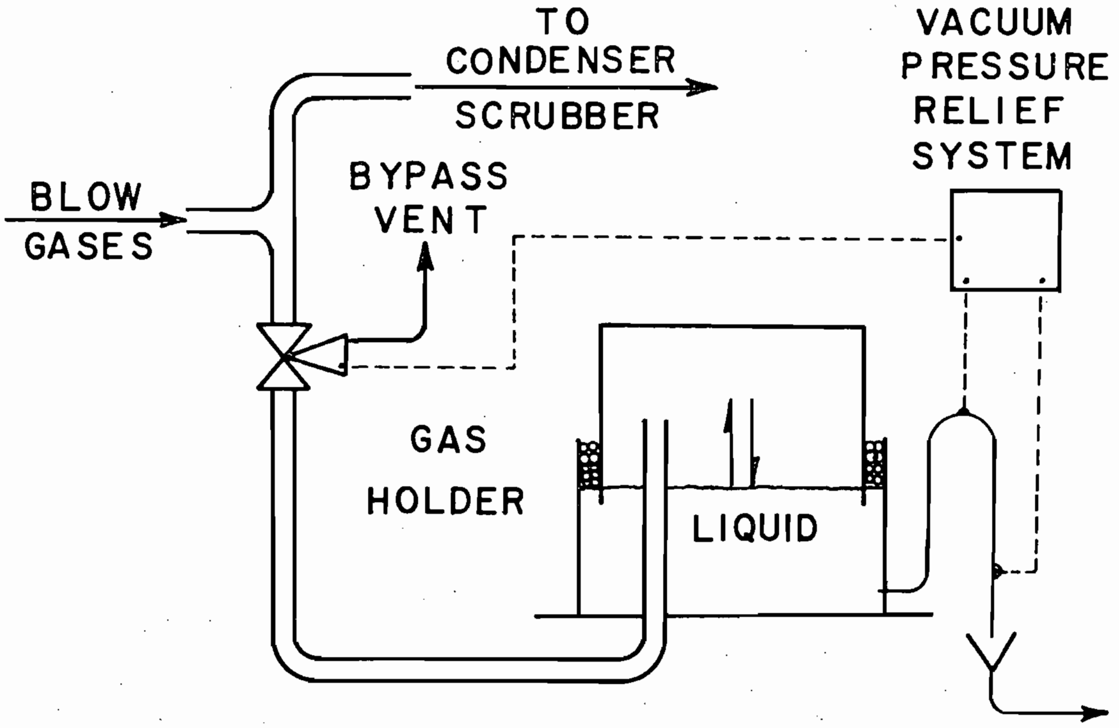


FIGURE 4. STEADY STATE FLOW SYSTEM

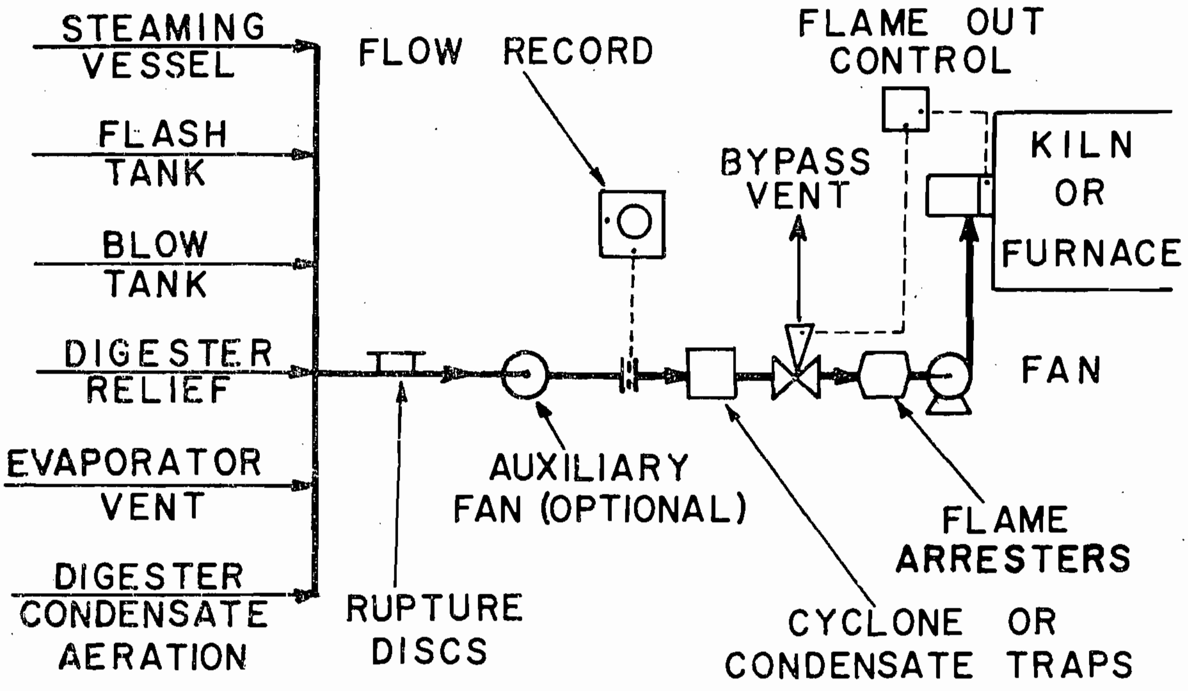
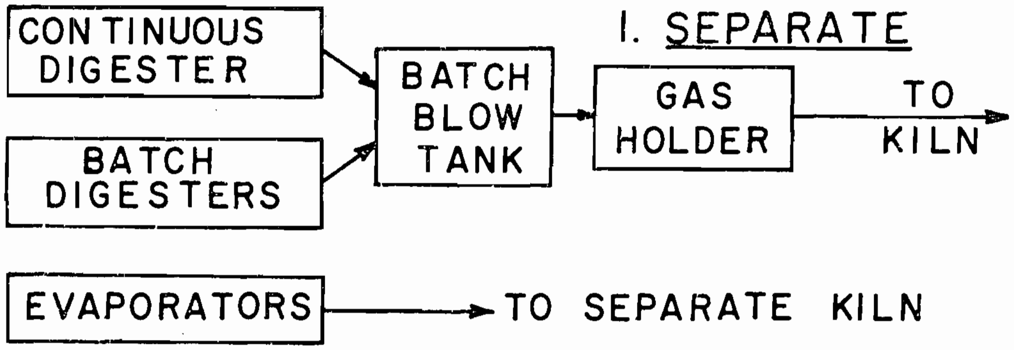


FIGURE 5. COMBINATION FLOW SYSTEMS

1. SEPARATE



2. INTEGRATED

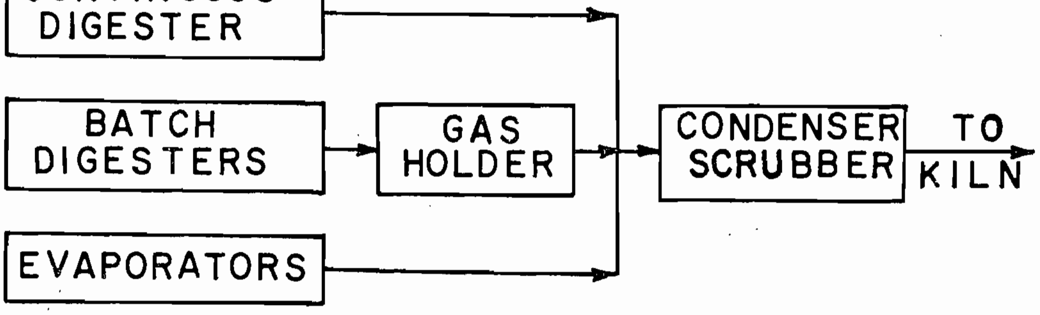


FIGURE 6. AUXILIARY EQUIPMENT

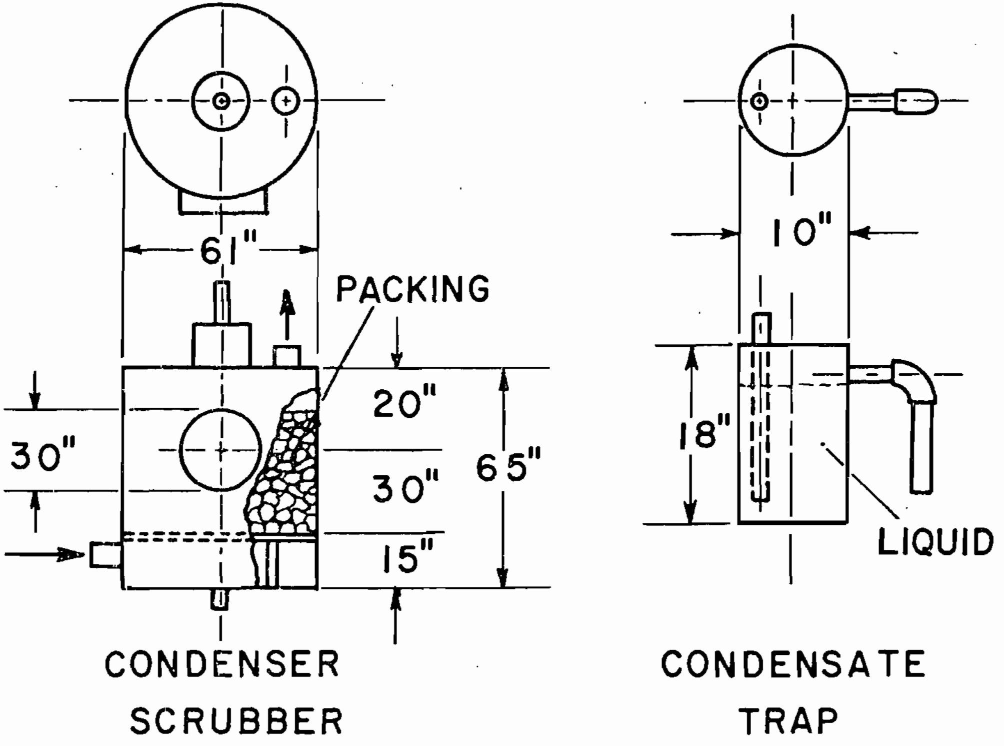
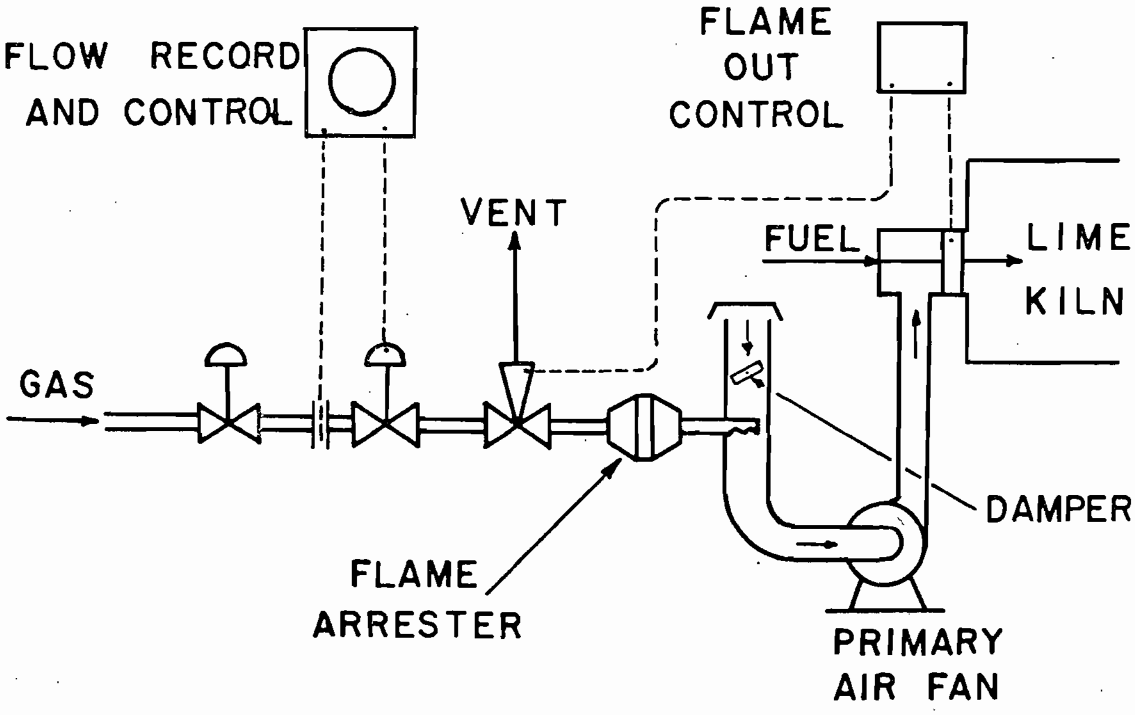


FIGURE 7. GAS BURNING SYSTEM



that used with the vaporsphere to prevent structural damage. Maintenance requirements on this system have been lower than comparable systems using a vaporsphere.

A steady state flow system typical of those found where only continuous digesters are used is shown in Figure 4. These systems are much simpler than the non steady state flow systems since they do not require a gas holder. They are therefore less expensive to install. Although not illustrated, it may be desirable at some installations to install a condenser scrubber.

Two schemes are employed where batch and continuous digesters are both used. These are illustrated in Figure 5. In one, the noncondensables from the continuous digester after passing through the steaming vessel are bled to the batch blow tank and hence to the gas holder. The evaporator hot well is vented to a separate kiln at this installation. At the second installation, the noncondensables from the continuous digester and the evaporators are added immediately after the gas holder and prior to the condenser scrubber.

(3) Condenser Scrubbers -- Figure 6 illustrates the design detail of a condenser scrubber for a 400 ton mill. It is a simple 5 ft. x 5 ft. packed tower with counter current flow of gas and liquid. Gravel, stones and 1 inch packing rings are used as a media in these devices. Also shown is a condensate trap used at one mill.

(4) Gas Introduction to Combustion Units -- The features usually employed at the inlet to the primary air fan on kilns is illustrated in Figure 7. A damper in the primary air line above the point of introduction of the gas is used to produce a negative head of 1 to 3 inches of water which is adequate to maintain gas flow in most installations. The gases are introduced through a multiport inlet to assure rapid and complete mixing. Other safety features which are normally located in close proximity to the kiln are also shown, and are described below.

(5) Auxiliary Operating and Safety Features

(a) The use of rupture discs and their placement has been described previously.

(b) Some systems employ auxiliary booster fans to compensate for head loss in the piping system if necessary. These employ no special design or safety features and are of both mild steel and stainless construction.

(c) It is a common practice to use condensate traps at all low points in the line for moisture collection and removal. Most systems also use one just before the burner.

(d) If only one flame arrester is used, it is always located in the gas line and as close to the burner as possible.

(e) The flame out control is normally interconnected to a 3-way valve with vent to the atmosphere in case of power failure or blackout.

C. Combustion Units and Their Effectiveness

(1) Auxiliary and Catalytic Furnaces -- At least three mills have experience burning noncondensables in auxiliary furnaces. The Weyerhaeuser Company discontinued the use of the Anthony furnace cited above due to maintenance of the controls, problems with water in the turpentine used as a source of heat and no practical method of recovering the heat of combustion of either the turpentine or noncondensables.

Two mills now incinerate noncondensables in a catalytic oxidation unit manufactured by Oxy-Catalyst Inc., Berwyn, Pennsylvania. The noncondensables are introduced into these units where they are heated with gas to a temperature of 750°F in the presence of a series of porcelain rods processed with a thin film of catalytic alumina and platinum alloy. One of these units, which handles 10 to 12 CFM, is 21 inches square and 8 feet long. Complete removal of mercaptan and dimethyl sulfide and more than 85 per cent removal dimethyl disulfide has been observed in one of these units. Maintenance of automatic controls has been a problem in these units, and frequent replacement of catalyst cells may be encountered where removal of condensables is poor.

(2) Lime Kilns -- Seven mills now burn noncondensables in lime kilns and at least six others have systems in various stages of planning or construction. Tests were run at three installations by National Council engineers in cooperation with member mills to determine the effectiveness of burning noncondensables gases in lime kilns as a means of eliminating malodorous sulfur gas emissions. Efficiencies were determined by simultaneous sampling of the kiln primary air inlet following introduction of noncondensable gases, and the kiln exit gases. Reduced sulfur gases were analyzed by means of the Harding method as described in NCSI Technical Bulletin No. 28 (12).

Results of the field survey for the three mills have been summarized in Table V. Samples taken from the kiln exit gases showed that thermal oxidation provided virtually complete destruction of the malodorous sulfur gases. Results from Mills A and E when processing lime mud showed the reduced sulfur gas loadings were about the same when burning or

TABLE V. EFFECT OF BURNING NONCONDENSABLE GASES IN LIME KILNS ON EMISSION GAS COMPOSITION(3)

Gas	Mill A (1)			Mill B (2)		Mill E(1)		
	Kiln Inlet Zone	Kiln Exit Gases (a)	Kiln Exit Gases (b)	Kiln Inlet Zone	Kiln Exit Gases	Kiln Inlet Zone	Kiln Exit Gases (a)	Kiln Exit Gases (b)
H_2S	0	0	0	0	0	0	0	0
CH_3SH(4)	26	4	8	0	0	0	0	0
$(CH_3)_2S$(4)	336	25	21	63.5	0	97	7	8
$(CH_3)_2S_2$(4)	74	3	2	51.5	0	95	2.4	2

Notes:

(1) Samples were taken while calcining lime mud in kiln.

(2) Samples were taken while calcining lime rock in kiln.

(3) Emissions are calculated as lb per day of each gas.

(4) Alkyl mercaptans, sulfides, and disulfides were all calculated as equivalent amounts of the methyl homolog.

(a) Noncondensable gases being burned in kiln.

(b) Noncondensable gases not being burned in kiln.

not burning the noncondensable gases. The possible interference of sulfur emissions from lime mud was eliminated at Mill B where samples were taken while processing lime rock. No reduced sulfur gases were detected in the kiln exit when burning the noncondensable gases in this case.

IV. Economics of Thermal Oxidation of Noncondensable Gases

Limited information regarding the cost of noncondensable handling systems is available. Landry and Longwell described a system employing a catalytic furnace at a 160 ton pulp per day mill, where the total cost for installation was about $23,000 (16). Approximately $13,000 of this was for the installation of a vaporsphere gas holder, a reasonably fixed cost item. The total cost will very with the diameter, length, and materials used for piping, the number and size of safety and other appurtenances added, and with the necessity of adding flow equalization gas holders and auxiliary fan units. Operating and maintenance costs where the kiln is used as a combustion unit have proven to be less expensive than burning in auxiliary furnaces. This is possible since dual use of fuel control systems can be made, supervision and operating personnel are already present, and replacement of catalytic cells in devices requiring them is not needed. Burning the turpentine in the kiln where heat could be salvaged, in contrast to its former use as pilot fuel in an auxiliary furnace where noncondensables were burned, is reported by Coleman in 1958 to result in a savings of 4 cents per ton pulp produced (7). This savings represents a reduction in former cost of pollution abatement. We know of only one instance where fuel to the kiln can be reduced when burning noncondensables.

There is a possibility in some systems of some sulfur recovery where alkaline process liquors are used in condenser scrubbers and returned for process use. This sulfur saving is obviously dependent on presence of hydrogen sulfide and low molecular weight mercaptans, and their removal efficiency.

V. Summary

Noncondensable process gas streams provide a low volume, high concentration source of malodorous sulfur gases, where thermal oxidation has proven applicable as a means of odor elimination. A historical review of past practices and recent developments in thermal oxidation has been presented. Early work by DeHaas and Hansen (6), and others has led to the successful development of presently used systems for burning gases in lime kilns. Other units which have been used for thermal destruction of noncondensables have included recovery furnaces, auxiliary furnaces, gas and bark-fired power boilers, catalytic oxidation units, and waste wood burners.

Safety features, such as flame arresters, flame out controls, condenser scrubbers, rupture discs, and possibly auxiliary fans to maintain velocity above flame propagation speed of the gas mixture are commonly included in these systems. These have proven successful in eliminating possible hazards. It has been necessary to provide a flow equalization gas holder when batch digesters are used, to compensate for flow surges and assure a uniform flow to the burning device. However, this device is unnecessary for steady state flow systems, as when continuous pulp digesters alone are used.

A recent field survey by National Council engineers, with the cooperation of member mills, showed that thermal oxidation of noncondensable gases in lime kilns provides essentially complete destruction of the malodorous sulfur compounds. Data collected by individual mills shows burning in auxiliary furnaces under the proper temperature conditions can be equally as effective. Laboratory work using odor threshold as a measure of effectiveness showed that destruction of the reduced sulfur compounds by burning also results in essentially complete destruction of any other offensive odors that may be present in blow and relief noncondensables from the kraft industry.

The thermal oxidation of reduced sulfur compounds results in the formation of sulfur dioxide. However, very limited information developed in field studies by National Council engineers and member mills when burning noncondensable gases in lime kilns has failed to show significant amounts of sulfur oxides in the kiln exit gases. It is possible that the alkaline lime material in the kiln bed provides an efficient removal mechanism for the acidic sulfur oxides formed. Further work is necessary to ascertain this phenomenon. However, we are aware of no adverse conditions developing in the causticizing system or related problems resulting from burning noncondensable gases in lime kilns if this absorption phenomena exists. On a pound basis the sulfur dioxide generated burning noncondensables is low and the dilution afforded with air at the kiln assures concentrations many times less than any existing or proposed emission standards.

REFERENCES

1. Cederlof, R., Edfors, M. L., Friberg, L., and Lindvall, T., "Determination of Odor Thresholds for Flue Gases from a Swedish Sulfate Cellulose Plant," Tappi, 48,(7)405 (1965).

2. Hisey, W.O., "Abatement of Sulphate Mill Odors and Effluent Nuisances," Tappi, 34, (1) 1 (1951).

3. Ghisoni, Pietro, "Elimination of Odors in a Sulphate Pulp Mill," Tappi, 37, (5) 201 (1954).

4. Lindberg, Sivgard, "How One Swedish Kraft Mill Destroys Air and Water Pollutants," Pulp and Paper, 41, (3) 35 (January 16, 1967).

5. Adams, D. F., "A Survey of European Kraft Mill Odor Reduction Systems," Tappi, 48, (5) 83A (1965).

6. DeHaas, G. G., and Hansen, G. A., "The Abatement of Kraft Mill Odors by Burning," Tappi, 38, (12) 732 (1955).

7. Coleman, A. A., "The Combustion of Noncondensable Blow and Relief Gases in the Lime Kiln," Tappi, 41, (10) 166A (1958).

8. Chase, S., Jr., "Control of Air Pollution at the Champion Paper and Fibre Company," Paper Read to the Semi-Annual Technical Meeting of the Air Pollution Control Association, Houston, Texas, December 3, 1956.

9. Thomas, E. W., "Direct Determination of Hydrocarbon Sulfides in Kraft Gases by Gas-Liquid Chromatography," Tappi, 47, (9) 587 (1964).

10. Bialkowsky, H. W., and DeHaas, G. G., "A Catalytic Oxidation Procedure for Determining Sulfur Compounds in Kraft Mill Gases," Tappi, 36, (7) 330 (1953).

11. Bergstrom, H., and Trobeck, K. G., "Sulfur Losses in the Production of Sulfate Cellulose," Svensk Papper, 48, (3) 49 (1945).

12. Harding, C. I., Hendrickson, E. R., Sundareson, B. B., and Walker, C. G., "A Method of Measuring the Concentrations of Sulfur Compounds in Process Gas Streams," National Council for Stream Improvement Atmospheric Pollution Technical Bulletin, No. 28 (December 1965).

13. Perry, J. H., Chemical Engineers Handbook, 3rd Edition, McGraw-Hill Book Co., New York, N.Y.,1950, pp. 1585-1586.

14. Hansen, G. A., "Odor and Fallout Control in a Kraft Pulp Mill," Journal of the Air Pollution Control Association, 12, (9) 409 (1962).

15. Harkness, A. C., Murray, F. E., and Girard, L., "Removal of Sulfurous Air Pollutants from Kraft Mill Gases by Oxidation on an Oxidized Iron Catalyst," Presented at the Fourth Annual Meeting of the Pacific Northwest International Section of the Air Pollution Control Association, Seattle, Washington, November 3-4, 1966.

16. Landry, J. E., and Longwell, D. H., "Advances in Air Pollution Control in the Pulp and Paper Industry," Tappi, 48, (6) 66A (1965).

APPENDIX

Following is a list of details on equipment used for noncondensable handling systems. Also included is a list of manufacturers who furnish special equipment used where noncondensables are burned. This list may not include all available equipment and the use of the name of a firm does not constitute endorsement of its equipment by the National Council. An asterisk beside the name of a firm indicates that we have knowledge that they have supplied equipment to the industry for some phase of burning noncondensables.

A. Dimensions and Construction Materials for Noncondensable Gas Collection and Handling Systems

Mill	Gas Holder				Piping	
	Type	Size ft	Materials of Construction	Volume ft^3	Size Inches	Materials of Construction
A	Vap.	27.0(D)	Mild Steel	6,000	4	Mild Steel
B	Vap.	27.0(D)	Mild Steel	6,000	4	Mild Steel
C	----	-------	---------	-----	8	316 S.S.
D	----	-------	---------	-----	8	304 S.S.
E	FC	28.0(D) (1) 15.0(H)	Mild Steel	10,000	4	Mild Steel
F	----	-------	---------	------	4	Mild Steel
G	Vap.	27.0(D)	Mild Steel	6,000	8	Mild Steel
H	Vap.	21.6(D)	Mild Steel	5,000	3	Mild Steel

Note:

(1) For both cover and shell.

* (c) C. M. Kemp Manufacturing Co.
490 - Baltimore - Annapolis Road
Glen Burnie, Maryland 21061

For D = 1.0 - 4.0 in.
Model F - 18 - Screwed Connection
Model FA - 50- Flanged Connection
For D = 5 - 12 in.
Model FA - 49 - Multiple Insert
Body and End Caps - Cast Iron
Arrester Grid - 316 Stainless Steel
Carbon Steel, Stainless Steel, Hastelloy, and nickel materials are available.

Pipe Dia. in.	Model	Weight lb.
1	FA-50	19
1 1/2	FA-50	21
2	FA-50	41
2 1/2	FA-50	60
3	FA-50	82
4	FA-50	118
5	FA-49	135
6	FA-49	170
8	FA-49	430
10	FA-49	600
12	FA-49	800

No price quotes are available.

(2) Rupture Discs

* (a) C. M. Kemp Co.

Cast iron housing
Zinc, aluminum, or stainless steel rupture discs are available.
Bursting pressure of discs for up to 6" dia.

Material	Bursting Pressure psig
Zinc	55
Aluminum	30
Stainless Steel	50

Screwed or flanged connections are available.
Gasket I. D. = 8.0 in.
Thickness = 0.010 in.

For Screwed Connections

Pipe Dia. Inches	Shipping Wt. lb	Price $
3	32	45
4	32	50
5	32	55
6	62	70
8	80	85
12	110	170

* (b) Varec, Inc.

Model No. 221 - Emergency Relief Valve
Model No. 71 - Pressure Relief Valve, Spring Loaded

No other information is available.

(3) Special Burners

(a) Hydro Combustion Corp.
9630 Santa Fe Springs Road
Santa Fe Springs, California 90670

(b) Air Preheater Co., Inc., Div. of
Combustion Engineering, Inc.
Department CP
Wellsville, New York 14895

(c) Maxon Premix Burner Co.
Muncie, Indiana 47302

(d) Hirt Combustion Engineers
931 South Maple Avenue
Montebello, California 90640

* (e) Oxy-Catalyst, Inc.
511 Old Lancaster Rd.
Berwyn, Pennsylvania 19312

(f) Coppus Engineering Corporation
244 Park Avenue
Worchester, Massachusetts 01601

(4) Gas Holders

* (a) Vaporspheres - Chicago Bridge and Iron Co.

PULP AND PAPER MANUFACTURE

SECOND EDITION
VOLUME I

THE PULPING OF WOOD

Prepared under the direction of the
JOINT TEXTBOOK COMMITTEE OF THE PAPER INDUSTRY

RONALD G. MACDONALD, *Editor*
JOHN N. FRANKLIN, *Technical Editor*

McGRAW-HILL BOOK COMPANY
NEW YORK ST. LOUIS SAN FRANCISCO LONDON
SYDNEY TORONTO MEXICO PANAMA

TABLE 9-27 HEAT BALANCE

10- by 175-ft kiln; 125 tons/day of product

	Btu/ton product
Evaporate and heat water	3,010,000
Heat into kiln product	1,070,000
Heat of dissociation	2,500,000
Heat in CO_2 gas	187,000
Heat in dust	13,000
Radiation	1,600,000
Net heat	8,380,000
Gross heat oil[a] $= \frac{8,380,000}{0.813}$	10,280,000
Gross heat gas[a] $= \frac{8,380,000}{0.783}$	10,700,000

At 35% water in feed, as compared with performance at 40% water in feed, a net savings of about 500,000 Btu/ton can be expected.

Radiation loss based on 5-mph wind:
75 ft of 450°F shell
100 ft of 275°F shell

[a] At 600°F exit gas temperature, 81.3% of gross heat in oil and 78.3% of gross heat in natural gas are available for use in the kiln.

Heat balance based on:	
90% CaO in product	1,800 lb/ton product
10% inert in product	200 lb/ton product
5% of product as dust loss	100 lb/ton product
$CaCO_3$ in feed calcined to CaO	3,210 lb/ton product
Total dry feed	3,510 lb/ton product
Total wet feed (40% water)	5,850 lb/ton product
Water in feed	2,340 lb/ton product
CO_2 from feed	1,410 lb/ton product
Ambient	70°F
Exit gas temperature from kiln	600°F
Material temperature from kiln	2100°F

consumption is, however, much more difficult to maintain in short kilns, and for this reason there could be fuel usage to 14 or 15 million Btu/ton of product in some cases. By contrast, in long kilns (30:1 ratio length to diameter) good fuel consumption is easy to maintain. In either case, but particularly with the long kilns, a great deal can be done not only to improve the fuel economy but also to improve the quality of the lime produced, and such improvement can be realized by reducing the moisture content of the feed entering the kiln, establishing a regular feed rate, restricting the amount of excess air in the combustion system, giving the kiln operator proper access through instrumentation to conditions within the kiln system by attention to the quality of the feed entering the kiln, using proper burning equipment within the kiln, using a properly designed heat exchange system in the feed end of the kiln, and taking cognizance of wind conditions which will adversely affect losses due to radiation from the skin of the shell of the kiln. A more realistic fuel comparison between short and long kilns would therefore be of the order of 3 to 4 million Btu/ton of product.

Calcium carbonate will dissociate at a temperature of about 1500°F. Therefore, lime sludge could be heated to this temperature (discounting effect of impurities) and held there until the dissociation is completed. However, the dissociation process is accelerated at elevated temperatures; consequently, to facilitate the dissociation of the various size pellets of the carbonate in a reasonable retention time, temperatures in excess of 1500°F are necessary. In short kilns, the retention time is short. Therefore, material treatment temperatures necessary to calcine the lime will be high, being about 2300°F. In a long kiln, the retention time is longer and excellent lime can be produced at a temperature of about 2000°F. These facts mean that lime will discharge at a lower temperature from a long kiln, and therefore there will be less heat lost in the lime discharged from the long kiln than from the short kiln. Radiation loss will also be reduced. Further, at the lower temperatures, a lime with greater reactivity will be obtained, since there will be less overburning of the product.

In a 10-ft-diam kiln having a length of 275 ft (30.56 × diam), with 40% water in the sludge feed, the exit gas temperature would be approximately 400°F. With 90% calcium oxide and 10% impurities in the burned-lime sludge, and with the information outlined in Table 9-26 (page 555), the expected fuel consumption would be 8.78 million Btu/ton of product based upon the use of fuel oil, and 9.18 million Btu/ton of product based upon the use of natural gas.

The heat balance indicates a fuel consumption which will be readily obtainable, and as previously outlined, much better operating results can be obtained with proper attention to other details.

Regarding shell radiation losses, it is interesting to note that information in Tables 9-26 and 9-27 is predicated upon a wind velocity for radiation purposes of 5 mph. If wind velocity could be completely eliminated, there would be a reduction in radiation losses in the higher temperature ranges of approximately 35% and in the lower temperature ranges of approximately 50%. Thus, proper housing of the kiln can be of material assistance in reducing fuel consumption.

9-56 INSTRUMENTATION AND CONTROLS

Significant strides have been made recently in the development and use of instrumentation in connection with the use of rotary kilns in the calcination of lime sludge. Figure 9-81 illustrates a modern system of instrumentation. Briefly, in setting up a system of instrumentation, it is well to keep in mind that in order to produce good-quality lime at low fuel rates, it is essential that the feed to the kiln be regular. It is also essential that the operation of the entire system be held as constant as possible, and this can be facilitated by holding the burning temperature constant and by controlling the air necessary to support combustion so as to completely consume the fuel, and at the same time, avoid any excess of air. It is necessary to maintain the moisture content of the entering feed as low and as nearly constant as is possible. Further, the retention time within the kiln should be maintained constant at its optimum figure. So that all these things may be properly accomplished, the slurry going to the centrifuge or the filter should be positively and adequately controlled. The burning temperature of the material within the kiln should be kept as low as is commensurate with good-quality lime, and it should also be kept constant. To keep this temperature constant it is well to measure the temperature of the gases of combustion, after they have passed the calcining zone, through the use of thermocouples which are inserted in the gas stream. The thermocouples will accurately measure the temperature of the gas, which will be relative, and immediately relative to the actual temperature of the material further on toward the discharge end of the kiln. Through the use of such thermocouples, any deviation from the norm will then be automatically transmitted to the regulating valve on the fuel to the burner and, by ratio, to the damper on the primary-air fan.

Through the use of a continuous O_2 analyzer, the O_2 content at the feed end of the kiln can be established and can be maintained at the optimum level through control of the supply of secondary air. A secondary-air fan and damper are necessary to accomplish this. It is, of course, also important that draft at the firing hood be maintained constant, and this should be accomplished through the use of a suitable draft control instrument at the firing hood. Any deviation from the desirable norm here will, through the use of suitable control,

MODERN TRS CONTROL IN THE KRAFT PULPING INDUSTRY

James Herlihy
Environmental Protection Agency
Durham, North Carolina

ABSTRACT

The status of TRS control technology in the kraft industry is summarized. Modern control methods are described for the major TRS sources, including recovery furnaces, digesters, multiple-effect evaporators, lime kilns, brown stock washers, smelt dissolving tanks, and water treatment ponds. For each source, TRS emission levels are indicated both for average and for well controlled units.

Kraft pulp mills are being studied by the United States Environmental Protection Agency (EPA). One objective is to learn the status of modern emission control technology. Some findings of the study are reported here. Mention of company or product names is not an endorsement by EPA.

Although all pollutants are being studied by EPA, only reduced sulfur gases will be covered here. These gases have foul odors detectable at very low concentration levels, and are the major odorous compounds emitted by kraft mills. The principally occurring compounds are hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide. These and similar compounds, taken as a group, are referred to as "total reduced sulfur" (TRS).

MAJOR TRS SOURCES AND MEDIAN EMISSIONS

The major TRS sources are listed in Table 1. Emission rates shown in the table are medians of data available from United States mills equipped with typical emission control systems.[1,8]

TABLE 1. MAJOR TRS SOURCES, AND MEDIAN EMISSIONS.

Source	Median TRS Emissions lb/ton
Recovery Furnace System (Unoxidized black liquor)	10
Digester System	1.5
Lime Kiln	0.5
Pulp Washing System	0.26
Multiple-Effect Evaporator System	0.2
Black Liquor Oxidation System	0.08
Smelt Dissolving Tank	0.02
Water Treatment Ponds	No data

The recovery furnace system (furnace plus direct contact evaporator) is easily the largest source, with a median TRS emission rate of 10 pounds per ton of pulp produced (lb/ton). The remaining sources, listed in descending order of importance, range from 1.5 to 0.02 lb/ton. No emission factors are currently available for the water treatment ponds.

From well controlled sources, emission rates are far less than the above medians. The following sections discuss current control technology and indicate modern TRS emission levels.

INDIVIDUAL SOURCES

RECOVERY FURNACE SYSTEMS

There are two general approaches for controlling recovery furnace TRS emissions; the Direct Contact System, and the Indirect Contact System. Both are illustrated in Figure 1.

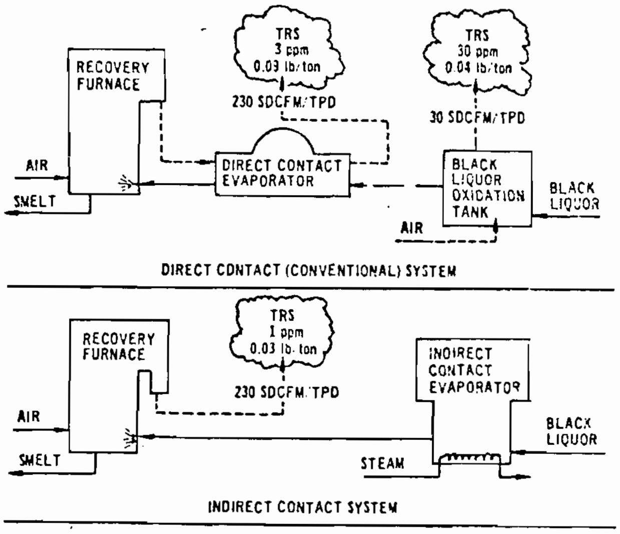


FIGURE 1. CONTROLLED RECOVERY FURNACE SYSTEMS.

Both systems perform the same overall function--burning evaporated black liquor to produce smelt and steam. The key difference is the direct contact evaporator, found only in the Direct Contact System. This unit provides the last stage of evaporation for the black liquor. In the unit, black liquor is brought into direct contact with the hot gases leaving the recovery furnace. The problem is that carbon dioxide in the furnace gases and dissolved sulfides in the black liquor trigger the formation of hydrogen sulfide gas. The reactions are as follows:

$$CO_2 + H_2O \longrightarrow H_2CO_3 \longrightarrow H^+ + HCO_3^- \qquad (1)$$

$$2H^+ + S^= \longrightarrow H_2S \uparrow \qquad (2)$$

The two control systems represent two ways of dealing with the direct contact evaporator. In the Direct Contact System, the black liquor is oxidized before entering the direct contact evaporator. The dissolved sulfides are thereby converted to more stable thiosulfates, inhibiting the formation of hydrogen sulfide. The reaction is:

$$S^= + O_2 \longrightarrow S_2O_3^= \qquad (3)$$

In the Indirect Contact System, on the other hand, the direct contact evaporator is replaced by a steam-heated indirect contact evaporator. Interaction between the furnace gases and the black liquor is eliminated, preventing formation of hydrogen sulfide.

TRS compounds are formed in the furnace itself, but to a lesser extent than in the direct contact evaporator. These emissions are controlled by designing and operating the furnace for high combustion efficiency. Interestingly, the SO_2 formed by the combustion of TRS is removed by interaction with sodium oxide fume pyrolyzed from the smelt bed. The reactions are:

$$SO_2 + 1/2\ O_2 \longrightarrow SO_3 \qquad (4)$$

$$SO_3 + Na_2O \longrightarrow Na_2SO_4 \qquad (5)$$

Most of the sodium sulfate particles are collected in an electrostatic precipitator. Combustion of TRS within the furnace, therefore, does not result in corresponding increases in SO_2 emissions, but leads to nearly complete recovery of sulfur as sodium sulfate. SO_2 emissions are normally less than 200 parts per million (ppm) and as low as 1 ppm in some EPA tests.

The parameters affecting TRS combustion efficiency have been reported elsewhere.[2] They include; droplet size of black liquor sprayed into the furnace; percent solids of black liquor fired; furnace operating load (actual vs. design); distribution of combustion air; turbulance within the furnace; sulfur content of black liquor fired; combustion air temperature; furnace temperature; smelt bed temperature; and smelt bed height.

Variations of both furnace systems are found in practice. In the Direct Contact System, the black liquor is sometime oxidized before evaporation (weak black liquor oxidation) sometimes following evaporation (strong black liquor oxidation) and sometimes both. Air is the normal oxidizing agent but molecular oxygen is also used when a supply is on hand. Air sparging reactors are the most common units but packed towers and bubble tray towers are also operating. The various Indirect Contact Systems are called Direct Fired (Babcock and Wilcox Co.), Large Economizer, Laminaire Heater, and Air Contact Evaporation (last three by Combustion Engineering Inc.).[3]

Recovery furnace systems of both types were surveyed to identify available control levels. The most extensive documentation of a well controlled Direct Contact System was found at a 600 ton per day mill. This mill oxidizes strong black liquor in two sequential air-sparged reactors. TRS emissions are monitored continuously by the company with a Barton titrator. The gas sampling probe is in the stack, so measurements indicate the combined emissions from the furnace and the direct contact evaporator. For a seventeen month period ending in October 1972, the average TRS stack emissions were 3 parts per million on a dry gas basis. This is equivalent to about 0.09 lb/ton. An EPA test team visited this mill in June of 1972 and confirmed these low levels by simultaneous measurements with a Barton titrator and a gas chromatography unit, during normal furnace operation. The results of the six-day EPA test are shown in Figure 2 (Furnace A). The Barton results are a few ppm higher than the chromatography results. The difference is thought to be caused by non-sulfur compounds stripped from the direct contact evaporator that give a reading on the Barton. The company Barton was inoperative during the EPA test and cannot be compared. On the whole, the agreement between the EPA Barton, the gas chromatograph, and the average company readings of 3 ppm, is encouraging.

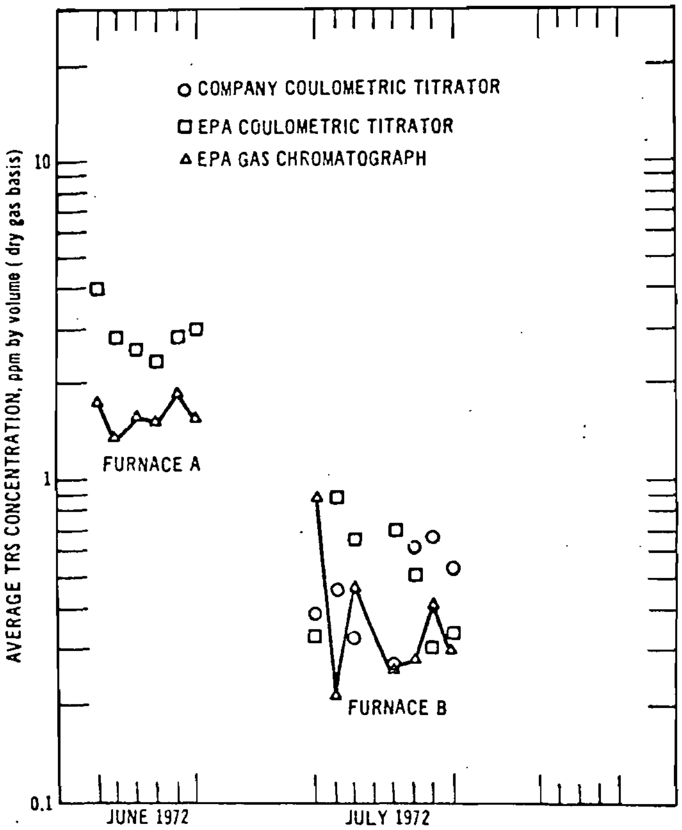


FIGURE 2. TRS EMISSIONS FROM RECOVERY FURNACE SYSTEMS, AVERAGED FOR PERIODS OF ABOUT SIX HOURS.

The most extensive documentation of a well controlled Indirect Contact System was found at a 300 ton per day mill. The company continuously monitors TRS emissions from the recovery furnace stack using a Barton titrator. Since there is no direct contact evaporator in the system, the emissions are exclusively from the furnace. For a 26 month operating period ending in November 1972, the average TRS emissions were 1 ppm on a dry gas basis, which is equivalent to about 0.03 lb/ton. An EPA test team visited this mill in July 1972 and confirmed these low levels during normal mill operation, using a Barton titrator and a gas chromatograph. Results of the seven day EPA test are shown in Figure 2 (Furnace B).

Agreement between the company Barton, the EPA Barton, and the EPA gas chromatograph is again very good, especially considering the low concentrations measured. Interestingly, the Barton readings are not uniformly higher than the chromatography results, as for Furnace A. But since Furnace B has no direct contact evaporator, interference compounds should not be present.

When comparing TRS emissions from the two furnace systems, it should be noted that the Direct Contact System usually has an additional source - the black liquor oxidation tank. The air blown through the tank is vented to the atmosphere (refer to Figure 1). The oxidation tank provides yeoman service in reducing emissions from the direct contact evaporator as much as 99 percent, but becomes an offender itself.

Currently no oxidation tanks are controlled; all operating units vent to the atmosphere. In the future, however, these streams will probably be burned. The recovery furnace is considered a likely combustion unit, but condensers may be required to remove excess moisture from the oxidation vent gases. There is apparently no technical reason why other combustion units, such as power boilers or separate incinerators, could not be used.

DIGESTERS AND MULTIPLE EFFECT EVAPORATORS

The digester and multiple-effect evaporators will be considered together, because their emissions are normally combined for treatment.

In the digester, wood chips are cooked under pressure. The proper cooking pressure is maintained by relieving gases formed during the cook. Other gases are released at the end of the cook when the digester contents are transferred to a blow tank at atmospheric pressure. The relief gases and blow-tank gases are sent to a condenser; the non-condensable gases are either vented to the atmosphere or treated to remove TRS compounds.

In the multiple-effect evaporators, weak black liquor is concentrated before being burned in the recovery furnace. The gases and vapors formed are collected and condensed; the noncondensable gases are either vented to the atmosphere or treated to remove TRS compounds.

Incineration systems for the digester and evaporator noncondensable gases have been described elsewhere.[4] Although the systems are potentially hazardous, safety features have been well worked out. A count made in 1971 revealed at least 23 United States mills that operate such control systems.

Typically, the noncondensables are burned in a lime kiln. There is commonly a back-up unit for times when the kiln is not operating. The back-up unit may be a second lime kiln, a recovery furnace or a small incinerator.

TRS compounds readily burn to SO_2. In lime kilns, the SO_2 is apparently removed by reaction with CaO fume, since normal SO_2 emission levels are under 1 ppm. Combustion in lime kilns, therefore, provides effective destruction of TRS compounds with essentially no increase in SO_2 emissions.

Gas fired incinerators in current use can also provide high TRS removal efficiencies. The sulfur dioxide formed during combustion, however, is released to the atmosphere. Since the odor threshold of sulfur dioxide is about 1000 times higher than for reduced sulfur gases, the odor reduction is substantial. At one incinerator installation, the SO_2 is scrubbed from the exit gas with weak wash - an alkaline water from the limestone mud washing operation.[5]

To investigate the effectiveness of combustion for treating noncondensable gases, EPA ran emission tests on a gas-fired incinerator.[6] The test unit serves the continuous digester and multiple-effect evaporators in a 600 ton per day kraft pulp mill. Inlet and outlet TRS concentrations were measured by gas chromatography on four different days, during normal mill operation. The TRS concentrations were converted to mass emission rates (lb/ton) based on measured gas flow rates and average pulp production rates. The results are shown in Table 2.

TABLE 2. RESULTS OF AN EPA TEST ON A GAS-FIRED INCINERATOR BURNING NONCONDENSABLE GASES

	INLET Average TRS		OUTLET Average TRS	
DATE	ppm(dry basis)	lb/ton	ppm(dry basis)	lb/ton
10/05/72	32.20	1.42	2.82	0.0572
10/06/72	527	8.95	0.40	0.00696
10/07/72	521	9.22	1.55	0.0226
12/13/72			0.93	0.0161
12/14/72	625	10.34		
Average	426	7.48	1.4	0.0257

The principal result of the incinerator test is the demonstration that TRS compounds are dramatically reduced by combustion. Whereas the average inlet loadings were 7.48, the average outlet loadings were 0.0257 lb/ton. Combustion in lime kilns is probably even more complete, because of higher temperatures and longer residence times. A kiln was not chosen for testing because of the greater difficulty in measuring combustion residuals. (In a kiln stack, noncondensable TRS residuals are difficult to distinguish from TRS compounds generated by the kiln itself.)

LIME KILNS

As mentioned in the process description above, a calcium carbonate mud precipitates from the causticizing tank. The mud is washed, dried on a vacuum filter, and fed to a rotating kiln that is fired countercurrently with either natural gas or oil. Carbon dioxide is driven off, leaving calcium oxide (lime) as product. Gases from the kiln are scrubbed in a venturi for particulate removal, and pass through a demister to a stack. Water collected in the demister is returned to the venturi, minus a portion that is bled off to the mud washers.

Hydrogen sulfide is the predominant TRS compound emitted from lime kilns. It originates in a manner very similar to its generation in direct contact evaporators. Dissolved sulfides are present both in the limestone slurry fed to the kiln, and in the venturi scrubbing water. When contact is made with carbon dioxide in the kiln gases, hydrogen sulfide is generated. (Refer to Equations 1 and 2.)

TRS control depends on the operating conditions in the kiln and the venturi scrubber. The parameters of greatest importance have been identified in a recent NCASI study.[7] Control procedures are directed towards inhibiting formation of hydrogen sulfide, and towards burning what is formed. These procedures are discussed below.

To reduce the amount of dissolved sulfides entering the kiln, the mud is washed thoroughly. The sprays on the vacuum filter (the final washing stage) should be fresh water.

Since hydrogen sulfide is formed at the cold end of the kiln, where kiln gases contact the incoming mud, combustion conditions there are critical. The temperature should be above about 400°F, and the oxygen concentration should exceed about 4 percent. The required levels vary from plant to plant.

To prevent formation of hydrogen sulfide in the venturi scrubber, fresh water is used as makeup, rather than a recycle stream containing dissolved sulfides. Recirculation of scrubbing water should not be excessive or a buildup of dissolved carbon dioxide will occur.

Recently a novel control practice has come into operation at one United States mill. Sodium hydroxide is added to the scrubber water to raise its pH. The effect is to reverse the hydrogen sulfide equilibrium by removing hydrogen ions (Refer to Equation 2). The mill reports a significant lowering of hydrogen sulfide emissions.

The addition of caustic to the scrubbing water does not represent an increased operating cost, since this compound is normally added to the recovery process to replace lost cooking chemicals. Only the addition point is changed. The mill cautions that long term adverse effects on pulp properties have not been completely ruled out. Also, some mills operating at low ratios of sodium hydroxide to sodium sulfide in the cooking liquor, may require less caustic makeup. At such mills, caustic addition to the scrubber may entail additional operating costs.

Lime kilns have been surveyed to locate well controlled units. Three kilns have been found to average a few ppm TRS. Kiln A, which adds caustic to its scrubber, averages below 1 ppm TRS (below 0.005 lb/ton). This is based on several months of continuous monitoring by the operator using a Barton titrator, plus a confirmatory test by EPA using gas chromatography.

Kiln B reports less than 1 ppm TRS emissions based on several months of continuous Barton measurements. Kiln C reports less than 5 ppm (0.025 lb/ton) averages based on spot checks with a Barton. Neither Kiln B nor Kiln C add caustic to their scrubbing water.

PULP WASHERS

Pulp from the digesters is washed countercurrently with water in several sequential stages. On leaving each stage, the pulp is dried on a vacuum filter, with the water draining into filtrate tanks. The washers are hooded to collect the vapors steaming off the open washers. At most mills the hoods and filtrate tank vent to the atmosphere. TRS emissions average about 0.1 lb/ton in the hood vent gas, and about 0.16 lb/ton in the filtrate tank vent.

Modern control practice is to burn both vent gases. Hood gases present the greater problem because they are a relatively large and moist stream. To minimize volumes, the pulp washers are enclosed with tightly fitting hoods. The hood vent is ducted into the air fan for the recovery furnace; the gases mix with the combustion air and are incinerated. The small volume of filtrate tank vent gases are easily controlled; they are combined with the hood vent gases or with the digester noncondensables destined for the lime kiln.

At least three mills in the United States and Canada burn the washer vent gases in recovery furnaces. The original mill has had several years of satisfactory operation.

Direct information is unavailable on the TRS combustion residuals of washer gases burned in recovery furnaces, because the furnace is itself a source of TRS. The residuals are apparently low, however, as judged by Furnace B mentioned above. Vent gases from the washers and filtrate tanks, with a combined input of about 0.26 lb TRS/ton are burned in this furnace. TRS emissions from the furnace average 1 ppm, equivalent to about 0.03 lb/ton. Assuming that all the TRS emitted is due to unburned vent gases, which is unlikely, the minimum combustion efficiency is about 90 percent.

SMELT DISSOLVING TANK

The hot smelt produced in the recovery furnace is tapped into a tank of water. Steam and gases vaporize out of the tank and are vented to the atmosphere through a scrubber to remove entrained droplets. TRS compounds are emitted in the vent gases.

The origin of the TRS compounds is not clear. Since the dissolving tank is not a combustion source, CO_2, is not present in large amounts to react with dissolved sulfides. There seem to be two possible explanations. The TRS compounds may be adsorbed on the smelt and subsequently vaporize from the green liquor solution; or the water added to the dissolving tank contains TRS compounds that are stripped out in the scrubber. Partly for the latter reason, some mills use only fresh water in their dissolving tanks.

TRS emissions have been measured from numerous dissolving tanks. NCASI studied 20 facilities and found TRS emissions ranging from negligible to 3.70 lb/ton.[8] Little effect was observed from the types of water used, which included fresh water, lime mud washer filtrate, and contaminated condensate. An independent collection of data for 18 facilities exhibits a TRS emission range from 0.013 to 3.70 lb/ton.[1] Data in the high range indicate that the dissolving tank can be a significant source. EPA has conducted tests on two dissolving tanks and found TRS emissions of 0.011 and 0.036 lb/ton.[1] The median value of all three data sets is 0.02 lb/ton.

WATER TREATMENT PONDS

When digester and multiple effect evaporator offgases are condensed, TRS gases partially dissolve in the condensate. The condensate is then discharged to the water treatment ponds, usually without prior treatment. The large surface area of the ponds promotes the evolution of TRS compounds. TRS emission data are not generally available, but TRS odors are detectable, and several mills, including two in the United States, have undertaken to strip the condensates before discharge. Most stripping towers employ steam, but one of the United States mills uses air. The effluent stripper gas is condensed (in the case of steam) and burned in the lime kiln.

SUMMARY

Modern TRS control technology is summarized in Table 3. As shown, the average TRS emission rate for the combined major sources is 12.48 lb/ton. When recovery furnaces of the Indirect Contact System are used, and all other sources are controlled, the TRS emission rate can be reduced to 0.075 lb/ton.

If black liquor oxidation systems are used, furnace TRS emissions will increase from 0.03 to 0.09 lb/ton. If the oxidation tank vent gases are burned, the TRS residual will be about 0.01 lb/ton. The TRS total for all major sources will therefore be 0.145 lb/ton.

TABLE 3. SUMMARY OF MODERN TRS CONTROL TECHNOLOGY

Sources	Modern Control Technology	Average TRS Emissions lb/ton	Modern TRS Emissions lb/ton	Notes
Recovery Furnace	1.Black Liquor Oxidation or Elimination of Direct Contact Evaporator 2.Proper design and operation of furnace for TRS combustion.	10	0.03(1)	(1) Indirect Contact System
Digester	Incineration of noncondensable offgases.	1.5	0.01(2)	(2) Measured combustion residual averaged 0.0257 for combined digester and multiple-effect evaporators; it is assumed that about half the residual was attributable to each source.
Multiple-Effect Evaporator	Incineration of noncondensable offgases.	0.2	0.01(2)	
Lime Kiln	Proper operation of lime kiln and scrubber.	0.5	0.005	
Pulp Washers	Incineration of vent gases.	0.26	0.01(2)	(2) No direct measurements available. It is assumed that combustion residuals are the same as for digesters and multiple-effect evaporators.
Smelt Dissolving Tank	Clean water to dissolving tank.	0.02	0.01	
Water Treatment Pond	1.Digester & Evaporator Condensates stripped with steam or air. 2.Incineration of stripper offgases.	No Data	No Data	
		12.48	0.075	

REFERENCES

1. Atmospheric Emissions from the Pulp and Paper Manufacturing Industry; EPA Report No. AP-127.
2. Thoen, G. N., DeHaas, G. G., Tallent, R. G., and Davis, A. S., "The Effect of Combustion Variables on the Release of Odorous Sulfur Compounds from a Kraft Recovery Furnace," TAPPI, 51, 330 (1968).
3. Gommi, J. V., "Reduced Odor Units," TAPPI, 55, 1094-1096 (July 1972).
4. Current Practices in Thermal Oxidation of Noncondensable Gases in the Kraft Industry, NCASI Technical Bulletin #34, Nov. 1967.
5. "Design and Operation of Malodorous Gas Incineration System in the Kraft Pulp Mill Industry," Paper Trade Journal, page 27, Feb. 26, 1973.
6. Malodorous Reduced Sulfur Emissions from Incineration of Noncondensable Off-Gases, EPA, Office of Air Programs, Emission Measurement Branch, Report No. 73-KPM-1A.
7. Suggested Procedures for the Conduct of Lime Kiln Studies to Define Minimum Emissions of Reduced Sulfur Through Control of Kiln and Scrubber Operating Variables, NCASI Special Report No. 71-01, January 1971.
8. Factors Affecting Emissions of Odorous Reduced Sulfur Compounds from Miscellaneous Kraft Process Sources, NCASI Technical Bulletin No. 60, March 1972.

Trout

EPA-450/2-76-014-a
September 1976

STANDARDS SUPPORT AND ENVIRONMENTAL IMPACT STATEMENT VOLUME 1: PROPOSED STANDARDS OF PERFORMANCE FOR KRAFT PULP MILLS

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

6.2 TRS EMISSIONS

6.2.1 Digesters and Multiple-Effect Evaporators

At least 23 U.S. mills incinerate noncondensable gases from digesters and multiple-effect evaporators in lime kilns.[27] TRS remaining from incomplete combustion of the noncondensables is difficult to distinguish from TRS normally emitted by the lime kiln. To determine TRS emission levels that can be achieved by combustion, EPA measured emissions at a plant that combines noncondensable gases from a continuous digester and multiple-effect evaporator and burns them in a separate incinerator.[23]

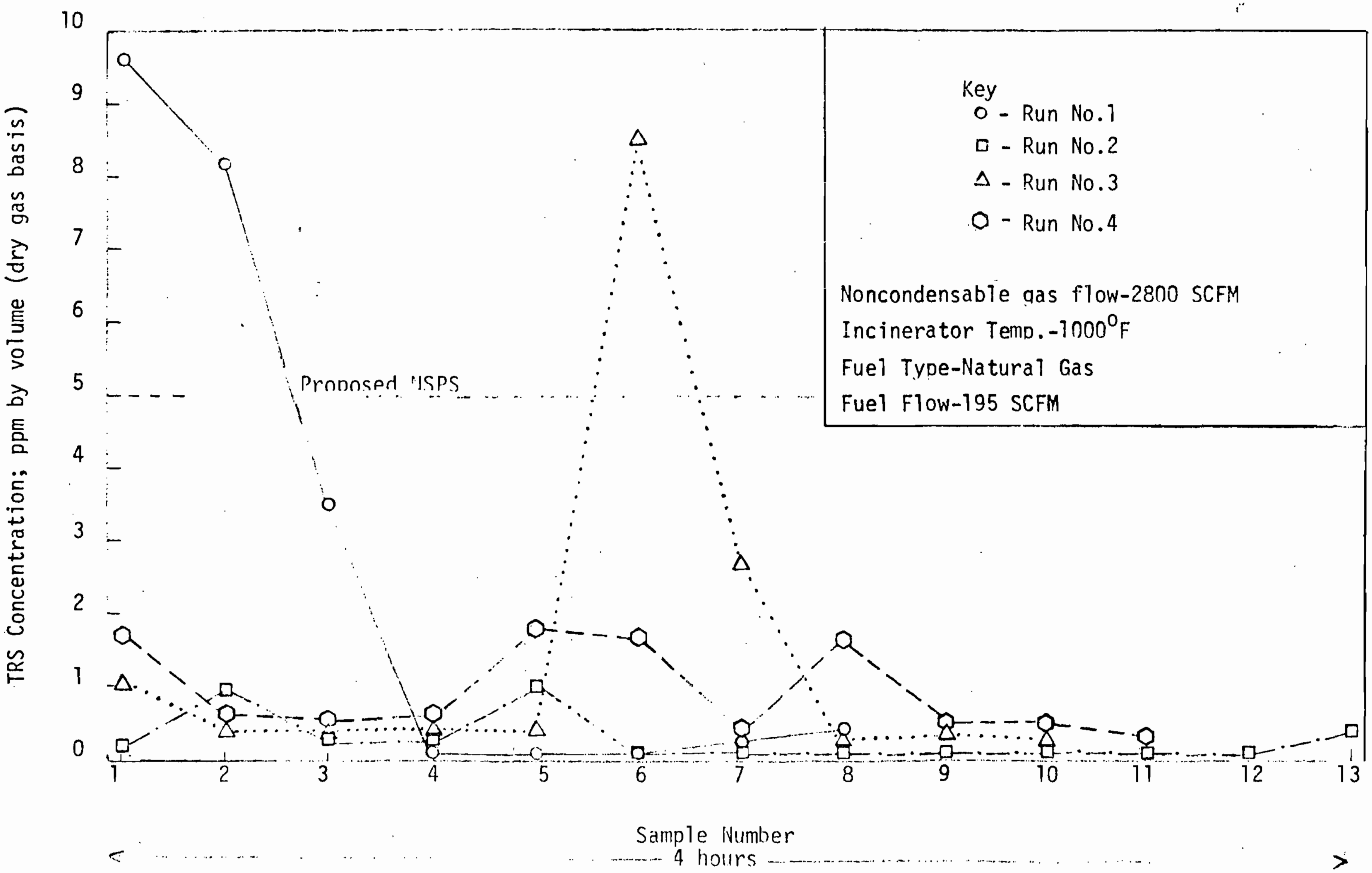
The inlet and outlet streams of the incinerator were monitored for TRS by gas chromatography. The inlet stream, which included premixed combustion air, was found to contain trace amounts of SO_2 and more than 1,000 parts per million TRS. (Precise TRS measurements of the inlet stream could not be made because the high levels saturated the photometric detector.) The results of four test runs on the outlet stream, presented in Figure 6-5, indicate that the TRS levels were less than 5 ppm. The TRS test results (four-hour averages) ranged between 0.5 and 3 ppm and averaged 1.5 ppm (dry gas basis).

During the tests, the incinerator was handling a combination flow rate of abour 2800 scfm of noncondensable gases from the digester system and multiple-effect evaporator system. The continuous digester was producing about 670 tons of pulp per day. The incinerator was operating at 1000°F (measured) with a retention time for the gases of at least 0.5 seconds (calculated). Natural gas was fired in the incinerator at an estimated rate of 195 scfm.

In a batch digestion system, TRS emission levels from an incinerator may peak during a blow of a digester due to the large surges of gas to the incinerating device. However, these peaks

Figure 6-5

TRS Concentration From Incinerator Burning Noncondensables[24]



can effectively be avoided by preventing these large surges of gas by using either large spherical tanks equipped with a movable nonporous diaphragm or conventional gas holders.

6.2.2 Brown Stock Washing System

Table 19 - TRS Emissions from Separate Incinerator

Summary of Results

Run Number	1	2	3	4
Date - 1972	10/5	10/6	10/7	12/13
Test Time - minutes	240	240	240	240
Production Rate - TPH	-	-	-	-
Stack Effluent				
Flow rate - DSCFM (X1000)	2610	2223	2302	-
Flow rate - DSCF/ton	-	-	-	-
Temperature - °F	805	805	805	-
Water vapor - Vol. %	6.3	4.3	5.4	-
CO_2 - Vol. % dry	2.6	2.4	2.1	9.0
O_2 - Vol. % dry	11.8	12.0	12.7	15.7
CO - ppm	0	0	0	0
TRS Emissions				
ppm	2.8	0.4	1.6	0.9
lb/hr	1.5	0.2	0.6	0.4
lb/ton of pulp	0.06	0.007	0.02	0.02
SO_2 Emissions				
ppm	25	306	1050	-
lb/hr	9.4	96.9	358	-
lb/ton of pulp	0.4	3.8	13.9	-

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 60

[FRL 2406-4]

Review and Proposed Revision of Standards of Performance for New Stationary Sources: Kraft Pulp Mills

AGENCY: Environmental Protection Agency (EPA).

ACTION: Review and proposed rule.

SUMMARY: A review of the standards of performance for kraft pulp mills (40 CFR 60.280, Subpart BB) has been completed. Today's proposal, which is based on information gathered during the review, would make five changes to these standards. These revisions would: (1) Exempt black liquor oxidation systems from the standards; (2) revise the existing total reduced sulfur (TRS) standard for smelt dissolving tanks; (3) revise the units of the TRS standard for smelt dissolving tanks; (4) delete the requirement to monitor the combustion temperature in lime kilns, power boilers, or recovery furnaces; and (5) change the frequency of excess emission reports from quarterly to semi-annually.

In the overall context of this source category, all of the proposed changes to the existing standards of performance are minor. Nevertheless, they are appropriate because they change the numerical emission limit for smelt dissolving tanks to reflect the performance of best demonstrated technology, improve the overall cost effectiveness of the existing standards with little increse in TRS emissions, and streamline reporting and record keeping requirements.

A public hearing will be held, if requested, to provide interested persons an opportunity for oral presentations of data, views, or arguments concerning the proposed revisions.

DATES: *Comments.* Comments must be received on or before March 9, 1984.

Public Hearing. If anyone contacts EPA requesting to speak at a public hearing by January 25, 1984, a public hearing will be held on February 21, 1984 beginning at 9:00 a.m. Persons interested in attending the hearing should call Ms. Shelby Journigan at (919) 541-5578 to verify that a hearing will occur.

Request to Speak at Hearing. Persons wishing to present oral testimony must contact EPA by February 13, 1984.

ADDRESSES: *Comments.* Comments should be submitted (in duplicate if possible) to: Central Docket Section (A-130), Attention: Docket No. A-82-36, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460.

Public Hearing. If a public hearing is held, it will be held at the Environmental Research Center Auditorium, Corner of Highway 54 and Alexander Drive, Research Triangle Park, N.C., Research Triangle Park, North Carolina. Persons wishing to present oral testimony should notify Ms. Shelby Journigan, Standards Development Branch (MD-13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5578.

Docket. Docket No. A-82-36, containing supporting information used in developing the proposed standards, is available for public inspection and copying between 8:00 a.m. and 4:00 p.m., Monday through Friday, at EPA's Central Docket Section, West Tower Lobby, Gallery 1, Waterside Mall, 401 M Street, S.W., Washington, D.C. 20460. A reasonable fee may be charged for copying.

FOR FURTHER INFORMATION CONTACT: *About the Standards.* Mr. Fred Porter, Standards Development Branch, Emission Standards and Engineering Division, MD-13, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5624.

For Further Technical Information Contact: Mr. Ken Durkee, Industrial Studies Branch, Emission Standards and Engineering Division, MD-13, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5595.

SUPPLEMENTARY INFORMATION:

Background

On September 24, 1976, new source performance standards (NSPS) were proposed for kraft pulp mills under Section 111 of the Clean Air Act (41 FR 42012). These regulations were promulgated on February 23, 1978 (43 FR 7568). The standards limit emissions of particulate matter and TRS from new or modified recovery furnaces, smelt dissolving tanks, lime kilns, digester systems, multiple effect evaporator systems, black liquor oxidation systems, brown stock washer systems, and condensate stripper systems that have been constructed, modified, or reconstructed after September 24, 1976.

The particulate matter emission limits are: 0.10 gram per dry standard cubic meter (g/dscm) at 8 percent oxygen for recovery furnaces; 0.10 gram per kilogram of black liquor solids (dry weight) (g/kg BLS) for smelt dissolving tanks; 0.15 g/dscm at 10 percent oxygen for lime kilns burning gas; and 0.30 g/dscm at 10 percent oxygen for lime kilns burning oil. Visible emissions from recovery furnaces are limited to 35 percent opacity.

The TRS emission limits are: 5 parts per million (ppm) by volume at 8 percent oxygen from straight kraft recovery furnaces; 25 ppm by volume at 8 percent oxygen from cross recovery furnaces; 8 ppm by volume at 10 percent oxygen from lime kilns; and 5 ppm by volume at the actual oxygen content of the untreated gas stream from digester systems, multiple-effect evaporator systems, brown stock washer systems, black liquor oxidation systems, and condensate stripper systems. TRS emissions from smelt dissolving tanks are limited to 0.0084 g/kg BLS.

The standards also require continuous monitoring, recordkeeping, and excess emission reporting. The opacity of recovery furnace exhaust gases must be monitored continuously, and a record of these measurements must be maintained. The concentration of TRS emissions from all affected facilities except smelt dissolving tanks must be monitored continuously and a record of these measurements must be maintained. However, this TRS monitoring requirement will not be implemented until performance specifications for the monitoring equipment are promulgated. The performance specifications were proposed on July 20, 1981 (46 CFR 37287) and will be promulgated shortly. Kraft pulp mills regulated by the NSPS will have 12 months from the date of promulgation to install the TRS monitors. The incineration temperature of effluent gases from digesters, brown stock washers, multiple-effect evaporators, black liquor oxidizers, or condensate strippers must be monitored. Finally, the gas stream pressure drop and liquid supply pressure for any scrubber controlling emissions from lime kilns or smelt dissolving tanks must be continuously monitored. Records of 12-hour average TRS concentrations and 12-hour oxygen concentrations must be maintained on a daily basis. Quarterly reports of excess TRS emissions, excess opacities, and inadequate incineration temperatures are required as well.

As required by Section 111(a)(1) of the Clean Air Act, the promuglated standards reflected application of "the best technological system of continuous emission reduction which (taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated." For convenience, this is referred to as "best demonstrated technology" or "BDT."

Section 111(b)(1)(B) requires review and, if appropriate, revision of NSPS every 4 years. A principal purpose of this review and revision is to insure that the standards reflect a current assessment of best demonstrated technology. Thus, if there now exists an adequately demonstrated technology that yields greater emission reduction than required by the standards, more stringent standards will be established reflecting the performance of that technology. On the other hand, if the standard is found to require application of technology that is not adequately demonstrated (for either technical or cost reasons, for example), more lenient standards will be established reflecting the best technology that is adequately demonstrated.

A review of the standards of performance for kraft pulp mills has recently been completed. The findings of this review are presented in the following sections of this notice. The first two sections summarize the industry growth and changes in emission control technology that have occurred since proposal of the NSPS. Subsequent sections discuss the findings of the review for each of the kraft pulp mill facilities regulated by the NSPS. This discussion parallels the order in which the affected facilities are used in the kraft pulping process.

Findings and Conclusions

Industry Growth

IN 1976 there were about 120 kraft pulp mills located in 28 States throughout the United States. The production capacity of these plants ranged from 200 to 2,500 tons of pulp per day. A typical mill produced 800 tons of pulp per day.

Since proposal of the NSPS in 1976, 91 affected facilities have been constructed at 24 existing and two new kraft pulp mills. This industry growth has occurred primarily in the Southeastern United States. Typical production capacity for the two new plants is 1,000 tons of pulp per day.

The growth in annual pulp production has averaged 3.5 percent from 1976 through 1981. Current growth forecasts indicate that pulp production declined by 2.3 percent in 1982, but will rise to a 4.6 percent annual growth rate by late 1983.

Best Demonstrated Technology

At proposal of the NSPS, the best demonstrated technologies for control of particulate matter emissions from kraft pulp mills were considered to be: (1) Electrostatic precipitators for recovery furnaces, (2) venturi scrubbers for lime kilns, and (3) wet scrubbers for smelt dissolving tanks. As explained in the following sections, these devices continue to be considered best demonstrated technologies for control of particulate matter emissions in this industry.

At proposal, the best demonstrated technologies for controlling TRS emissions from kraft pulp mills were considered to be: (1) Incineratin of the exhaust gases from digestors, evaporators, washers, black liquor oxidation systems, and condensate strippers; (2) the use of water in smelt dissolving tanks that is low in sulfides and TRS compounds; (3) process controls and either black liquor oxidation or noncontact evaporators for recovery furnaces; and (4) process controls, proper mud washing, and caustic scrubbing for lime kilns. As explained below, these technologies continue to be considered best demonstrated technology for TRS emissions in this industry—with one exception. The exception is incineration of TRS emissions from black liquor oxidation systems.

The Kraft Pulping Process

The kraft pulping process begins with the chemical pulping of wood chips in a digester. Next, the chemicals are separated from the pulp in a series of washers and the pulp is processed into an intermediate of finished product. The remainder of the kraft process is designed to recover chemicals and heat for reuse in the digester. Initially, the chemicals are concentrated in multiple effect evaporators and combusted in a furnace to recover sodium and sulfur. The molten chemicals, or smelt, that collect at the bottom of the recovery furnace are dissolved in a smelt dissolving tank and transferred to a causticizing tank where quicklime is added. This completes the regeneration of the chemicals that are used in the digester. The precipitate remaining in the causticizing tank is then calcined in a lime kiln to recover quicklime. Condensed vapor streams from several of the pulping facilities are transferred to a condensate stripping system before recycle or discharge to a water treatment pond.

Digester and Multiple-Effect Evaporator Systems

In the digester, wood chips are cooked with sodium sulfide and sodium hydroxide at elevated temperatures and pressures. Spent cooking liquor from the disgester is combined with discharge from brown stock washers to form dilute black liquor. This black liquor is then concentrated in a series of multiple effect evaporators to facilitate combustion.

Exhaust gases from digesters and multiple effect evaporates contain TRS compounds. Normally, TRS emissions from these facilities are combined for treatment. The TRS standard for digesters and evaporators is based on incineration of exhaust gases in either a lime kiln, power boiler, or incinerator. No other control techniques for reducing TRS emissions from digesters and evaporators have been demonstrated.

Thirteen digesters and twelve multiple effect evaporators have been installed since proposal of the existing standards. Each of these digesters and evaporators is in compliance with the TRS standard. The cost of incinerating the TRS emissions from these facilities is the aggregate of the component costs of pipes and blowers that collect the gas streams, and pipes and controls used to deliver and inject the gases into the kiln, boiler, or incinerator. The annualized costs, emission reductions, and cost effectiveness for TRS control in this manner are about $67,000, 410 tons of TRS removed, and $160 per ton of TRS removed, respectively.

Based on the performance and costs cited above, no changes are proposed to the best demonstrated technology for controlling TRS emissions or to the TRS standard for digesters and evaporators.

Brown Stock Washers

Brown stock washers remove the black liquor from the pulp produced by the digesters. Emissions containing TRS compounds are generated in the washers as volatile sulfur compounds are vaporized in the washer exhaust gases. The standard for TRS emissions from brown stock washers is based on incineration of the exhaust gases. No other control techniques for reducing TRS emissions from brown stock washers have been demonstrated.

Ten brown stock washers are regulated by the existing standards; each of these washers is in compliance with the TRS standards. Three of these washers are vacuum drum washers, while seven are the newer diffusion washers. Virtually all new washers are expected to be diffusion washers.

In contrast to the vacuum washer, the diffusion washer is a closed reactor. Ideally, there is no air introduced into this washer, and little or no gas is generated during the washing process. Therefore, the mass of the TRS compounds in the exhaust gas is considered to be very small in comparison to the mass of TRS in the exhaust gas from vacuum drum washers. In fact, two diffusion washers subject to the NSPS were not required to be controlled by their permitting agencies because no gases were vented from the washers. Vent gases from the other five diffusion washers subject to the standard are being incinerated in either a lime kiln, recovery furnace or incinerator, and therefore, are in compliance with the NSPS.

The annualized costs, emission reductions beyond uncontrolled levels, and overall cost effectiveness of incinerating TRS emissions from diffusion washers are estimated to be $44,000, 50 tons of TRS compounds annually and $900 per ton of TRS removed. These estimates are based on the assumption that TRS emission rates from diffusion washers are essentially the same as those from vacuum drum washers. These cost estimates and the performance discussed confirm the reasonableness of the TRS standard for diffusion washers.

The air flows and TRS emissions from diffusion washers, however, may be significantly lower than those of vacuum washers. An industry testing program to quantify these parameters for diffusion washers is currently in progress and the results of this study will be available later this year. If the TRS emissions from diffusion washers are significantly lower than those of vacuum washers, the diffusion washers may be able to meet the TRS standard without controls. If this is the case, then the units of the standard could be changed to permit compliance on a mass basis or diffusion washers could be exempted from the standards. Neither of these approaches would require control of TRS emissions from diffusion washers.

The costs of incinerating TRS emissions from vacuum washers are somewhat higher than the costs of incinerating TRS emssions from diffusion washers. This is because of the larger hoods and exhaust gas volumes associated with vacuum drum washers. The annualized costs, emission reductions beyond uncontrolled levels, and overall cost effectiveness of incinerating TRS emissions from vacuum washers are about $120,000, 50 tons of TRS removed annually, and $2,300 per ton of TRS compounds removed, respectively. This cost effectiveness is based on the installation of a vacuum washer in a new mill. If a vacuum washer is installed in an existing mill, the cost effectiveness may be significantly higher. This is because the exhaust gases might have to be conveyed a long distance to reach an incineration device. Thus, where vacuum washers must be installed and located some distance from an incineration device, an exemption from the incineration requirement is reasonable. This exemption is discussed further below.

Recovery Furnace Systems

Recovery furnaces combust concentrated black liquor to recover chemicals and produce steam. Pollutants generated by this combustion include particulate matter and TRS compounds. Sixteen recovery furnaces have been installed or modified since proposal of the NSPS and thus are regulated by the standards. Two of these furnaces concentrate the black liquor (before combustion) by bringing the liquor into direct contact with furnace exhaust gases in a direct contact evaporator. To prevent the exhaust gases from absorbing TRS compounds from the liquor, the liquor is oxidized in a black liquor oxidation system to reduce the concentration of sulfides. The other fourteen furnaces concentrate black liquor in noncontact evaporators. These noncontact furnaces eliminate the need for black liquor oxidation. Most future recovery furnace installations are expected to be the noncontact type.

The particulate matter standard for recovery furnaces is based on the use of electrostatic precipitators and performance test data available from 13 NSPS recovery furnaces indicate that each is in compliance with the particulate matter emission limit. (Performance test data for particulate matter control are not available for the other three NSPS recovery furnaces.) All use ESP's to recover sodium sulfates and carbonates from the furnace exhaust. Particulate matter emissions from ESP's on new and modified recovery furnaces range from 0.007 to 0.080 gram per dry standard cubic meter (g/dscm). These ESP's achieve emission reductions (beyond uncontrolled levels) of 29,000 to 37,000 tons per year of particulate matter. Their total annualized costs of $980,000 to $1,100,000 are offset by the value of the sodium sulfate and carbonate recovered, which ranges from about $3,300,000 to $4,200,000 annually. Thus, the overall cost effectiveness of particulate matter emission control is a savings of about $80 per ton of particulate matter removed. The incremental emission reduction, costs, and cost effectiveness (beyond the recovery level that the mill would achieve in the absence of standards) are 830 to 1,200 tons per year, $150,000 to $140,000 annually, and about $180 to $120 per ton of particulate matter removed

During review of the recovery furnace particulate matter standard, the potential for gradual ESP deterioration was investigated to insure that the recovery furnace particulate matter emission limit adequately reflected long-term ESP performance. While most of the installations subject to the NSPS have operated for less than 3 years, data are available from one unit that has been operating since 1973 (see BID pages 4–4 and 4–5). This information indicates that, with maintenance of about 900 hours annually, ESP performance has remained below the NSPS emission limit over the 9-year period. Thus, the recovery furnace aprticulate matter emission limit is reasonable, because it reflects long-term ESP performance.

The performance and cost information discussed above indicates that no revisions to best demonstrated technology or to the particulate standard for recovery furnaces, therefore, are appropriate.

TRS emissions from a recovery furnace system can originate in both the recovery furnace and the direct contact evaporator, if this type of evaporator is used. Most new recovery furnace systems use noncontact evaporators and most future furnaces are expected to use noncontact evaporators. There may be some situations, however, in which direct contact evaporators must be used. Pulping of some hardwoods, for example, may require the use of a direct contact furnace. Controlled TRS emissions are about the same from a noncontact recovery furnace and a direct contact recovery furnace with a black liquor oxidation system. Consequently, from the viewpoint of TRS emissions control, neither furnace has a distinct advantage over the other.

Best demonstrated technology for controlling TRS emissions from direct contact recovery furnaces is maintenance of proper combustion conditions and black liquor oxidation. No other control techniques for reducing TRS emissions have been demonstrated for direct contact recovery furnaces. Black liquor oxidation (BLO) inhibits the reaction between the recorvery furnace exhaust gases and black liquor in the direct contact evaporator that generates TRS. TRS emissions from the two new direct contact recovery furnaces are 0.1 and 2.8 ppm. The total annualized costs and TRS emission reduction of the direct contact furnace system are about $770,000 and 2,400 tons per year, respectively. Thus, the cost effectiveness of controlling TRS emissions from a direct contact recovery furnace system with BLO is about \$320 per ton of TRS removed.

In the noncontact furnace systems, best demonstrated technology for controlling TRS emissions from the furnace is the maintenance of proper combustion conditions and black liquor feed rates to the furnace. No other control techniques for reducing TRS emissions have been demonstrated for noncontact recovery furnaces. Performance tests data available from 10 of these noncontact recovery furnace systems indicate that TRS emissions at the furnace exists are in compliance with the TRS emission limit. (Performance test data for TRS emission control are not availabe for the other six NSPS recovery furnaces.) TRS emissions from these recovery furnaces range from 1.8 to 4.4 parts per million (ppm).

The total incremental annualized costs and TRS emission reduction achieved by a noncontact recovery furnace over an uncontrolled direct contact recovery furance are about \$450,000 and 2,400 tons per year, respectively. Thus, the overall cost-effectiveness of controlling TRS emission through the use of a noncontact recovery furnace is about \$200 per ton of TRS removed.

Recently, four kraft pulp mills with "wet-bottom" ESP's on noncontact recovery furnaces subject to the NSPS have experienced problems in achieving the TRS emission limit. Wet-bottom ESP's use unoxidized black liquor to remove particulate matter that is collected in the ESP. While the exhaust gases from these noncontact recovery furances reportedly meet the TRS emission standard, the gases apparently absorb TRS compounds as they pass over the unoxidized black liquor in the wet-bottom ESP. Only within the past several months, as these new facilities have completed start-up and initiated performance testing, has this problem become evident.

The application of wet-bottom ESP's that use unoxidized black liquor to NSPS recovery furnaces has occurred since proposal of the NSPS. These ESP's were installed after tests of wet-bottom ESP's using unoxidized liquor on two recovery furnaces not subject to the NSPS revealed that they could comply with the NSPS particulate matter and TRS emission limits.

Of the eight noncontact recovery furnacs with wet-bottom ESP's three have been able to deomonstrate compliance with the standard, and modifications to another have enabled it to achieve compliance. However, despite identical modifications made to the remaining noncontact recovery furnaces with wet-bottom ESP's, they have failed to demonstrate compliance to date.

In an attempt to focus resources and attention in this situation, the industry has turned to its technical association, the National Council for Air and Stream Improvement (NCASI). In response, NCASI has initiated a study to determine the factors which influence TRS emissions from noncontact recovery furnace wet-bottom ESP's using unoxidized black liquor and to evaluate alternaitve means of bringing these recovery furnaces into compliance with the TRS standard. The results of this study will be available in about a year.

In conclusion, the available data show that new recovery furnaces can achieve the TRS standard through the use of dry-bottom ESP's and, at least in some cases, with wet-bottom ESP's. However, the problems being experienced at some mills with wet-bottom ESP's indicate that any future decision by a mill owner to install a wet-bottom ESP should be made only after careful consideration of information specific to the individual mill and the results of the NCASI study as it evolves. With respect to furnaces which are now on-line with wet-bottom ESP's, careful evaluation indicates that the only reasonable course of action is to delay completion of the review of the TRS standard for recovery furnaces until the NCASI study is complete. The progress of this study will be followed closely and, at its conclusion, the results will be evaluated to determine the appropriate action to take.

Recovery furnaces are also sources of sulfur dioxide (SO_2) and nitrogen oxide (NO_x) emissions. Emission tests conducted during development of the NSPS indicate that a typical recovery furnace may emit as much as 600 tons per year of SO_2 and 300 tons per year of NO_x. While no techniques for SO_2 controls have been demonstrated in this industry, it may be possible to transfer SO_2 controls that have been applied to industrial and utility boilers. However, a preliminary analysis of the costs of applying a technique such as wet scrubbing to recovery furnaces indicates that the cost effectiveness of such control may approach \$3,000 per ton of SO_2 removed. Because of the magnitude of this control costs, no revisions to the NSPS to regualte SO_2 emissions are proposed. Additionally, no revisions to the NSPS to regulate NO_x emissions from recovery furnaces are proposed, because no techniques for reducing these NO_x emissions have been demonstrated.

Black Liquor Oxidation Systems

Since proposal of the NSPS, two black liquor oxidation (BLO) systems have been installed with direct contact recovery furnaces. As discussed previously, BLO is designed to decrease TRS emissions from direct contract evaporators by oxidizing the sodium sulfides in the black liquor. The sulfides may be oxidized by bubbling either air or molecular oxygen through the black liquor. By-products of the air-liquor reaction are TRS compounds; there are no by-products from the oxygen-liquor reaction.

To control TRS emissions from BLO systems that use air, the gases containing TRS compounds are generally vented from the BLO tank through a condenser and preheater before being used as combustion air in a power boiler. The annualized costs, emission reductions, and cost effectiveness of this TRS control method are about \$150,000, 16 tons of TRS removed annually, and about \$9,200 per ton of TRS removed, respectively. As mentioned above, molecular oxygen could be used in BLO systems rather than air. This would preclude the need to control TRS emissions. The cost of a molecular oxygen system, however, is significantly higher than that mentioned above for control of TRS emissions from BLO systems that use air. Costs approach \$500,000 annually for the supply of molecular oxygen alone.

When the NSPS was proposed, the TRS standard for BLO systems was based on incineration of the exhaust gases in a power boiler or other combustion device. This is because the cost of the other demonstrated TRS emission control technique for BLO systems (the use of molecular oxygen) was found to be unreasonable.

There is no absolute criterion available for establishing what cost per ton of TRS removed may be reasonable. However, a cost effectiveness in the range of \$9,200 per ton of TRS removed is very high compared to the cost effectiveness of controlling other pollutants regulated by new source performance standards (typically, \$3,000 or less per ton in 1982 dollars). Consequently, considering that TRS emissions from BLO tanks are a relatively small part (about 0.5 percent) of the total uncontrolled TRS emissions from a kraft pulp mill, this \$9,200 cost per ton of TRS removed is unreasonable. Thus, incineration of TRS emissions from BLO tanks is no longer considered to be best demonstrated technology. Because there are no other demonstrated techniques for reducing

TRS emissions from BLO tanks with costs lower than those of incineration, a revision to the NSPS exempting these facilities from regulation is proposed.

The national economic and environmental impacts of the proposed revision are a cost savings of $500,000 annually and an increase in TRS emissions of 16 tons annually. These projections assume that the mill with the molecular oxygen BLO system will stop using this system upon promulgation of the proposed revision. The increased TRS emissions represent 42 percent of the mill's controlled TRS emissions but only about 0.5 percent of its uncontrolled emissions.

Smelt Dissolving Tanks

Molten smelt that accumulates on the floor of the recovery furnace is dissolved in water in the smelt tank. As the molten smelt contacts the water, a large volume of steam is evolved. This steam, which is vented from the smelt tank, contains entrained particulate matter and TRS compounds.

Sixteen new smelt dissolving tanks are subject to the existing standards of performance. Review of particulate matter emission performance test results from 12 of the smelt dissolving tanks indicates that each is in compliance with the particulate matter standard. (Performance test data for particulate matter control are not available for the other four smelt tanks.) A wetted fan scrubber or venturi scrubber is being used to remove particulate matter (as sodium sulfates carbonates) from the gas stream exhausted from each smelt tank. The particulate matter standard for smelt tanks is based on the use of wet scrubbers. No other control techniques for reducing particulate mattter emissions from smelt dissolving tanks are demonstrated. Particulate matter emissions from scrubbers on new and modified smelt dissolving tanks range from 0.025 to 0.095 gram per kilogram of black liquor solids. The total annualized costs of about $69,000 for this particulate matter control are offset by the value of the 1,300 tons of sodium sulfate and carbonate recovered (beyond uncontrolled levels), which is about $140,000 annually. Thus, the overall cost effectiveness of the scrubbers is a savings of about $55 per ton of particulate matter removed. The incremental emission reduction, costs, and cost effectiveness (beyond the recovery level that the mill would establish in the absence of standards) are 180 tons annually, $29,000, and $160 per ton of particulate matter removed. No changes are proposed to best demonstrated technology or to the particulate matter standard for smelt disolving tanks.

There are no TRS control devices for smelt dissolving tanks. Emissions of TRS compounds are governed by the concentration of reduced sulfur compounds either in the smelt from the recovery furnace or in the water in the smelt tank. The best demonstrated technology for controlling TRS emissions from smelt dissolving tanks is to use a liquid that is low in sulfides and TRS compounds—such as fresh water or recycled water from the lime mud washer—in the smelt tank and particulate control device. There are no other demonstrated technologies for controlling TRS emissions from smelt tanks. Review ot TRS performance test results from nine smelt dissolving tanks indicates that all but one are complying with the TRS emission standard. (Performance test data for TRS emission control are not available for the other seven smelt tanks.) TRS emissions from new and modified smelt dissolving tanks that are in compliance ranged from 0.001 to 0.007 gram per kilogram of black liquor solids (g/kg BLS). While there is no cost associated with this process control technique, it reduces TRS emissions by 30 tons per year.

The single smelt tank that was not in compliance with the smelt tank TRS emission standard was using a liquid that was low in sulfides and TRS compounds during its compliance test. Subsequently, fresh water and water-caustic solutions were employed in an attempt to achieve compliance. However, TRS emissions ranged as high as 0.016 g/kg BLS during these tests, in spite of the use of best demonstrated technology. Consequently, to insure that the TRS standard for smelt tanks can be achieved by best demonstrated technology, a revision to this standard is proposed to increase the emission limit from 0.0084 g/kg BLS to 0.016 g/kg BLS. This proposed change is consistent with the observed performance of best demonstrated technology for controlling TRS emissions from smelt tanks.

There would be no economic impact associated with the proposed change in the TRS standard for smelt tanks. The proposed revision will permit the kraft pulp mill that cannot meet the existing TRS standard for smelt tanks to increase its TRS emissions by 3 tons annually. This represents about 0.2 percent of the kraft pulp mill's uncontrolled TRS emissions and, at most, 8 percent of its controlled TRS emissions. Based on the past performance of smelt tanks subject to the NSPS, it is expected that one more smelt tank will emit TRS compounds at the level of the proposed limit during the next 5 years. Thus, the cumulative impact of the proposed TRS standard in the fifth year following proposal is an increase in TRS emissions of 6 tons annually.

Compliance with the TRS standard for smelt dissolving tanks is calculated by summation of the mass emission rates of each TRS compound measured with Method 16 [as described in Section 60.285(d)(3) of the regulation]. Since promulgation of this compliance procedure, a less expensive and simpler performance test method has been proposed. This test method, Method 16A, does not yield results for each individual TRS compound; rather, it yields a single value for TRS emissions expressed as hydrogen sulfide (H_2S). To permit the use of Method 16A in determining compliance with the TRS standard for smelt dissolving tanks, a revision to the standards is proposed to change the units of the smelt tank standard from pounds per ton of black liquor solids dry weight to pounds per ton of black liquor solids expressed as H_2S.

Lime Kilns

Lime Kilns are used at kraft pulp mills to regenerate quicklime from the precipitate that collects at the bottom of a causticizing tank. As the kiln calcines the precipitate, both particulate matter and TRS emissions are generated. At proposal of the NSPS, the particulate matter standard was based on the use of venturi scrubbers, while the TRS standard was based on the use of process controls, proper mud washing, and caustic scrubbing.

Nineteen lime kilns are subject to the NSPS. Performance test data from 15 kilns indicate that each is in compliance with the particulate matter emission limit. (Performance test data for particulate matter control are not available for the other four kilns.) The particulate matter emissions ranged from 0.027 to 0.144 g/dscm for gas-fired kilns and from 0.071 to 0.185 g/dscm for oil-fired kilns. Fourteen of these kilns control particulate emissions (calcium carbonate and calcium oxide) with venturi scrubbers. One mill, however, has installed an ESP for particulate emission control. The total annualized costs of about $230,000 for venturi scrubber control of particulate matter emissions are offset by the value of the 13,000 tons of sodium sulfate and carbonate removed, which is about $780,000. Thus, the overall cost effectiveness of the scrubbers is a savings of about $43 per ton of particulate matter removed. The incremental costs (beyond the recovery level that the mill would establish in the absence of standards), emission reductions, and cost effectiveness are $29,000, 180 tons of particulate matter annually, and $160 per ton of particulate matter removed respectively.

ESP's are capable of achieving greater reductions in particulate matter emissions that venturi scrubbers. However, they are not capable of reducing TRS emissions from the lime kiln. Venturi scrubbers, on the other hand, can achieve substantial reductions in TRS emissions, as well as in particulate matter emissions. The incremental cost (beyond that of venturi scrubbers alone) of standards based on control of emissions by using ESP's and venturi scrubbers in series is about $3,200 per ton of particulate matter removed. Considering the magnitude of this cost, and the performance of venturi scrubbers in achieving both particulate matter and TRS emission reductions, venturi scrubbers continue to be the basis for the particulate matter standard.

The best demonstrated technology for control of TRS emissions from lime kilns is a combination of good process controls, adequate mud washing, and the use of caustic in the scrubber (if necessary). No other control techniques for reducing TRS matter emissions from lime kilns have been demonstrated. Review of performance test data available from 13 new kilns indicates that each is in compliance with the TRS emission limit. (Performance test data for TRS emission control are not available for the other six kilns.) The TRS emissions ranged from 0.5 to 7.3 ppm. The annualized cost, TRS emission reductions, and overall cost effectiveness of these control techniques are about $110,000, 120 tons annually, and $890 per ton of TRS removed, respectively. These costs do not take any credit for the particulate matter emission control achieved by the scrubber. However, they do include the cost of caustic addition to the scrubber, and the cost of the energy needed to raise the cold-end kiln temperature by 100° F.

The one lime kiln mentioned above which is controlled with an ESP is trying to meet the TRS emission limit by relying only on good process control and mud washing. While the kiln has not completed a performance test for TRS emissions, preliminary indications are that some 12-hour average TRS concentrations are in excess of the standard. This kiln, however, has been operating for only a few months and is still in the process of start-up. Consequently, the plant is still "debugging" and optimizing the operation of the lime kiln and the mud washers. The plant engineers believe that improved mud washing practices—possibly in conjunction with mud oxidation—will result in compliance with the TRS standard.

Lime kilns are also sources of NO_x emissions. Emission tests conducted during development of the NSPS indicate that a typical lime kiln may emit as much as 200 tons per year of NO_x. No revision to the NSPS to regulate this pollutant is proposed, however, because no techniques for control of NO_x have been demonstrated in this industry.

Condensate Stripping System

When the exhaust gases from the digester and evaporators are condensed, some TRS compounds are dissolved in the condensate. To prevent the release of TRS compounds with the condensed liquid that is discharged to water treatment ponds, some kraft pulp mills strip the TRS compounds from the liquid prior to discharge. Other plants recycle the condensate.

Three condensate strippers have been installed since proposal of the standards. Each of these condensate strippers is in compliance with the TRS standards. The best demonstrated technology for reducing TRS emissions in the vent gases from these strippers is incineration in a lime kiln, power boiler, or incinerator. No other control technologies for reducing TRS emissions from condensate strippers have been demonstrated. The cost of incineration control of TRS emissions includes the costs of pipes and blowers that collect the gas streams, and pipes and controls used to deliver and inject the gases into the kiln, boiler, or incinerator. The annualized costs, TRS emission reductions, and cost effectiveness for control of condensate stripper TRS emissions in this manner are about $12,000, 330 tons, and about $37 per ton of TRS emissions, respectively.

No change is proposed to the best demonstrated technology or to the TRS standard for condensate strippers

Power Boilers and Water Treatment Ponds

The existing standards regulate all process gas streams identified as major sources of particulate matter emissions and TRS emissions at kraft pulp mills except for power boilers and water treatment ponds. Power boilers are a source of particulate matter and nitrogen oxide emissions and, depending on the fuel fired, sulfur dioxide emissions. Power boilers that are capable of firing more than 250 million Btu's of fossil fuel an hour are regulated under Subpart D, 40 CFR 60. Standards of performance for boilers that fire less than 250 million Btu's of fuel an hour are currently being developed.

Water treatment ponds are a source of TRS emissions at some kraft pulp mills. Many new mills reduce TRS emissions from their treatment ponds by treating effluent condensate streams in a condensate stripper prior to discharging them to the ponds. However, due to reactions that may occur in the ponds, the use of condensate strippers does not insure that TRS emission reductions will occur. Moreover, no technique for measuring fugitive TRS emissions is available. Thus, the magnitude of TRS emissions from treatment ponds cannot be quantified, the performance of condensate strippers cannot be determined, and those treatment pond design parameters which minimize reactions producing TRS emissions cannot be investigated. Consequently, an equipment standard that would require the use of condensate strippers to reduce TRS emissions from treatment ponds is not considered reasonable at this time.

Exemption for Brown Stock Washers and Black Liquor Oxidation Systems

Presently, the NSPS include an exemption from the requirement to incinerate TRS emissions from black liquor oxidation systems and brown stock washers when incineration is not economically feasible. This exemption was based on the belief that TRS emissions from these facilities would be controlled by incineration in recovery furnaces. The exemption was included because some older recovery furnaces do not have the capability to accept these gases safely without altering the furnaces. The costs associated with these alterations was considered unreasonable. However, information obtained during the review of the standards indicates that power boilders are being used as the incineration device instead of recovery furnaces. Thus, the rationale that originally supported the exemption is no longer appropriate. However, as discussed earlier, when new vacuum drum washers installed at existing mills must be located a long distance away from an incineration device, the cost of incineration control may be unreasonable. For this reason, and because no other control techniques with lower costs are considered demonstrated, the exemption is retained in the revised standards.

Temperature Monitoring Requirement

The standards currently require the installation of a monitor to measure the combustion temperature at the point of incineration of effluent gases which have been combusted in an incinerator or other device not regulated by the standards. Review of this requirement indicates that it is unnecessary for power boilers, recovery furnaces, or lime kilns. Flame temperatures and residence times required to operate these facilities generally exceed the 1,200°F and ½ second considered necessary for adequate incineration of TRS emissions. Therefore, when adequate temperature and residence time are demonstrated at the point the effluent gases are incinerated, a requirement to monitor combustion temperatures in these facilities is not needed. As a result, a revision is proposed to the standards to require combustion temperature monitoring only when effluent gases are combusted in an incinerator.

Impacts of Reporting and Recordkeeping Requirements

Three types of reports are associated with the existing standards of performance. First are notification requirements, which inform enforcement personnel of facilities subject to the standards. Second is reporting of the results of performance tests that are conducted to determine compliance with the standards. Third are quarterly reports that identify periods of excess emissions recorded by each continuous emission monitor. These reports are required by the General Provisions of 40 CFR Part 60, which apply to all standards of performance. No other reports are required by the existing standards.

Today's proposal would make two minor changes to these reporting requirements. The first change would be to delete the requirement to monitor and report combustion temperatures in lime kilns, power boilers, and recovery furnaces. The second change would be to revise the frequency of excess emission reports from quarterly to semi-annually. These changes would have a negligible impact on the reporting burdens required by the existing NSPS.

Pursuant to the Paperwork Reduction Act of 1980 (Pub. L. 96-511), EPA estimated the reporting and recordkeeping requirements imposed by the NSPS. During the next 2 years the standards are in effect the total industry-wide burden of the reporting and recordkeeping requirements will be about 26,000 person-hours, based on 8 respondents in 2 years.

The Office of Management and Budget (OMB) has approved the information collection requirements contained in this proposed rule under the provisions of the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.* and have been assigned OMB control number 2060-0021. Comments on these requirements should be submitted to the Office of Information Regulatory Affairs of OMB marked Attention: Desk Officer for EPA. The final rule package will respond to any OMB or public comments on the information collection requirements.

Public Hearing

A public hearing will be held, if requested, to discuss the proposed standards in accordance with Section 307(d)(5) of the Clean Air Act. Persons wishing to make oral presentations should contact EPA at the address given in the **ADDRESSES** section of this preamble. Oral presentations will be limited to 15 minutes each. Any member of the public may file a written statement before, during, or within 30 days after the hearing. Written statements should be addressed to the Central Docket Section address given in the **ADDRESSES** section of this preamble.

A verbatim transcript of the hearing and written statements will be available for public inspection and copying during normal working hours at EPA's Central Docket Section in Washington, D.C. (see **ADDRESSES** section of this preamble).

Docket

The docket is an organized and complete file of all the information submitted to or otherwise considered in the development of this proposed rulemaking. The principal purposes of the docket are: (1) To allow interested parties to identify and locate documents so that they can effectively participate in the rulemaking process; and (2) to serve as the record in case of judicial review, except for interagency review materials (Sec. 307(d)(7)(A)).

Regulatory Flexibility Analysis

Pursuant to the Regulatory Flexibility Act of 1980 (RFA), the impacts of the standards on small businesses were considered. Applicable guidelines define a small business as "any business concern which is independently owned and operated and not dominant in its field as defined by the Small Business Administration Regulations under Section 3 of the Small Business Act." The Small Business Administration has determined that any firm classified in the SIC 2611 (which includes kraft pulp mills) that employs less than 750 workers will be considered small in regard to the Small Business Act.

It is quite possible that some kraft pulp mills qualify as small businesses and are affected by the standards. If a substantial number of small businesses are affected by a regulation, and any of the following four criteria are met, the impact of the regulation on a small business is considered significant.

Under the first criterion, the impact is judged to be significant if the regulation causes the average total cost of production to increase by 5 percent or more. The standards do not cause an increase in the average total cost of production as high as 5 percent. Thus, the impacts of the standards on small businesses are not significant from an average total cost standpoint.

The second criterion for significance relates compliance costs to sales for small versus large businesses. If compliance costs as a percent of sales for small businesses are at least 10 percent higher than compliance costs as a percent of sales for larger businesses, the impact is judged to be significant.

The total annualized cost of compliance as a percent of sales is much less than 10 percent greater for a small plant than for a large plant. The small business impact of the standards is not significant by this measure.

A third criterion to measure the significance of an impact on small businesses compares the capital cost of compliance with the capital available to small firms. It is difficult to determine how much capital is available to a firm. A reasonable approach is to recognize that the capital available to a small firm building a new kraft pulp mill at least equals the capital cost of the plant itself. The capital cost of compliance with the standards is about 2 percent of plant capital cost. Therefore, the capital costs of compliance do not represent a significant portion of capital available to small businesses.

The fourth criterion for significance is whether the regulation is likely to result in closures of small businesses. The standards will not result in any closure of firms of any size.

The standards, therefore, do not have a significant impact on small businesses.

Miscellaneous

As prescribed by Section 111, establishment of standards of performance for kraft pulp mills was preceded by the Administrator's determination that these sources contribute significantly to air pollution which may reasonably be anticipated to endanger public health or welfare. In accordance with Section 117 of the Act, publication of this proposal was preceded by consultation with appropriate advisory committees, independent experts, and Federal departments and agencies. The Administrator will welcome comments on all aspects of the proposed regulation, including economic and technological issues.

This regulation will be reviewed 4 years from the date of promulgation as required by the Clean Air Act.

Section 317 of the Clean Air Act requires the Administrator to prepare an economic impact assessment for any revision of a new source standard of performance promulgated under Section 111(b) of the Act that the Administrator determines to be a substantial revision. An economic impact assessment was prepared for the proposed revisions and for other regulatory alternatives. All aspects of the assessment were considered in the formulation of the proposed revisions to ensure that the revised standards would represent the best system of emission reduction considering costs. The economic impact assessment is included in the BID.

The cost effectiveness of each regulatory alternative was evaluated in order to determine the least costly way to reduce emissions and to assure that the controls required by this rule are reasonable relative to other regulations. In this case, the proposed revisions will not impact particulate matter emissions from this industry, but may increase emissions of TRS by about 22 tons per year in the fifth year following today's proposal. This estimate is based on the assumption that, in the fifth year, one BLO tank will not control TRS emissions, and two smelt tanks will emit TRS compounds at the level of the proposed TRS standard. The economic impact associated with the proposed revisions is an annual savings of $500,000 in the fifth year following proposal. The savings accrues from avoided operating costs for the BLO tank will no longer control TRS emissions.

Under Executive Order 12291, a judgement must be made as to whether a regulation is "major" and therefore subject to the requirement of a regulatory impact analysis. This regulation is not considered major. The proposed revision would have a minimal impact on the economy with a slight decrease in the air pollution control system expenditures by 1987. No impacts on costs or prices of products are anticipated. The proposed standard would not adversely affect competition, employment, or the ability of the industry to compete with foreign pulp mills.

This regulation was submitted to the Office of Management and Budget (OMB) for review as required by Executive Order 12291.

List of Subject in 40 CFR Part 60

Air pollution control, Aluminum, Ammonium sulfate plants, Asphalt, Cement industry, Coal, Copper, Electric power plants, Glass and glass products, Grains, Intergovernmental relations, Iron, Lead, Metals, Metallic minerals, Motor vehicles, Nitric acid plants, Paper and paper products industry, Petroleum, Phosphate, Sewage disposal, Steel, Sulfuric acid plants, Waste treatment and disposal, Zinc, Tires, Incorporation by reference, Can surface coating, Sulfuric acid plants, Industrial organic chemicals, Organic solvent cleaners, Fossil fuel-fired steam generators.

Dated: December 28, 1983.

Alvin L. Alm,

Acting Administrator.

PART 60—[AMENDED]

It is proposed to amend 40 CFR Subpart BB as follows:

* * * * *

1. In § 60.280, paragraphs (a) and (b) are revised to read as follows:

§ 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 modificaiton after September 24, 1976, is subject to the requirements of this subpart.

* * * * *

2. In § 60.283, the introductory text of paragraph (a)(1) is revised to read as indicated below. Additionally, subparagraphs (a)(1)(iv) and (a)(1)(v) and paragraph (a)(4) are revised to read as indicated below:

§ 60.283 Standard for total reduced sulfur (TRS).

(a) * * *

(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:

* * * * *

(iv) It has been demonstrated to the Administratior'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 not feasible. 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 of a dry basis, corrected to the actual oxygen content of the untreated gas stream.

* * * * *

(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).

* * * * *

3. In § 60.284, both the introductory text of paragraph (a)(2) and paragraph (b)(1) are revised to read as indicated below. Additionally, the intorductory text of paragraph (d) is revised, and paragraph (d)(3) is revised to read as indicated below:

§60.284 Monitoring of emissions and operations.

(a) * * *

(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:

* * * * *

(b) * * *

(1) For any incinerator, a monitoring device which measures 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.

* * * * *

(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:

* * * * *

(3) For emissions from any digester system, brown stock washer system, multiple-effect evaporator system, or condensate stripper system periods of excess emissions are: All 12-hour average TRS concentrations above 5 ppm by volume unless the provisions of § 60.283(a)(1) (i), (ii), or (iv) apply.

* * * * *

(Sec. 114, Clean Air Act as amended (42 U.S.C. 7414))

* * * * *

[FR Doc. 84-683 Filed 1-18-84; 8:45 am]

BILLING CODE 6560-50-M

ADDITIONAL INFORMATION NOT INCLUDED IN PROPOSAL

AIR EMISSION CONTROL SYSTEMS
AMERICAN CAN CO. HALSEY, OREGON

NON-CONDENSIBLES FROM DIGESTERS & EVAPORATORS
(see DWG, #461-206B)

Summary of Equipment:

DIGESTERS: Two continuousBauer M&D Digesters rated at 360 ADT/day total, unbleached kraft pulp.

EVAPORATORS: 6-effect L.T.V.'s with three forced concentrators, surface condenser.

NON-CONDENSIBLE SYSTEM:

Piping: Glass reinforced polyester.

Valves: Butterfly, cast-iron body, 316 S.S. Disc, Ethylene-Propylene seat, Teflon bushing.

Vacuum Relief: Norman Rupp Co. Shand & Jurs, 94110, 6". cast iron body, stainless steel fitted, teflon diaphragm.

Non-Condensible Fan: 600 C.F.M. 10" wg, 3 H.P. 1800 RPM, fiberglass construction.

Flame Arrestors: General precision systems, model # 94303, 8".

Moisture Separator: Fabricated mild steel.

Operating Experience:

Overall, operation of the non-condensible system has been quite successful.

Normally, the gases are burned in the Lime Kiln, but when the kiln is not operating, they are diverted and burned in the Recovery furnace. No difference in TRS emissions is noted at either location when burning non-condensibles.

Following is a list of problems encountered since startup:

1. Flame arrestor elements became fouled with an Organic Sulfide material. They are now successfully cleaned with a solvent approximately every six months.

2. Rubber boot expansion joints in the long straight runs of FRP piping failed frequently. These have all been replaced with FRP spool pieces.

3. A gasket inside the blow condenser failed allowing blow gas to bypass the condenser into the non-condensible system. This permitted excessive moisture to get into the system causing a greater volume of gases.

4. Repair of the non-condensible fan has resulted in Digester and Evaporator shutdowns. An In-place spare fan is planned.

5. Difficulty sustaining lime kiln burner flame when firing oil and non-condensibles has resulted in burning non-condensibles at the Recovery part time when the kiln is firing oil. This problem is related to the kiln flame detection system.

There has been no problem with this when firing natural gas which has been the case in all but the Winter months.

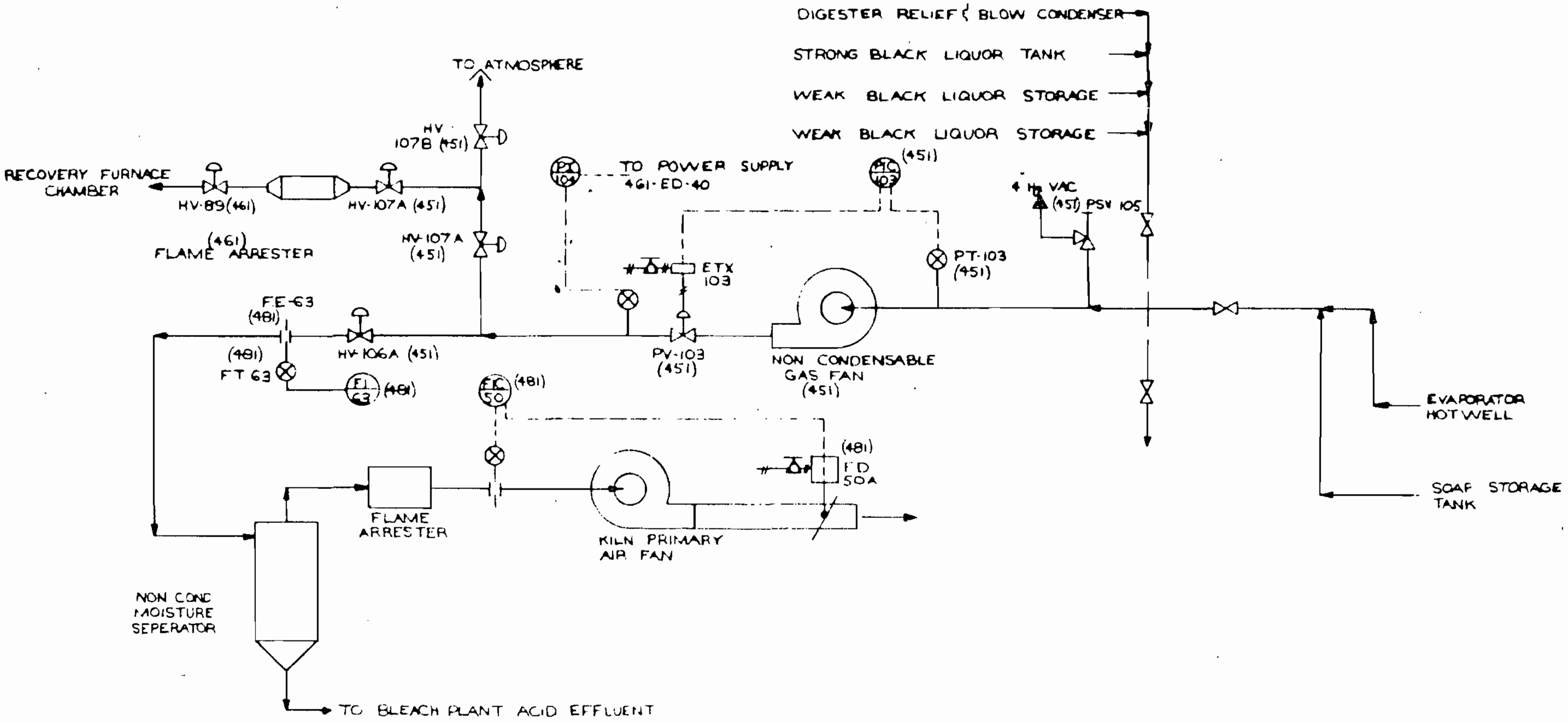
6. Non-condensible ports at the recovery furnace plug up between periods of use sometimes causing a delay in switching. An automatic rodding system is scheduled to be installed.

7. Non-condensibles leak slightly around the lime kiln burner. This should be taken into account in burner design.

BEST AVAILABLE COPY

BREAK ALL SHARP CORNERS UNLESS OTHERWISE SPECIFIED

FINISHED FRACTIONAL DIMENSIONS ± 008 UNLESS OTHERWISE SPECIFIED



ITEM	REQD	DESCRIPTION	MATERIAL	SIZE	PATT NO.	DWG NO	REMARKS

SYM	FINISH
f1	ROUGH
f2	MED
f3	FINE
f4	COURSE GRIND
f5	FINE GRIND
f6	POLISH

SYM.	REVISION	DATE	BY
1	REDRAWN		
2			
3			
4			
5			
6			

SUPERSEDES DWG. NO

SUPERSEDED BY DWG NO

DATE ISSUED

JOB NO

AMERICAN CAN CO.

HALSEY, OREGON

RECOVERY PLANT
FLOW DIAGRAM
NON-CONDENSABLE GAS PROCESS

DATE [illegible]

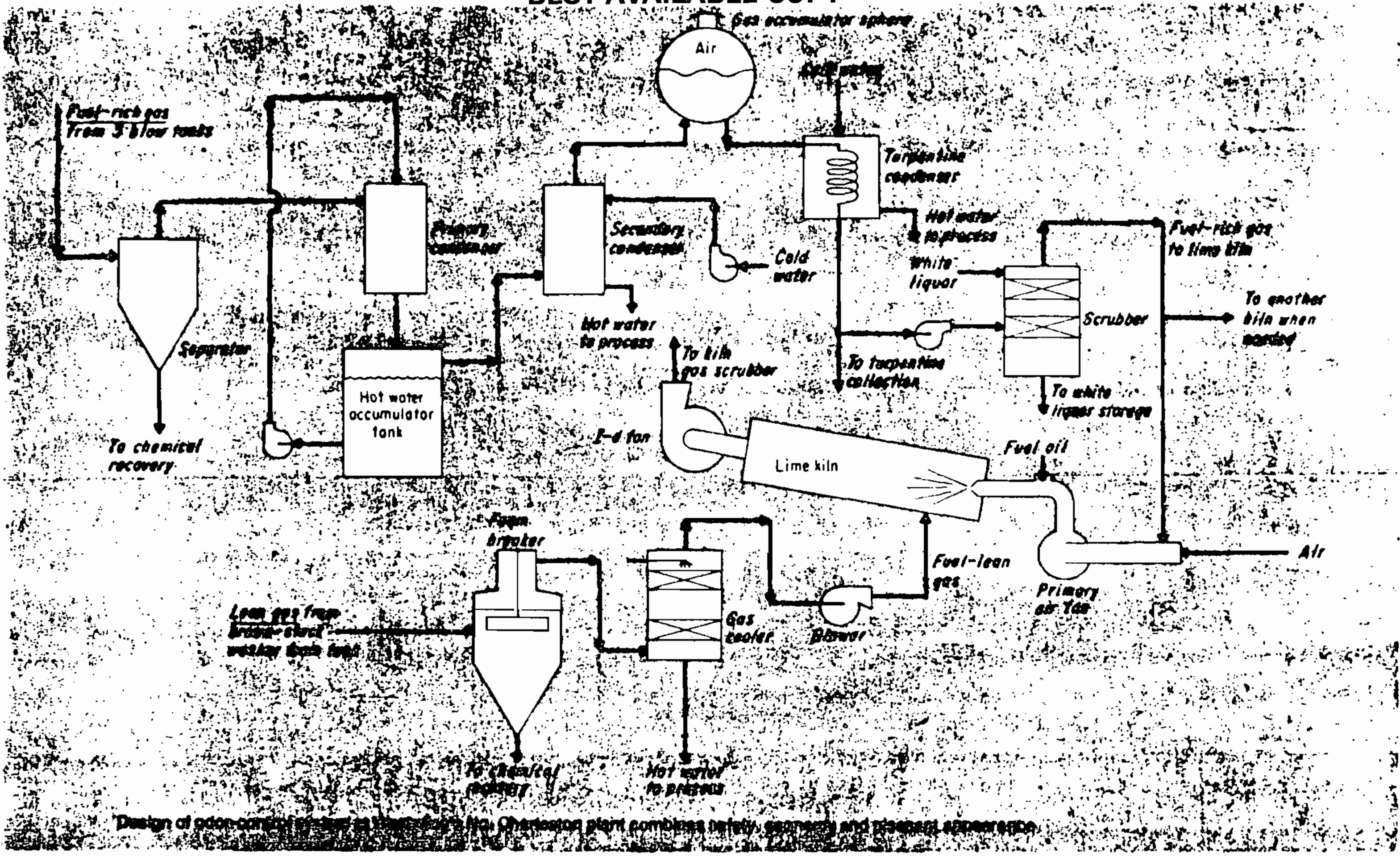
SCALE NONE

DR [illegible]

CHK

APP

461-206 -B



Design of odor-control system at Westvaco's No. Charleston plant combines safety, economy and pleasant appearance

How Westvaco controls odor

One of the most annoying problems facing pulp and paper manufacturers is the malodorous discharges which have been associated with their industry for many years. These odors emanate at various points of the paper-making process. A particularly difficult troublespot is the recovery boiler. Up until a few years ago, flue gases were carrying along objectionable gases produced in the evaporation of black liquor. Today, this problem has been pretty well resolved by eliminating direct contact between the liquor and the flue gases. Another source of bad odors is the blow-tank into which the digested pulp is discharged intermittently, together with a large amount of steam and fuel-rich, noncondensable gases. A third source is the brown-stock washer foam tank, which discharges a fuel-lean gas.

Westvaco has solved this problem at its 2000-ton/day plant in North Charleston, SC at a cost of $11.5 million. It has completed an incineration system for both fuel-rich gas and lean gases, illustrated on the simplified flow diagram (facing page); system was inaugurated in May of this year. An additional $7 million has been budgeted for secondary treatment of mill effluent.

In addition to eliminating virtually all bad odors, characteristics of the Westvaco system making it worthy of a **Power** citation relate to its basic design, offering several advantages: (1) It is completely safe—ignition of fuel-rich gas is avoided all along its path by means of pressure and vacuum relief valves, rupture discs, flame arrestors, proper dilution of gases and air and means for diverting gas flow to another incinerator; (2) it is economical because of the recovery of every possible reusable component—turpentine, white liquor compounds—and because successive volume reductions through cooling of gases have minimized pump and blower requirements; (3) it eliminates the plume completely, through reduction of water-vapor carryover; (4) it burns off malodorous lean gases after their release from the foam-breakers, once chemical recovery is completed—one of the very few paper mills to do so.

Equipment manufacturers have cooperated enthusiastically in efforts to control odors, in some cases joining with Westvaco in applying for patents. Both primary and secondary condensers were built by Rosenblad Corp. These are installed upstream and downstream of the large water accumulator, a product of Chattanooga Boiler & Tank Co. The gas-accumulator sphere, built for Westvaco by Barthel Chemical Construction Co, is of glass-reinforced polyester—more resistant to corrosion than steel; the regulating membrane inside, made of polyester-reinforced mylar, rises or falls according to variations in gas production to maintain constant flow downstream. The turpentine condenser comes from American Heat Reclaiming Corp; the white liquor scrubber was supplied by International Pipe and Ceramics Corp. Varec, Inc provided the flame arrestors.

In continuance of its efforts toward environmental protection, Westvaco—with the cooperation of Clemson University faculty—is studying a process for recovery of useful compounds emerging from white liquor treatment.

Reprinted with permission from POWER, November 1972...Copyright McGraw-Hill, Inc. 1972

What happens to reduced sulfur compounds burned in lime kilns?

TRS compounds are effectively reduced to SO_2 in lime kiln burning and resulting SO_2 removed in reaction with lime and scrubbing at stack at Crofton mill

By A. N. THAKORE

A simple and reliable analytical method for measuring high levels of total reduced sulfur (TRS) compounds in kraft mill relief, vent, and blow gases is described in this article. The results obtained by this method were used to derive a sulfur balance around the kiln burning TRS gases at B.C. Forest Products' Crofton, B.C., pulp and paper mill. Careful analysis of sulfur balance study indicates that in the presence of excess oxygen, 50% of the sulfur dioxide produced by burning oil and TRS gas in No. 2 lime kiln reacts with lime at the prevailing high temperature to give calcium sulfate. The balance of sulfur dioxide is carried along with lime dust and stack gases to a primary dust chamber and Peabody scrubber, where 49% is absorbed by lime dust and contaminated hot water. Only 1% of the total sulfur introduced in the kiln escapes as gaseous sulfur dioxide. Operation of the TRS system reduces sulfur loss from the kraft recovery system to 1630 lb/day (740 kg/day).

Total reduced sulfur gas from process and recovery furnaces is the main source of odor from a kraft pulp mill. TRS is generated during pulping and is released with blow gases, relief gases, from storage tanks and during pulp washing, black liquor oxidation, and evaporation. One of the methods available to reduce TRS emission is the incineration of major TRS gas sources.[1,2,3] The collection and burning system at the Crofton mill was worked out in conjunction with Lundberg Ahlen Equipment. The system involves collection of three major concentrated sources of TRS gas, mainly batch blow gases (discontinuous source), batch and digester relief gases (continuous source), and vent gases from evaporator foul condensate seal tank (evaporator source). After cooling to remove steam, recover heat, and condense out crude turpentine, the three TRS gas sources are transported separately to a dilution stack at a concentration above the explosive range. (At Crofton, a mixture of TRS gas and air is explosive between 1% and 3% TRS content.) At the dilution stack the three sources are combined and diluted with air at a controlled level to bring the concentration of TRS gas below its explosive limit. However, the collection part of this system is equipped with flame arrestors and pressure relief valves and is grounded against electrical sparks. The diluted mixture is then used as a primary source of air in the lime kilns as shown in Figure 1.

The TRS incineration system, if properly operated, affords two advantages. Environmentally it reduces the total discharge of TRS gas to the atmosphere, and it minimizes the loss of sulfur from the system. At the onset of the TRS incineration program it was important to evaluate the effectiveness of such a system in minimizing reduced sulfur gas emission, and to analyze any associated problems that would arise in the lime kiln operation due to a higher level of sulfur dioxide. To accomplish the above objectives, a reliable and simple method was needed to measure the concentration of reduced sulfur gases in the major sources of TRS gas.

Measuring high levels of reduced sulfur gases

There are several published methods for analyzing reduced sulfur gases.[4,5] The majority of these methods utilize a gas chromatograph coupled to a flame photometric detector. Other methods incinerate TRS gas to sulfur dioxide followed by flame photometric or coulometric determinations. These methods are suitable for samples containing 10 parts per billion (ppb) to 1000 parts per million (ppm) of reduced sulfur gases. In the case of the present study, levels of gas in samples would be as high as 100%, and before testing a large dilution with air would be required. The accuracy of the final result would be reduced by errors involved in such large dilutions. Besides, flame photometric detectors, gas chromatographs, and coulometric titrators are relatively expensive units requiring a fair amount of servicing by skilled technical personnel; and they are prone to flooding and deactivation by high concentrations of TRS gas. A relatively simple method requiring only readily available apparatus was therefore developed.

Gas samples to be analyzed were collected in one of

Mr. Thakore is with the technical services department, Crofton Pulp & Paper Div., British Columbia Forest Products Ltd., Crofton, B.C.

two ways depending on the concentration of reduced sulfur compounds:

1. Samples containing 5% to 100% TRS gas (volume/volume) were collected in a Teflon tube of known volume (21.68 ml) equipped with a stainless steel quick-disconnect valve to ensure easy sampling and storage in the field. The collected gas was transferred quantitatively by approximately one liter of pressurized oxygen into a two-liter Teflon bag.

2. When TRS gas content was below 5%, the sample was collected directly by inflating the two-liter Teflon bag with the sample to a known standard pressure (2 psi). At a known temperature it is relatively simple to calculate the volume of the collected gas at ambient conditions. Samples collected in this manner require no further dilution with oxygen.

TRS gases sampled by one of the two methods described were passed at 1832°F (1000°C ± 5°) through a quartz combustion tube (10-mm o.d., 800-mm length, packed with crushed Vycor glass) at approximately 30 ml/min. The products of combustion were absorbed in a flask containing 50 ml of 10% KI, 50 ml of 4N H_2SO_4, 2 ml of starch solution, and 2 drops of 0.1N KIO_3 solution. As the reactive products of combustion were quantitatively absorbed, the blue iodine solution in the absorption flask was decolorized. A titration was therefore carried out with 0.1N KIO_3 solution at such a rate to maintain the original blue color of the solution. Since preliminary work had shown that the first absorption flask completely removed all the reactive products of combustion, a second absorption flask containing the same solution, connected in series, acted as a blank.

TRS gas samples contain hydrogen sulfide (H_2S), methyl mercaptan (CH_3SH), dimethyl sulfide ($(CH_3)_2S$), and dimethyl disulfide ($(CH_3)_2S_2$). During combustion the sulfur gases are converted to sulfur dioxide.

$$R_2S + 3/2\ O_2 \rightarrow R_2O + SO_2$$

The absorption process involves reaction between iodine and sulfur dioxide.

$$2H_2O + SO_2 + I_2 \rightarrow 2HI + H_2SO_4$$

During titration potassium iodate reacts with potassium iodide to release iodine stoichiometrically.

$$6H^+ + 5KI + KIO_3 \rightarrow 3I_2 \uparrow + 3H_2O$$

This volume of 0.1N KIO_3 used during a test is related to the amount of TRS gas present in the sample, and is calculated according to equation (1) and (2).

$$V_1 = 1.12 \times V_2 \qquad (1)$$

$$V_3 = 1.12 \times V_2 \times \left(\frac{273 + t}{273}\right) \times \left(\frac{760}{p}\right) \qquad (2)$$

Where V_1 = Volume of TRS gas at standard temperature and pressure
V_2 = Volume of 0.1N KIO_3 used during the test
P = Atmospheric pressure at the time of sampling
t = Sampling temperature, °C
V_3 = Calculated volume of TRS gas under sampling condition

Therefore, % TRS gas (volume/volume) in test sample:

$$= \frac{311.795 \times V_2 \times (273 + t)}{P \times V_4}$$

Where V_4 = Total volume of test gas used at sampling temperature and pressure.

The method was calibrated using pure hydrogen sulfide gas. The mean recovery for six determinations was 98.0 ± 0.96% (Table 1).

Samples from the three major sources of TRS gas at Crofton were analyzed and the results are presented in Table 2. Both the discontinuous and evaporator source contained TRS gas mixtures above the explosive range as confirmed by a gas sniffer (explosion meter) test. The

Table 1 **Results of calibration test** using pure hydrogen sulfide as a sample gas

Volume of 100% H_2S used, ml	Volume of 0.1 NKIO_3 required, ml	Ambient temperature, °C	Pressure, mm Hg	H_2S (volume/volume) calculated, %	
21 68	17 6	20	762	97 3	98 0 ±0 95%
21 68	17 8	20	761	98 6	
21 68	17.4	21	761	96 7	
21 68	17 9	20	760	99 3	
21 68	17.6	21	762	97.7	
21 68	17.7	21	762	98.3	

Table 2. **Levels of reduced sulfur gases** in principal TRS sources at Crofton

Sample source	% TRS volume/volume†	Other parameters*
Continuous	5 ± 1 2	Explosive only when % TRS volume/volume > 3
Discontinuous	63 9 ± 19 2	Nonexplosive for all tests
Evaporator	10 4 ± 3.4	Nonexplosive for all tests
Diluted TRS going to kilns	0 59 ± 0 06	Nonexplosive for all tests

†% TRS volume/volume are averages of 20 individual determinations for each source

*Explosive nature of individual samples was determined by JB gas sniffer for combustible gases Model G.

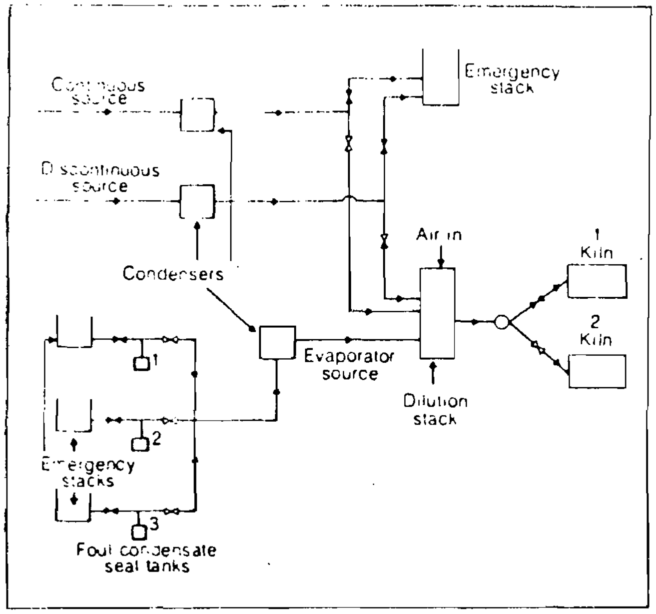


Figure 1 **Crofton TRS incineration system schematic.**

level of TRS gas in continuous source averaged 5% with a standard deviation of ± 1.2%. Of the twenty samples analyzed for continuous source only two samples showed concentration of TRS gas below 3%, and were therefore in the explosive range as determined by a gas sniffer test.

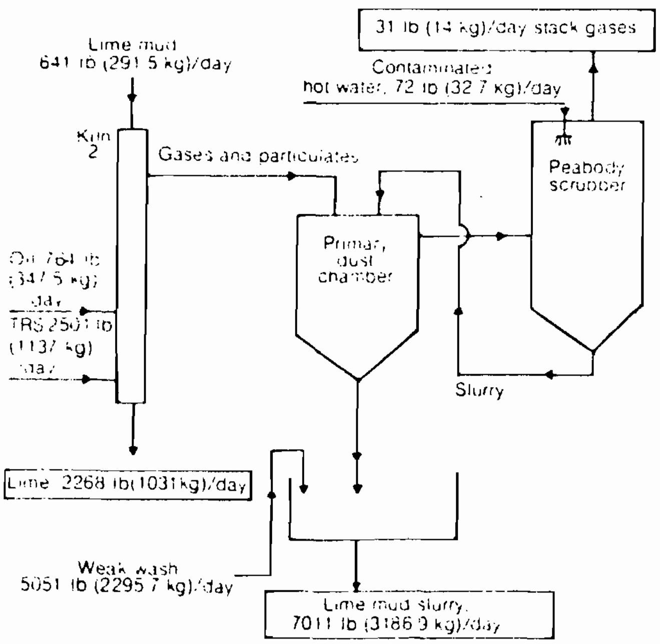
TRS gas samples taken after the dilution stacks contained 0.59 ± 0.06% TRS compounds. Gas sniffer (explosion meter) study of these samples indicated that the diluted TRS gas going to the kilns for incineration was always below the explosive range during the test.

Observations indicate the explosive range of Crofton TRS gas sources to be in the 1.0% to 3.0% range. This differs substantially from the published estimates of the explosive range for a mixture of TRS gases in air.[8] The difference may be due to the fact that the explosive limits of various reduced sulfur gases are determined in air and are therefore valid only if the sources of TRS gases contain air as the principal diluent.

Sulfur balance around the lime kilns

Figure 2 shows the principal input and output sources of sulfur compounds at the No. 2 lime kiln and the adjoining primary dust chamber and Peabody scrubber. The main input sources are oil, TRS gas, lime mud, and weak wash, while the major output sources are reburned lime, stack gases, and lime mud slurry from the primary dust chamber.

Total sulfur present in oil was obtained from the oil supplier's specification charts, while level of sulfur in TRS gas was obtained by the analytical method described in this paper. Sulfur in lime and lime muds, present mainly as sulfates of calcium, magnesium, and sodium, was determined gravimetrically by precipitating barium sulfate from an acidified solution of the sample with 10% barium chloride solution.[6] Amount of sulfur gases present in the lime stack emissions were measured by gas chromatography, while level of total sulfur compounds present in weak wash and lime mud slurries coming out of the primary dust chamber were measured gravimetrically by precipitating barium sulfate from oxidized and acidified solutions of the respective samples.



Total output of sulfur compounds = 9310 lb (4232 kg)/day
Total input of sulfur compounds = 9029 lb (4104 kg)/day

Note: lb (or kg)/day = lb or kilograms of sulfur compounds expressed as elemental sulfur/day

Figure 2 **Sulfur balance around No. 2 kiln at Crofton mill.**

Table 3 **Concentration of total sulfur compounds present in various samples from lime kiln**

Sample	% $SO_4^{=}$ as $CaSO_4$	% $SO_3^{=}$ as $CaSO_3$
Lime	2.5	0
Lime mud	0.35	0
Lime mud slurry from primary dust chamber	0.35	<0.1
Deposits in primary dust chamber	4.1	55.3
Deposits in Peabody scrubber	3.1	76.6

The result of the sulfur balance study when No. 2 lime kiln was operating normally with an average of 4% oxygen in the stack gases is shown in Figure 2. All measured values of sulfur compounds in this study were expressed in pounds or kilograms of elemental sulfur. Approximately 99% of the sulfur introduced by oil and TRS gas is effectively absorbed in the system when excess air is present for oxidation of TRS gases. An identical sulfur balance study conducted on No. 1 lime kiln, at a time when the level of oxygen in the stack gases was only 0.5%, indicated that under limiting oxygen concentration, a majority of the reduced sulfur gases introduced by oil and TRS gas escaped unaltered.

Fate of reduced sulfur gases

The major product of burning TRS gas in the lime kiln is expected to be sulfur dioxide if sufficient oxygen is available during combustion.[7] It would therefore be of interest to study the fate of sulfur dioxide in the kiln, and the adjoining primary dust chambers and Peabody scrubber. A sulfur balance indicates almost 50% of the total sulfur dioxide is absorbed by the reburned lime in No. 2 kiln. Detailed analysis of sulfur compounds in lime, lime muds, deposits in the primary dust chamber, and Peabody scrubber and lime mud slurry from the primary dust chamber (Table 3) provides evidence against the prevalent belief that sulfur dioxide is absorbed by reburned lime as calcium sulfite. Laboratory pyrolysis study of pure calcium sulfite in air suggests that under the prevailing condition in the lime kilns, any sulfur dioxide reacting with the lime would give calcium sulfate only. Indeed, the only major sulfur compound present in lime from No. 2 kiln was calcium sulfate.

The remaining 50% of the unabsorbed sulfur dioxide present in the kiln is carried along with lime dust and exhaust gases to the primary dust chamber and Peabody scrubber. Here sulfur dioxide is quantitatively absorbed by the contaminated hot water and the settling lime dust. Although solid deposits accumulating after start of the TRS system, in primary dust chamber and

(Continued on page 80)

words - which will simplify it and minimize the blow. He reviews information to be covered in the dismissal.

Properly used, the consultant is brought in before the termination to learn the dischargee's background and problems, if any. The first-phase relationship between counsel and candidate can then simply be a matter of encouraging the dischargee to blow off steam. It's healthy to be angry, to talk out bitterness, to wade through any abject swamp of self-degradation, and to express fears. The sooner that's done, the sooner the counselor and dischargee can get down to business.

"Business" starts with confidence-building. The consultant gets candidates to list their triumphs, achievements, performances they have enjoyed, and tasks they feel they have done well. Through this career summarization, strengths, weaknesses, likes, dislikes, and selling points can be assessed. During this process, a thorough review of career options is also initiated.

Next, the consultant helps the candidate develop a personalized marketing plan, quite similar to the working experiences of many executives. This includes: a presentation of skills and abilities; a resume based on job achievement; a technique in handling interviews; and outreach into different areas for which the candidate's experience qualifies him.

After the materials are prepared, and potential employers listed, the period of coaching and consultation continues until the candidate is settled in a job. This includes regular reviews of progress in the job search, final-phase evaluation of offers, and guidance on how to keep offers open while negotiating among several employers. The counselor also provides advice on any problems arising in the early days of the new job.

For once in an executive's career he has someone working with him as an agent does for a star athlete or entertainer, and a professional's view on what he can negotiate in selling his talent. Outplacement counselors do not deal directly with potential employers, nor offer legal services as athletes' agents often do. But their role plays a part in ensuring most executives who receive their help emerge on higher-level jobs at higher pay.

There is some confusion between outplacement and executive search, or recruitment, consultants. In fact, these services are diametrically opposed. So-called "head-hunters" fill corporate vacancies, often with a bias for doing so with executive prospects who are currently employed. Some executive search firms claim to offer outplacement service as well as recruitment for companies, but the potential for conflict of interest is obvious.

Outplacement counseling differs from these services and from employment agencies in several ways. The guidance in the job search is not only intensive but open-ended. It begins with an understanding of the corporate situation which led to the need for a new job, and helps the individual resolve any personal problems that may have contributed to this need.

Another aspect of outplacement is especially interesting. Many executives find jobs in the "hidden" market, that is, jobs not listed publicly, or those created to fill a company need that had not been fully realized until a candidate's qualifications came before a responsible official.

Being fired forces an individual to take a new focus on himself, his life, and his career. It *can* turn out to be one of the best things that ever happened to him. □

Reduced sulfur compounds

(Continued from page 77)

Peabody scrubber, contained a high level of calcium sulfite (Table 3), there was only an insignificant amount of sulfite salts present in the lime mud slurry coming out of the primary dust chamber. This observation can be rationalized on the basis that metal sulfites in the presence of water and air oxidize rapidly to sulfates. Since impervious deposits found in primary dust chambers and Peabody scrubber are protected from air, oxidation of the initially formed calcium sulfite does not occur, thus accounting for the high level of sulfite in these deposits. However, sulfites initially formed in the lime mud slurry (from primary dust chamber) rapidly oxidize to sulfates since they are always in contact with air. The overall process of incineration and absorption of TRS gas therefore involves oxidation of sulfur compounds to sulfur dioxide followed by its quantitative absorption by lime and lime mud slurry to give mainly calcium and some sodium sulfates.

During proper operation with excess air, only 1% of the total reduced sulfur introduced into the lime kiln escapes as sulfur dioxide via stack emission.

It was also interesting to note that the level of calcium sulfate in the lime did not increase during the period of this study. The observation indicates a steady depletion of calcium sulfate from reburned lime during the causticizing process. Obviously the solubility of calcium sulfate (0.298 g/100 g H_2O) as compared to that of calcium carbonate (0.0014 g/100 g H_2O) dictates that during the causticizing process most of the calcium sulfate would be converted to soluble sodium sulfate. Since sodium sulfate would be carried along with the white liquor into the kraft recovery system, it would be expected that the level of sulfur compound in lime would not accumulate as a result of incinerating TRS gas in the kilns. The sulfur balance also indicates that the Crofton TRS system reduces the loss of approximately 1630 lb/day (740 kg/day) from the kraft process. □

Acknowledgment

Author wishes to thank D. S. Hill and D. W. Smiley for constructive criticism and discussions made during this study and subsequent preparation of the manuscript.

REFERENCES

1. T. L. Burgess, D. M. Carter, and D. E. McEachern, "Incineration of malodorous gases in kraft pulp mills," *Pulp & Paper Magazine of Canada*, 75:5, April 1974, pp. T194-198.
2. A. A. Coleman, "The combustion of noncondensable blow and relief gases in the lime kiln," *Tappi*, 41: 10, October 1958, pp. 166A-168A.
3. R. O. Blosser and H. B. H. Cooper, "Current practices in thermal oxidation of noncondensable gases in the kraft industry," NCASI Technical Bulletin No. 34.
4. T. L. C. DeSouza and S. P. Bhatia, "Development of calibration systems for measuring TRS gas and sulphur dioxide in ambient concentrations in the ppb range," *Analytical Chemistry*, 48:14, December 1976, pp. 2234-2240.
5. K. V. Sarkanen, B. V. Hrutfior, L. N. Johanson, and H. S. Gardner, "Kraft odor—measurements of sulfur emissions and release," *Tappi*, 53:5, May 1970, pp. 766-783.
6. "Analysis of soda and sulfite white and green liquors," *Tappi*, Procedure T624 OS-68.
7. W. H. Evans and D. D. Wagman, *J. Res. Natl. Bur. Std.*, 141, 1952, p. 49.
8. W. F. Beckwith, "Estimation of explosive limits of noncondensable gas mixtures," *Tappi* 57:12, December 1974, pp. 147-148.

NONCONDENSIBLE GAS DISPOSAL SYSTEM

POTLATCH CORPORATION
Lewiston, Idaho

For Presentation At:

NCASI Special Technical Conference on Kraft Noncondensible Gas Collection and Burning

Atlanta, Georgia
July 31, 1973

The noncondensible gas burning system was installed at Lewiston in August of 1970. The batch digester gas collection and transport system operates without a gas holder. A drawing of the system is attached.

1. Considerations in the design and operation of batch digestion blow heat recovery systems for subsequent treatment of noncondensibles.

    A. The blow heat recovery system was installed before there was any consideration of noncondensibles burning. No special design features were included to facilitate noncondensibles burning.

    B. The system was modified to eliminate entrance of air by pressuring the blow tank with steam. This reduced "popping off" in the blow heat system and surging in the noncondensibles disposal system.

    C. There are no special operating procedures designed specifically to facilitate noncondensibles burning. The blow heat system is operated for maximum heat recovery and the noncondensible disposal system takes the results.

2. System descriptions and performance of batch digester noncondensible burning systems without gas holders.

    A. Description (see also attached drawing) - Gases from the blow heat recovery system spiral condensers and the turpentine condenser flow to a barometric condenser. The exit gas temperature is 50-70° F with 1% or less moisture content. The cooled noncondensibles are piped to the suction side of the lime kiln primary air fan.

    B. The noncondensible system is equipped with a flow meter following the barometric condenser. When the system is overloaded the meter "pegs out". Overloading is a rare occurrence.

    C. A limited amount of monitoring data indicates no measurable lime kiln TRS emission differences whether operating with noncondensibles turned to the kiln or vented to the atmosphere.

3. Materials of construction, design, explosion protection and operating experience with noncondensible gas transport systems.

    A. The digester noncondensible gas transport system is fiberglasss up to the barometric condenser. The condenser and all lines between it and the lime kiln primary air fan are 316 L stainless steel. No problems have been encountered with respect to materials of construction.

    B. The evaporator gas transport system is all 316 L stainless steel up to the lime kiln primary air fan. No problems have been encountered with respect to materials of construction.

    C. The present primary air fan is not made of corrosion resistant material. No serious problems have been encountered but when the fan is replaced it will be with 316 stainless steel.

    D. Both the digester noncondensible line and the evaporator noncondensible line are equipped with four 50 lb rupture discs and a flame arrestor on each lime kiln inlet line and the vent lines. The protection equipment worked well on the one occasion it was needed.

4. Experience with burning noncondensibles from digestion and evaporation in lime kilns, auxiliary incinerators, and recovery furnaces.

   A. Early in the operation of the noncondensibles system, flame-outs in the lime kiln were a serious problem. It was found that the automatic control system on the barometric condenser was not operating properly and excess moisture was entering the kiln with the gases and "blinding" the fireye. The controller was bypassed and the water flow to the condenser set manually at about 150 gpm. This constant flow of water keeps the gases in the 50°-70°F range with less than 1% moisture. The occurrence of flame-outs dropped drastically with this change.

   B. Rapid surging, not connected with blow cycles, also caused some flame-out problems. The surging was traced to the turpentine condenser. Several digesters are relieved at the same time but at different and varying rates. This caused a surging relief gas flow to the turpentine condenser and on into the noncondensibles system. It was found that the cooling water flow to the condenser was too low so it was increased and surging was greatly reduced. This helped reduce flame-outs and improved the recovery of turpentine

   C. Despite the reduced number of flame-outs due to improvements in the condensers they still occurred often enough to be considered a problem. The kiln originally was equipped with one gun mounted fireye. The system was modified so the kiln is now equipped with two interlocking fireyes mounted to the side of the gun. One is pointed at the base of the flame and one down the kiln. Both must sense the absence of flame before the gas is turned off. Since this modification, flame-outs have ceased to be a major problem.

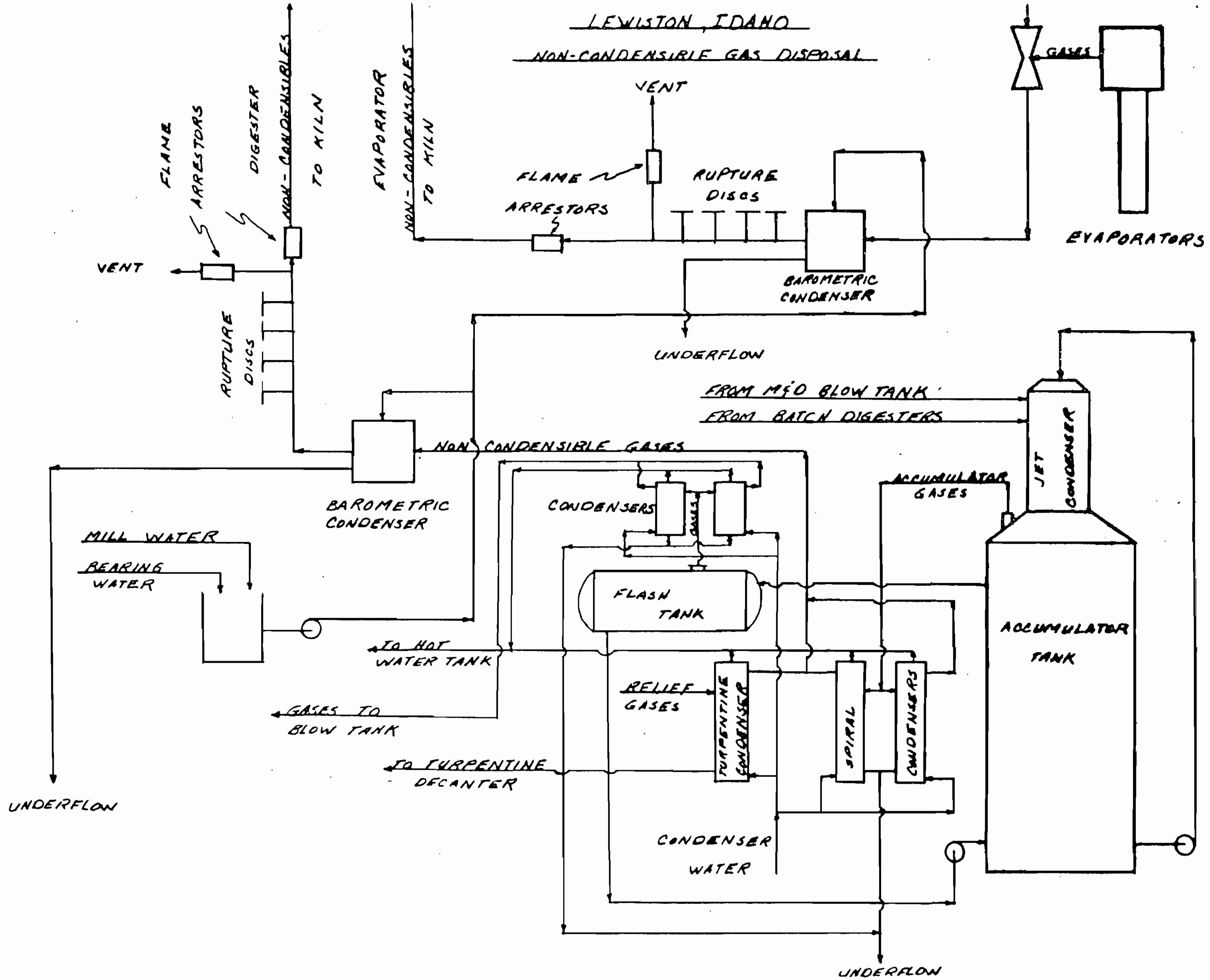
   D. One explosion has been experienced. The noncondensibles were turned to the kiln before the primary air fan was turned on and the gases became too concentrated (a 20 to 1 dilution with air should be maintained). The resulting explosion caused minor damage to the fan and primary air intake, but the rupture discs and flame arrestors prevented serious damage.

   E. The only problem presently attributed to the noncondensible disposal system is the coating over the lime kiln igniter rod apparently with organics present in the gas. The igniter rod must be replaced periodically.

   F. Production people feel the present system operates relatively troublefree. The only excess maintenance costs are minor expenses for instrument maintenance and replacement of igniter rods.

LEWISTON, IDAHO

NON-CONDENSIBLE GAS DISPOSAL



A P Files

ncasi

special report

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

Noncondensible
Burning

CURRENT PRACTICES IN THE HANDLING AND TREATMENT OF DIGESTER AND EVAPORATOR NONCONDENSIBLE GASES AND OTHER LOW TRS EMISSION SOURCES FROM THE KRAFT PULPING PROCESS

July 1980

A. L. Caron

F. Washer Hood Vents

As shown in Table 1, the brown stock washer hood vents can represent a substantial volume of low concentration reduced sulfur and could require treatment under some conditions. These high volumes of gas can only be economically treated in a fairly large combustion device with heat recovery such as a recovery furnace or power boiler. Some mills presently practice the burning of washer hood vent emissions in the kraft recovery furnace. At one location ventilation air from the digester room is included. At another site, combustion of the pulp washer hood vent emissions in a power boiler is practiced. Chemical oxidation is also a treatment option that might be considered by bleached kraft mills. No explosion hazard is anticipated with these systems.

Precautions to be practiced in the design and operation of these systems to avoid difficulties at the combustor are discussed in Section IV B.

IV COMBUSTION UNITS AND THEIR EFFECTIVENESS

A. Low Volume High Concentration Emissions

(1) Lime Kilns - The most commonly used device for the thermal oxidation of kraft pulping process noncondensibles is the lime kiln. The gas volume can either be included with the primary or secondary air to the unit or burned by way of an independent nozzle.

Energy demands for an efficient kraft pulping process kiln are on the order of 8.0×10^6 Btu per ton of product with a potential for 7.0×10^6 Btu per ton of product under some conditions. The cooking liquor causticizing reaction requires about 550 pounds of lime per ton of pulp. Kiln energy input presented on a pulp production basis is about 2.2×10^6 Btu per ton. This corresponds to a combustion air requirement at the kiln of between 20,000 and 22,000 ft^3 at standard conditions for the firing of oil or gas at 2 to 4 percent excess oxygen.

The lower explosive limit of turpentine is 0.8 percent (21) and for most of the reduced sulfur compounds, less than 3 percent (7). A number of the larger mills operate more than one kiln and can be expected to incinerate noncondensibles in a kiln that may produce as little as 25 percent of the mill's lime requirement. Kiln combustion air could be as little as 5,000 ft^3 or about 3.5 ft^3/min/ton of pulp. Thus, an explosive condition could exist in the combustion air for a contribution of 0.01 pounds per minute of gaseous reduced sulfur or turpentine per ton of pulp rated capacity of the kiln. There is no information on the synergism that may exist for the mixture of these compounds on lower explosive limits. If surges in excess of the above are expected, it may be necessary to burn noncondensibles using an independent nozzle at the kiln.

There is speculation on the fate of sulfur in noncondensible gases burned at the kiln. Monitoring data has indicated no measureable increase in the concentration of gaseous reduced sulfur or sulfur dioxide in the kiln exit gas when burning noncondensibles as compared to not burning noncondensibles. Typical results from six locations are presented in Table 4.

At one location a cyclic increase in TRS was measured at the kiln stack that corresponded to the blowing of digesters. A steady-state flow gas handling system was serving batch digesters. On a like system, a similar situation was remedied by increasing the capacity of the digester blow heat recovery system and the excess air in the kiln off-gases.

TABLE 4 EFFECTS OF BURNING NONCONDENSIBLES AT THE LIME KILN ON TRS EMISSIONS

Location	TRS Conc. (ppm) Kiln Exit Burning Noncondensibles	 Not Burning Noncondensibles
1	25-35	20-35
2	n.d.	n.d.
3	5-15	5-15
4	n.d.-20	n.d.-20
5	n.d.	n.d.
6	n.d.-10	

Thakore (22) speculated that noncondensible reduced sulfur was captured in the kiln and discharged with the product in the form of calcium sulfate ($CaSO_4$). In the causticizers, the calcium sulfate was converted to calcium carbonate ($CaCO_3$). Thus, the burning of noncondensibles in the kiln was assumed to produce a calcium carbonate dead load on the kiln. On the basis of a reduced sulfur contribution of five pounds per ton of pulp (sulfur basis), a calcium carbonate dead load of about 15 pounds per ton of pulp would be expected. The increased calcium carbonate load on the kiln would be on the order of two percent.

(2) Power Boilers and Recovery Furnaces - Noncondensibles are burned in power boilers or recovery furnaces at some locations. The approach chosen has included cooling to about 90°F for moisture removal and introduction to the furnace by way of an independent nozzle. Object is to avoid possible damage at the preheaters. A system similar to that shown in Figure 13 is used.

Diversion Activation Options

1. Firing Rate
2. Steam Production
3. Power Failure
4. Flame Outage
5. Noncondensible Temperature
6. Temperature at Flame Arrester
7. Velocity in NGG System

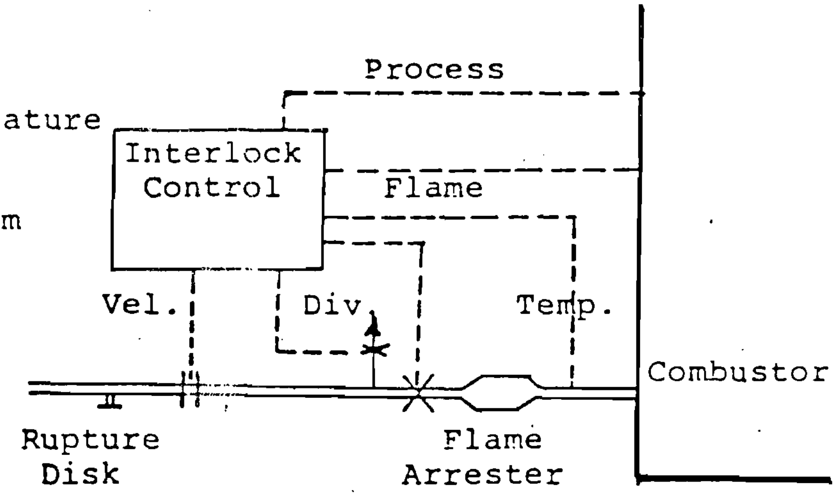


FIGURE 13

TYPICAL DESIGN FOR DIRECT INJECTION OF NONCONDENSIBLES TO BOILER FIRE BOX

A grid-type flame arrester should be located within two to three feet of the point of admission to the combustor. Rather extensive interlock systems for the automatic diversion of the noncondensibles have been installed on these systems. Diversion can be triggered by a power failure at the fan, flame outs, fuel firing rate falling to a preset level, steam production falling below a preset level, an increase in temperature at the flame arrester, and temperature of the noncondensibles reaching a preset level. With these systems, the gas stream is not diluted prior to firing. This same type of system can be used at the kiln.

Operating experience has indicated that properly engineered and maintained systems can be operated in a trouble free and effective manner.

(3) Auxiliary Furnaces - A number of mills have acquired experience in the burning of noncondensibles in auxiliary furnaces used

CCA
Container Corporation of America

Paper Mill Division

P. O. Box 2000
North Eighth Street
Fernandina Beach, Florida 32034

Phone: 904 261-5551

May 3, 1984

sh Bruce

DER
MAY 07 1984
BAQM

C. H. Fancy, P. E.
Deputy Chief
Bureau of Air Quality Management
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Dear Mr. Fancy,

We are reviewing your letter of April 23, 1984, concerning #6 Evaporator Permit, and anticipate having a response to your office by May 18, 1984. As covered in our phone conversation on April 20, 1984, my major concern is with specific condition #6, which we will address in our response. The other item which I expressed concern to you and Bruce Mitchell is complying with specific condition #12. At this time we do not have 90 days left on the construction permit to apply for an operating permit. I had requested an extension of the permit on February 27, 1984, because it was anticipated that this 90 day deadline would not be met. I received no response to this letter. Then in my conversation on April 23, 1984, with Bruce, he indicated that this specific condition could be waived if we complied with the other specific conditions before July 31, 1984. If you have any questions, please do not hesitate to contact us.

Sincerely,

Cynthia L. Sawyer

Cynthia L. Sawyer
Environmental Group Leader

CLS/ldt

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

April 23, 1984

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Tom Brown
Vice President and Resident Manager
Container Corporation of America
North Eighth Street
Fernandina Beach, Florida 32034

Re: Air Construction Permit No. AC 45-61751: Multiple Effect Evaporator Set #6 (MEE #6)

Dear Mr. Brown:

On July 7, 1983, the above referenced permit was issued by the Department of Environmental Regulation. On August 8, 1983, the expiration data of the original permit was extended from January 31, 1984, to July 31, 1984.

There are very specific conditions stated in the above referenced permit that must be complied with prior to applying for and receiving an operating permit from the department. Specically, conditions No. 6 and No. 12 are restated as follows:

No. 6: The allowable emissions for all pollutants in compliance with 40 CFR 60.283(a)(1)(iii) shall be below the minimum detectable limit and within normal variability. Due to this constraint, stack mass emission tests shall be conducted on the Lime Kilns, No. 3 and No. 2, before and after start-up of the multiple effect evaporator set #6 for the pollutants PM (particulate matter), SO_2, and TRS. For TRS, the maximum emissions increase shall not exceed 5 ppm (parts per million). Stack tests for PM conducted as a requirement of operating permit conditions will be acceptable as a before test requirement. Test methods shall be EPA Method 1, 2, 3, 4, 5 or 17, 6 and 16 in accordance with NSPS, 40 CFR 60.285, Subpart BB and as described in Appendix A of this part [EPA Method 16A may be performed upon approval from the Region IV EPA via a written request to and through the DER's Bureau of Air Quality Management (BAQM)].

At least 30 day prior to the date of compliance testing, the DER's Northeast District office and the DER's BAQM shall be notified in writing in order to witness the test(s).

The compliance tests shall be conducted at 90 to 100 percent of the permitted maximum total input of black liquor solids into the multiple effect evaporator sets Nos. 3, 4, 5 and 6. Once this Specific Condition has been satisfactorily performed and approved by the DER's BAQM, this Specific Condition will not become a part of the operating permit.

No. 12: The applicant will demonstrate compliance with the conditions of this construction permit and submit a complete application for an operating permit to the DER's Northeast District office prior to 90 days before the expiration date of this permit. The Certificate of Completion of Construction, DER Form 17-1.202(3), Florida Administrative Code, may be submitted in lieu of an application for a permit to operate. The applicant may continue to operate in compliance with all terms of this construction permit until its expiration date or the issuance of an operating permit.

If the mill cannot meet these requirements of the permit to verify compliance with the NSPS, 40 CFR 60.283(a)(1)(iii), then you must submit an alternate proposal to prove compliance for approval by the USEPA Region IV, the DER's Northeast District, and Bureau of Air Quality Management. In the event of failure to comply with these conditons prior to the expiration date, the issue will be referred to the USEPA Region IV as the MEE #6 is an NSPS source where the limits and test procedures are clearly stated in the federal regulations.

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

Sincerely,

CH Fancy

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

CHF/dt

cc: Doug Dutton, DER, Jacksonville
James T. Wilburn, USEPA
Dan Thompson, DER, OGC
Nancy Wright, DER, OGC

CCA
Container Corporation of America

Paper Mill Division
P. O. Box 2000
North Eighth Street
Fernandina Beach, Florida 32034
Phone: 904 261-5551

February 27, 1984

DER
MAR 05 1984
BAQM

Bruce

C. H. Fancy, P. E.
Deputy Bureau Chief
Bureau of Air Quality Management
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Re: Container Corporation of America
Fernandina Beach Mill - Evaporator
System No. 6
Permit/Certification No. AC45-61751

Dear Mr. Fancy:

In reference to the above permit we request that the expiration date be changed from July 31, 1984 to December 31, 1984 because of construction delays. Due to these delays we would be unable to complete testing and submit an operating permit application by the July deadline.

If you have any additional questions please do not hesitate to call.

Sincerely,

Cindy Sawyer

Cindy Sawyer
Group Leader-Environmental

CS/ldt

CCA Container Corporation of America

Paper Mill Division

P. O. Box 2000
North Eighth Street
Fernandina Beach, Florida 32034

Phone: 904 261-5551

February 24, 1984

DER
FEB 28 1984
BAQM

Mr. Johnny Cole
Department of Environmental Regulation
Northeast District
3426 Bills Road
Jacksonville, FL 32207

Dear Mr. Cole:

This letter is written notification of our intent to begin sampling No. 2 and No. 3 Lime Kilns for TRS and SO_2 as required by our No. 6 Evaporator Permit (AC 45-61751) on March 26, 1984. We will conduct several tests on each source so we can adequately determine baseline conditions for TRS and SO_2.

If you have any questions, please call

Sincerely,

CONTAINER CORPORATION OF AMERICA
Fernandina Beach Mill Division

David R. James

David R. James
Environmental Engineer

/ldt

cc: C. H. Fancy, Deputy Bureau Chief
Bureau of Air Quality Management

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET
ATLANTA, GEORGIA 30365

DER
DEC 05 1983
BAQM

NOV 30 1983

4AW-AM

Bruce

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

Dear Mr. Fancy:

In answer to your letter of November 15, 1983, please be advised that the proposed method 16A may be used by Container Corporation of America per their November 3, 1983, letter to your Agency. The approval to use this proposed method must be given with the full understanding that if method 16A, when promulgated, should significantly vary from the proposed method, retesting of the source may be necessary.

If you have further questions in this matter please contact Messrs. Joe Riley or Brian Beals at 404/881-4901.

Sincerely,

James T. Wilburn, Chief
Air Management Branch
Air & Waste Management Division

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

DER
DEC 05 1983
BAQM

NOV 30 1983

4AW-AM

Bruce

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

Dear Mr. Fancy:

In answer to your letter of November 15, 1983, please be advised that the proposed method 16A may be used by Container Corporation of America per their November 3, 1983, letter to your Agency. The approval to use this proposed method must be given with the full understanding that if method 16A, when promulgated, should significantly vary from the proposed method, retesting of the source may be necessary.

If you have further questions in this matter please contact Messrs. Joe Riley or Brian Beals at 404/881-4901.

Sincerely,

James T. Wilburn, Chief
Air Management Branch
Air & Waste Management Division

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

November 15, 1983

Mr. Brian Beals
USEPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: Container Corporation of America: Duval County, Florida
Request to Use Proposed Rule: Appendix A-Reference
Method 16A

Dear Mr. Beals:

The Bureau of Air Quality Management-Central Air Permitting Section has received from the above referenced facility a request (see attached) to use the proposed Reference Method 16A instead of the Reference Method 16. Pursuant to discussions between you and Mike Harley, the bureau requests approval of the proposed Reference Method 16A, 46 FR 31904, June 18, 1981.

If you have any questions, please call Mike Harley at (904)488-1344 or write to me at the above address.

Sincerely,

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

CHF/BM/s
cc: Marti Hall
Cynthia L. Sawyer

CCA
Container Corporation of America

Paper Mill Division
North Eighth Street
Fernandina Beach Florida 32034
Phone: 904 261-5551

November 3, 1983

DER
[illegible] 1983
BAQM

Bruce

Mr. William Thomas
Bureau of Air Quaility Management
Florida Department of Environmental Regulation
Twin Tower Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Dear Mr. Thomas:

Our construction permit #AC45-61751 for new multiple effect evaporators and concentrator No. 6, states we will perform a precompletion and a postcompletion test for TRS. The permit specifies that we must have your office permission to use method 16A. We would like to use method 16A because we have the capabilities inhouse; whereas with method 16 we would have to get an outside consultant.

If you have any additional questions, please call me at 904/261-5551.

Sincerely,

Cynthia L. Sawyer

Cynthia L. Sawyer
Technical Project Engineer

/ls

CCA
Container Corporation of America

Paper Mill Division
North Eighth Street
Fernandina Beach, Florida 32034
Phone: 904 261-5551

November 3, 1983

DER
NOV 07 1983
BAQM

Bruce

Mr. William Thomas
Bureau of Air Quaility Management
Florida Department of Environmental Regulation
Twin Tower Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Dear Mr. Thomas;

Our construction permit #AC45-61751 for new multiple effect evaporators and concentrator No. 6, states we will perform a precompletion and a postcompletion test for TRS. The permit specifies that we must have your office permission to use method 16A. We would like to use method 16A because we have the capabilities inhouse; whereas with method 16 we would have to get an outside consultant.

If you have any additional questions, please call me at 904/261-5551.

Sincerely,

Cynthia L. Sawyer

Cynthia L. Sawyer
Technical Project Engineer

/ls

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices
And/Or To Other Than The Addressee

To: ____________ Loctn.: ____________
To: ____________ Loctn.: ____________
To: ____________ Loctn.: ____________
From: ____________ Date: ____________
Reply Optional [ ] Reply Required [ ] Info. Only [ ]
Date Due: ____________ Date Due: ____________

TO: Clair Fancy

FROM: Marti Hall

DATE: September 1, 1983

SUBJECT: DER v. Container Corporation

I am in the midst of preparing a complaint to be filed against Container Corporation for various violations involving the visual emissions from its two recovery boilers and three of its power boilers. Among the violations I plan to raise are excess emissions, failure to immediately report malfunctions, circumvention of pollution control equipment, and excess emissions due to poor maintenance, poor operation, or preventable equipment or process failure. I am in particular need of some expert advice regarding the latter two violations.

Rather than have you plow through the file, I have tried to distill the relevant facts for your review. Please review them and let me know the following:

1. When do we have a legitimate claim that they have circumvented pollution control equipment or allowed emissions of air pollutants when pollution control equipment was not operating properly; and

2. When do we have a legitimate claim that excess emissions resulted from Container's failure to properly maintain or operate its equipment or to prevent preventable equipment or process failure?

I realize that this memo is rater lengthy, but if you could review it as soon as possible--I would appreciate it. It seems to me that Container has a rather poor operating record. What do you think?

If you have any questions, please let me know.

6/3/83 Container Corps. of America & BAQM

Bruce Mitchell	FDER/CAPS	(904) 488-1344
Roy Cobb	CCA	(312) 580-7142
Paul Trout	CCA	(312) 260-6816
WM Kendrick	CCA	904-261-5551
Cynthia Sawyer	CCA	904-261-5551
ERK J. SCHMIDT	C.C.A.	904-261-5551
BILL THOMAS	FDER	904-488-1344
Mike Harley	FDER	904-488-1344

A. On the following dates, Container's pollution control equipment on its #4 recovery boiler was not in full operation. The explanations given were supplied by Container.

January 18/19 The north side of the precipitator was taken down on Janauary 18 for cleaning off salt cake and for inspection (down at least 24 hours). Also, the south side went down due to salt caking on January 19. A DER employee observed emissions of 60 percent opacity from #4 recovery boiler.

January 20 The south side of the precipitator was taken down for cleaning and inspection (down 4 hours before boiler itself shut down).

January 27 The south side of the precipitator was taken down to clean salt cake off the rapper rod insulator (down 15 hours).

January 30 The south side of the precipitator went down due to a ground out in "A" field (down 17 hours).

January 31 The south side of the precipitator went down due to warped collecting plates (down 13.5 hours).

February 1 The north side of the precipitator went down due to a short in "E" and "F" fields (down 14 hours). Two complaints were received by DER on February 2 that white particulate was falling on cars and homes.

February 4 The north side of the precipitator was taken down for inspection. However, #4 recovery boiler was taken down 11 hours after the precipitator inspection began.

February 11 The north side of the precipitator was taken down for repair of the dust tank (down 11 hours). The south side of the precipitator went down due to a ground in "A" field (down 15 hours). (There was 1/2 hour when neither side was operating.)

February 15 The south side of the precipitator went down due to a ground in "B" field (down 12 hours). The south side went down again due to a broken cake conveyor screw (down 3 hours). Strangely, there is over a two hour overlap. Container reported the south side back up after the ground out at 12:30 p.m. but down from the broken conveyor screw at 10:15 P.M.)

February 25 The south side of the precipitator went down due to a broken conveyor screw (down 11 hours). DER received a public complaint that particulate was falling on cars and homes. (NOTE - The precipitator for #5 recovery boiler was also partially down.)

February 27 The south side of the precipitator was taken down to replace a dust tank agitator (down 7.5 hours).

March 1 The north side ofthe precipitator went down due to a ground in the fields (down 24 hours).

March 13 The south side of the precipitator went down due to a ground in "A" and "B" fields (down 4 hours).

March 14 The south side of the precipitator went down due to broken drag conveyor (down 7 hours).

March 15/16 The north side of the precipitator went down due to disc screen malfunction (down 24 hours).

March 29 The south side of the precipitator went down due to ground in "F" field (down 25 hours).

April 5/6 The south side of the precipitator taken down to allow removal of salt cake from distribution plates (down 14.5 hours).

April 6 The north side of the precipitator down to clean distribution plates, replace wiring, and repair broken drag conveyor (#4 recovery boiler down April 7). (This did not overlap with the time south side was down.) DER employee observed emissions of 100 percent opacity from #4 recovery boiler.

April 9-12 The north side of the precipitator was taken down to repair the drag conveyor (down 49.5 hours).

April 12/13 The south side of the precipitator went down due to ground out caused by salt cake build up (down 19 hours).

April 15 The south side of the precipitator was taken down to change a bearing on the salt discharge screw (down 6 hours).

April 19 The south side of the precipitator went down due to a ground in the field (down 14 hours).

April 22 "E" field was de-energized to allow maintenance on the control panel (out 5.5. hours). DER employee observed 60 - 70 percent opacity from #4 recovery boiler.

April 27 The north side of the precipitator was taken down to replace dust tank agitator and screw conveyor (down 15 hours).

April 29 The north side of the precipitator down due to ground in "E" and "F" fields (down 5 hours).

May 1 The south side of the precipitator down for repair of drag conveyor (down 2 hours).

May 4 The north side of the precipitator down for repair of drag conveyor (down 20.5 hours).

May 8 The south side of the precipitator down to repair drag conveyor (down 19 hours).

May 27 The north side of the precipitator down due to a ground in "D" field (down 13 hours).

June 14 The south side of the precipitator down for repair of the drag conveyor (down 11 hours).

B. The following are the instances on which Container reported improper operation of the precipitator designed to control the emissions from #5 recovery boiler.

February 9 The north side of the precipitator down due to broken wires causing ground out (down 10 hours).

February 25 The north side of the precipitator down due to broken salt cake feed conveyor (down 15 hours).

March 2 Black liquor supply to the boiler failed. Therefore, oil was fired and stream production was reduced -- precipitator cut off.

March 4 Boiler was oil fired to prepare for maintenance. Precipitator turned off 2.5 hours before boiler shut off. ? ask

March 5/6 The south side of the precipitator down due to problem with drag conveyor (down 12.5 hours).

March 22 The north side of the precipitator down due to ground in "B" field (down 15.5 hours).

March 30/31 The north side of the precipitator down due to broken ribbon mixer shaft (down 29 hours).

April 1 The south side of the precipitator down due to ground in "A" field (down 15 hours).

April 7 The north side of the precipitator down to repair the ribbon mixer (no indication of how long it was down).

April 17-19 The south side of the precipitator down due to ground in "F" field and salt cake build-up (down 39 hours).

April 24 The south side of the precipitator down due to ground out (down 3 hours).

April 25 The south side of the precipitator down due to ground out (down at least 11 hours).

April 29 The south side of the precipitator down due to ground out (down 14 hours).

May 6 The south side of the precipitator down due to ground in "D" field (down at least 7 hours).

May 11 The north side of the precipitator down to repair rapper rod (down at least 3.5 hours).

May 30 The north side of the precipitator down due to ground in "C" field (down 14 hours).

C. The following represent the reported instances of malfunction of the power boilers.

March 2 Black liquor was lost on #5 recovery boiler thus increasing the steam demand on #5 power boiler. High VEs probably resulted from poor combustion due to the inability of controls to respond to the increased steam demand.

March 2 Bark feeding to #4 power boiler was dicontinued to allow unanticipated maintenance on the emissions control fan. Bark feeding was restored after 10 minutes.

March 4 #5 recovery boiler was shut down thus increasing the steam demand on #5 power boiler. No. 1, 2, and 3 power boilers were down for maintenance at the time.

March 10 #7 power boiler shut off. No. 4 and 5 carried its load, resulting in black plume from #4 power boiler.

March 11 #7 power boiler tripped off thus increasing the load in #5 power boiler.

April 14 #7 power boiler tripped out resulting in increased demand on #5 power boiler. Bark feeding was discontinued and oil firing increased. This resulted in unstable boiler operation.

MHH/cv

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

13 JUN 1983

Mr. Mike Harley
Florida Department of Environmental
Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301

DER
JUN 17 1983
BAQM

Dear Mr. Harley:

I am writing to answer your question about the new source performance standards (NSPS) for kraft pulp mills (40 CFR Part 60, Subpart BB). In our telephone conversation of June 3, 1983, you asked how compliance with the TRS standard for an evaporator would be demonstrated if its exhaust gases were injected into a lime kiln that is not subject to the NSPS.

In part, the answer to your question is found at §60.283(a)(1)(iii) of Subpart BB. This passage provides that the applicable standard would be 5 ppm by volume on a dry basis, corrected to 10 percent oxygen, unless it could be demonstrated that the gases combusted in the lime kiln are subjected to a minimum temperature of 1,200°F and 1/2 second residence time in the primary combustion zone. It is important to note that, where there is any doubt that these criteria would be encountered in the primary combustion zone, additional analysis would be required. This analysis may include performance testing of the kiln to demonstrate that the injected evaporator gases do not increase the kiln TRS emissions by more than 5 ppm by volume on a dry basis corrected to 10 percent oxygen.

Please contact me at (919) 541-5624 if I can be of further assistance.

Sincerely yours,

Dale A. Pahl
Environmental Engineer
Standards Development Branch

No. 0158232

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED— NOT FOR INTERNATIONAL MAIL

(See Reverse)

SENT TO Cynthia L. Sawyer				
STREET AND NO.				
P.O., STATE AND ZIP CODE				
POSTAGE				$
CONSULT POSTMASTER FOR FEES	CERTIFIED FEE			¢
	OPTIONAL SERVICES	SPECIAL DELIVERY		¢
		RESTRICTED DELIVERY		¢
		RETURN RECEIPT SERVICE	SHOW TO WHOM AND DATE DELIVERED	¢
			SHOW TO WHOM, DATE, AND ADDRESS OF DELIVERY	¢
			SHOW TO WHOM AND DATE DELIVERED WITH RESTRICTED DELIVERY	¢
			SHOW TO WHOM, DATE AND ADDRESS OF DELIVERY WITH RESTRICTED DELIVERY	¢
TOTAL POSTAGE AND FEES				$
POSTMARK OR DATE 12/9/83				

PS Form 3800, Apr. 1976

PS Form 3811, Jan. 1979

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

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

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

   (CONSULT POSTMASTER FOR FEES)

2. **ARTICLE ADDRESSED TO:**

Cynthia L. Sawyer
North Eighth St.
Fernandina Beach, FL 32034

3. **ARTICLE DESCRIPTION:**

REGISTERED NO.	CERTIFIED NO.	INSURED NO.
	0158232	

(Always obtain signature of addressee or agent)

I have received the article described above.

SIGNATURE ☐ Addressee ☐ Authorized agent

4. **DATE OF DELIVERY**

POSTMARK

FERNANDINA BEACH, FL
DEC 12
1983
USPO

5. **ADDRESS** (Complete only if requested)

6. **UNABLE TO DELIVER BECAUSE:**

CLERK'S INITIALS

☆GPO : 1979-300-459

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

December 7, 1983

CERTIFIED MAIL - RECEIPT REQUESTED

Ms. Cynthia L. Sawyer
Technical Project Engineer
Container Corporation of America
North Eighth Street
Fernandina Beach, Florida 32034

Re: Testing Method: 16 vs. 16A

Dear Ms. Sawyer:

Enclosed is the response from Mr. James T. Wilburn with USEPA, Region IV, and the bureau concurs with the response.

If we can be of further assistance, please call Bruce Mitchell at (904)488-1344 or write to me at the above address.

Sincerely,

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

CHF/BM/s

cc: Martha Hall
enclosure
Copy sent to Doug Dutton

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

DER
DEC 05 1983
BAQM

NOV 30 1983

Bruce

4AW-AM

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

Dear Mr. Fancy:

In answer to your letter of November 15, 1983, please be advised that the proposed method 16A may be used by Container Corporation of America per their November 3, 1983, letter to your Agency. The approval to use this proposed method must be given with the full understanding that if method 16A, when promulgated, should significantly vary from the proposed method, retesting of the source may be necessary.

If you have further questions in this matter please contact Messrs. Joe Riley or Brian Beals at 404/881-4901.

Sincerely,

James T. Wilburn, Chief
Air Management Branch
Air & Waste Management Division

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

DER
DEC 05 1983
BAQM

NOV 30 1983

Bruce

4AW-AM

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

Dear Mr. Fancy:

In answer to your letter of November 15, 1983, please be advised that the proposed method 16A may be used by Container Corporation of America per their November 3, 1983, letter to your Agency. The approval to use this proposed method must be given with the full understanding that if method 16A, when promulgated, should significantly vary from the proposed method, retesting of the source may be necessary.

If you have further questions in this matter please contact Messrs. Joe Riley or Brian Beals at 404/881-4901.

Sincerely,

James T. Wilburn, Chief
Air Management Branch
Air & Waste Management Division

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

November 15, 1983

Mr. Brian Beals
USEPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

Re: Container Corporation of America: Duval County, Florida
Request to Use Proposed Rule: Appendix A-Reference
Method 16A

Dear Mr. Beals:

The Bureau of Air Quality Management-Central Air Permitting Section has received from the above referenced facility a request (see attached) to use the proposed Reference Method 16A instead of the Reference Method 16. Pursuant to discussions between you and Mike Harley, the bureau requests approval of the proposed Reference Method 16A, 46 FR 31904, June 18, 1981.

If you have any questions, please call Mike Harley at (904)488-1344 or write to me at the above address.

Sincerely,

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

CHF/BM/s
cc: Marti Hall
Cynthia L. Sawyer

BEST AVAILABLE COPY

CCA Container Corporation of America

Paper Mill Division

North Eighth Street
Fernandina Beach, Florida 32034

Phone: 904 261-5551

November 3, 1983

DER
NOV 07 1983
BAQM

Bruce

Mr. William Thomas
Bureau of Air Quaility Management
Florida Department of Environmental Regulation
Twin Tower Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301-8241

Dear Mr. Thomas:

Our construction permit #AC45-61751 for new multiple effect evaporators and concentrator No. 6, states we will perform a precompletion and a postcompletion test for TRS. The permit specifies that we must have your office permission to use method 16A. We would like to use method 16A because we have the capabilities inhouse; whereas with method 16 we would have to get an outside consultant.

If you have any additional questions, please call me at 904/261-5551.

Sincerely,

Cynthia L. Sawyer

Cynthia L. Sawyer
Technical Project Engineer

/ls

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

August 8, 1983

Mr. M. L. Woehle
Vice President & Resident Manager
Container Corporation of America
North Eighth Street
Fernandina Beach, Florida 32034

Dear Mr. Woehle:

The bureau is in receipt of your request to extend the expiration date and to correct a typographical error of the control devices identification numbers contained in the construction permit, No. AC 45-61751, issued July 7, 1983. The request is acceptable and the following changes to the permit are:

Expiration Date:

From: January 31, 1984
To: July 31, 1984

Typographical Error: Page 1, paragraph 2, of the Permit

From: The pollution control devices will be the existing Lime Kilns Nos. 3 and 4.

To: The pollution control devices will be the existing Lime Kilns Nos. 3 and 2.

Attachment to be incorporated is:

8. M. L. Woehle's letter dated July 21, 1983.

This letter and attachment must be attached to your permit, No. AC 45-61751, and shall become a part of that permit.

Sincerely,

Victoria J. Tschinkel
Secretary

VJT/bmm

cc: John Ketteringham
Roland L. Allen, Jr.

ATTACHMENT 8

CCA
Container Corporation of America

Paper Mill Division
North Eighth Street
Fernandina Beach, Florida 32034
Phone: 904 261-5551

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

~~Bill~~ Bruce

July 21, 1983

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

DER
JUL 26 1983
BAQM

Re: Container Corporation of America
Fernandina Beach Mill - Evaporator
System No. 6
Permit/Certification No. AC45-61751

Dear Mr. Fancy:

We acknowledge receipt of the Florida Department of Environmental Regulation Permit/Certification Number AC45-61751 as transmitted by your letter of July 7, 1983. We have reviewed the permit for our mill's No. 6 Evaporator and have the following comments about the permit:

1. We request that the expiration date be changed from January 31, 1984 to July 31, 1984 because construction will not be finished until late in the year and we will need to apply for the operating permit 90 days before the construction permit expires.

2. On Page 1, paragraph 2, of the Permit, there is a typographical error that says, "Lime Kilns Nos. 3 and 4." It should read: "Lime Kilns Nos. 3 and 2."

If you have any additional questions, please contact Miss Cynthia Sawyer at (904) 261-5551.

Sincerely,

CONTAINER CORPORATION OF AMERICA
Fernandina Beach Mill Division

ML Woehle

M. L. Woehle
Vice President & Resident Manager

/jm

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

IN RE:	)	
	)	
CONTAINER CORPORATION OF	)	Appl. No.: AC-45-61-75
AMERICA - FERNANDINA	)	
	)	

ORDER

Pursuant to Florida Administrative Code Rule 17-1.29, the Petitioner's Request for an Extension of Time to file a Petition for an administrative proceeding in regard to the above-referenced Permit of is hereby granted. The Petitioner may file a Petition for Administrative Proceeding no later than 5:00 p.m. August 16, 1983. Filing shall be deemed complete upon receipt of a petition by the Office of General Counsel of the Department.

DATED this 8th day of July, 1983, at Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

TERRY COLE
Assistant Secretary

2600 Blair Stone Road
Tallahassee, Florida 32301
(904)488-4805

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to S120.52 (9), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Deborah A. [illegible] 7/8/83
Clerk Date

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing Order has been furnished by United States Mail to Edgar M. Moore, Esquire, Post Office Box 1169, Tallahassee, Florida 32302, this 8th day of July, 1983.

Nancy E. Wright
NANCY E. WRIGHT
Assistant General Counsel

State of Florida Department
of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301
Telephone: (904)488-9730

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

IN TOWERS OFFICE BUILDING
0 BLAIR STONE ROAD
LAHASSEE, FLORIDA 32301

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

WAIVER OF 90 DAY TIME LIMIT
UNDER SECTIONS 120.60(2) AND 403.0876, FLORIDA STATUTES

License (Permit, Certification) Application No. AC-45-61-75

Applicant's Name: Container Corporation of America - Fernandina

he undersigned has read Sections 120.60(2) and 403.0876, Florida Statutes, and fully
nderstands the applicant's rights under that section.

ith regard to the above reference license (permit, certification) application, the
pplicant hereby, with full knowledge and understanding of (his) (her) (its) rights
nder Sections 120.60(2) and 403.0876, Florida Statutes, waives the right under Sec-
ions 120.60(2) and 403.0876, Florida Statutes, to have the application approved or
enied by the State of Florida Department of Environmental Regulation within the 90 day
ime period prescribed in Sections 120.60(2) and 403.0876, Florida Statutes. Said
aiver is made freely and voluntarily by the applicant, is in (his) (her) (its) self-
nterest, and without any pressure or coercion by anyone employed by the State of
lorida Department of Environmental Regulation.

his waiver shall expire on the 25th day of July 1983.

he undersigned is authorized to make this waiver on behalf of the applicant.

Edgar M Moore
Signature

Edgar M. Moore Its Atty
Please Type Name of Signee

July 7, , 1983
Date

worn to and subscribed
efore me this 7th day
f July 1983.

E. Latricia Hobby
Notary Public, State of Florida
My Commission Expires Feb. 25, 1986
Bonded Thru Troy Fain Insurance, Inc.
ER Form 17-1.201(8)

RECEIVED
JUL 7 1983
Dept. of Environmental Regulation
Office of General

Section 120.60, Florida Statutes

(2) When an application for a license is made as required by law, the agency shall conduct the proceedings required with reasonable dispatch and with due regard to the rights and privileges of all affected parties or aggrieved persons. Within 30 days after receipt of an application for a license, the agency shall examine the application, notify the applicant of any apparent errors or omissions, and request any additional information the agency is permitted by law to require. Failure to correct an error or omission or to supply additional information shall not be grounds for denial of the license unless the agency timely notified the applicant within this 30 day period. The agency shall notify the applicant if the activity for which he seeks a license is exempt from the licensing requirement and return any tendered application fee within 30 days after receipt of the original application or within 10 days after receipt of the timely requested additional information or correction of errors or omissions. Every application for license shall be approved or denied within 90 days after receipt of the original application or receipt of the timely requested additional information or correction of errors or omissions unless a shorter period of time for agency action is provided by law. The 90-day or shorter time period shall be tolled by the initiation of a proceeding under Section 120.57 and shall resume 10 days after the recommended order is submitted to the agency and the parties. Any application for a license not approved or denied within the 90-day period or shorter time period, within 15 days after conclusion of a public hearing held on the application, or within 45 days after the recommended order is submitted to the agency and the parties, whichever is latest, shall be deemed approved and, subject to the satisfactory completion of an examination, if required as prerequisite to licensure, the license shall be issued. he Public Service Commission, when issuing a license, and any other agency, if speciically exempted by law, shall be exempt from the time limitations within this subsecion. Each agency, upon issuing or denying a license, shall state with particularity he grounds or basis for the issuance or denial of same, except where issuance is a ministerial act. On denial of a license application on which there has been no hearng, the denying agency shall inform the applicant of any right to a hearing pursuant o Section 120.57.

ection 403.0876, Florida Statutes

Permits; processing. ---Within 30 days after receipt of an application for a perit under this chapter, the department shall review the application and shall request submittal of all additional information the department is permitted by law to require. f the applicant believes any departmental request for additional information is not uthorized by law or departmental rule, the applicant may request a hearing pursuant to . 120.57. Within 30 days after receipt of such additional information, the department hell review it and may request only that information needed to clarify such additional nformation or to answer new questions raised by or directly related to such additional nformation. If the applicant believes the request of the department for such addiional information is not authorized by law or departmental rule, the department, at he aplicant's request, shall proceed to process the permit application. Permits shall be approved or denied within 90 days after receipt of the original application, the ast item of timely requested additional material, or the applicant's written request to begin processing the permit application.

BEFORE THE DEPARTMENT OF ENVIRONMENTAL REGULATION
STATE OF FLORIDA

IN RE: APPLICATION NO. AC-45-61-75

CONTAINER CORPORATION OF
AMERICA - FERNANDINA

MOTION FOR EXTENSION OF TIME

The undersigned, attorney for CONTAINER CORPORATION OF AMERICA, moves the Department to extend to July 25, 1983, the time within which applicant is permitted to request a public hearing and to extend the time for publication of notice for a like period of time.

DATED this 7th day of July, 1983.

EDGAR M. MOORE
MOORE & WILLIAMS, P.A.
Post Office Box 1169
Tallahassee, Florida 32302
(904) 222-5510

ATTORNEY FOR CONTAINER
CORPORATION OF AMERICA

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a copy of the foregoing Motion for Extension of Time was furnished by hand delivery to Ms. Nancy Wright, Attorney-at-Law, Department of Environmental Regulation, Twin Towers Office Building, 2600 Blairstone Road, Tallahassee, Florida 32301, this 7th day of July, 1983.

EDGAR M. MOORE

OORE & WILLIAMS
ofessional Association
Attorneys at Law
East College Avenue
ost Office Box 1169
ahassee, Florida 32302
(904) 222-5510

RECEIVED
JUL 7 1983
Dept. of Environmental Regulation
Office of General Counsel

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

INTEROFFICE MEMORANDUM

For Routing To District Offices
And/Or To Other Than The Addressee

To: ______________ Loctn.: ______________
To: ______________ Loctn.: ______________
To: ______________ Loctn.: ______________
From: ______________ Date: ______________

Reply Optional [ ] Reply Required [ ] Info. Only [ ]
Date Due: __________ Date Due: __________

Memo to file

TO: Container Corporation of America file: AC 45-61751

THRU: Mike Harley M.H.
Bill Thomas BT

FROM: Bruce Mitchell

DATE: July 5, 1983

SUBJ: BAQM conference with Container Corporation of America (CCA) on June 3, 1983

The attached sheet of attendees met in the BAQM conference room to discuss comments (also attached) received from Mr. Eric J. Schmidt with CCA on April 25, 1983. The paragraphs have been numbered for convenience. Each paragraph will be answered (A.) in sequence and the result of the discussion per paragraph (P.) will be provided.

P.1.
A.1. No comment necessary

P.2.
A.2. The spill collection system (SCS) is an intermittent process of the total spent liquor system. When a spill occurs, there is a net loss of liquor. This material is recovered by the SCS and will be placed back into the process. Therefore, there is no net increase in black liquor due to the SCS.

P.3.
A.3. The 4,200 lbs BLS/min. to the Recovery Boilers is 63% solids, not 65%.

Production will be calculated using the current mill operation parameter of 2850 lbs BLS/Ton ADUP (air dried unbleached pulp) from the total mill evaporator sets and their associated concentrators.

The 1300 GPM from the SCS is only intermittent (see A.2.)

P.4.
A.4. The NSPS design criteria in 40 CFR 60.283(a)(1)(iii) is a design on paper. The BAQM will require a demonstration of CCA's claim to this section.

P.5.
A.5. Specific Conditions Nos. 4 and 5 will be combined to read: The total maximum input of black liquor solids (BLS) into the multiple effect evaporator sets Nos. 3, 4, 5 and 6 shall not exceed 274,089 pounds per hour (calculated at 100% BLS, dry).

P.6.,7.,8., and 9.
A.6.,7.,8., and 9. Specific Condition No. 7 will be revised to read:

The allowable emissions for all pollutants in compliance with 40 CFR 60.283(a)(1)(iii) shall be below the minimum detectable limit and within normal variability. Due to this constraint, stack mass emission tests shall be conducted on the Lime Kilns, No. 3 and No. 2, before and after start-up of the multiple effect evaporator set #6 for the pollutants PM (particulate matter), SO_2, and TRS. For TRS, the maximum emissions increase shall not exceed 5 ppm (parts per million). Stack tests for PM conducted as a requirement of the lime kilns' operating permit conditions will be acceptable as a before test requirement. Test methods shall be EPA Methods 1, 2, 3, 4, 5, or 17, 6, and 16 in accordance with the NSPS, 40 CFR 60.285, Subpart BB and as described in Appendix A of this part (EPA Method 16A may be performed upon approval from the Region IV EPA via a written request to and through the DER's Bureau of Air Quality Management (BAQM)).

At least 30 days prior to the date of compliance testing, the DER's Northeast District office and the DER's BAQM shall be notified in writing in order to witness the test(s).

The compliance tests shall be conducted at 90 to 100 percent of the permitted maximum total input of black liquor solids into the multiple effect evaporator sets Nos. 3, 4, 5, and 6. Once this Specific Condition has been satisfactorily performed and approved by the DER's BAQM, this Specific Condition will not become a part of the operating permit.

P.10.
A.10. Specific Condition No. 12 will be revised to read: An annual report, by month, of the daily product yield in air dried unbleached pulp (ADUP; based on the applicant's yield of 2850 lbs BLS/ton ADUP) from the multiple effect evaporator sets Nos. 3, 4, 5 and 6 shall be submitted by the 14th of January of each calendar year to the DER's Northest District office.

P.11.
A.11. No comment necessary.

Specific Condition No. 13 will be revised to read: The applicant will demonstrate compliance with the conditions of this construction permit and submit a complete application for an operating permit to the DER's Northeast District office prior to 90 days before the expiration date of this permit. The Certificate of Completion of Construction, DER Form 17-1.202(3), Florida Administrative Code, may be submitted in lieu of an application for a permit to operate. The applicant may continue to operate in compliance with all terms of this construction permit until its expiration date or the issuance of an operating permit.

As a result of Specific Condition Nos. 4 and 5 being combined into one, all of the Specific Conditions' numbers will be revised to read:

Nos. 4 and 5 to No. 4
No. 6 to No. 5
No. 7 to No. 6
No. 8 to No. 7
No. 9 to No. 8
No. 10 to No. 9
No. 11 to No. 10
No. 12 to No. 11
No. 13 to No. 12

RBM/bjm

6/3/83 Container Corp. of America ; BAQM

Bruce Mitchell	FDER/CAPS	(904) 488-1344
Roy Cobb	CCA	(312) 580-7142
Paul Trout	CCA	(312) 260-6816
WM Kendrick	CCA	904-261-5551
Cynthia Sawyer	CCA	904-261-5551
ERK J. SCHMIDT	C.C.A.	904-261-5551
BILL THOMAS	FDER	904-488-1344
Mike Harley	FDER	904-488-1344

DER
JUN 13 1983
BAQM

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

IN RE:

CONTAINER CORPORATION OF
AMERICA - FERNANDINA

Appl. No.: AC-45-61-75

ORDER

Pursuant to Florida Administrative Code Rule 17-1.29, the Petitioners' Requests for Extensions of Time and the time in which Applicant is required to publish notice to File a Petition for Administrative Proceeding in regard to the above referenced Notice of Intended Agency Action are hereby granted. The Petitioners may file a Petition for Administrative Proceeding no later than 5:00 p.m. July 8, 1983. Filing shall be deemed complete upon receipt of a petition by the Office of General Counsel of the Department.

DATED this 9th day of June, 1983, at Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

Stephen Fox for
TERRY COLE
Assistant Secretary

2600 Blair Stone Road
Tallahassee, Florida 32301
(904)488-4805

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to S120.52 (9), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Deborah A. Sutwood 6/9/83
Clerk Date

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing Order has been furnished by United States Mail to Edgar M. Moore, Esquire, Post Office Box 1169, Tallahassee, Florida 32302, this 9th day of June, 1983.

Nancy E. Wright
NANCY E. WRIGHT
Assistant General Counsel

State of Florida Department
of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301
Telephone: (904)488-9730

BEFORE THE DEPARTMENT OF ENVIRONMENTAL REGULATION
STATE OF FLORIDA

IN RE: APPLICATION NO. AC-45-61-75

CONTAINER CORPORATION OF
AMERICA - FERNANDINA

MOTION FOR EXTENSION OF TIME

The undersigned, attorney for CONTAINER CORPORATION OF AMERICA, moves the Department to extend to July 8, 1983, the time within which applicant is permitted to request a public hearing and to extend the time for publication of notice for a like period of time.

DATED this 9th day of June, 1983.

EDGAR M. MOORE
MOORE & WILLIAMS, P.A.
Post Office Box 1169
Tallahassee, Florida 32302
(904) 222-5510

ATTORNEY FOR CONTAINER
CORPORATION OF AMERICA

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a copy of the foregoing Motion for Extension of Time was furnished by hand delivery to Ms. Nancy Wright, Attorney-at-Law, Department of Environmental Regulation, Twin Towers Office Building, 2600 Blairstone Road, Tallahassee, Florida 32301, this 9th day of June, 1983.

EDGAR M. MOORE

MOORE & WILLIAMS
Professional Association
Attorneys at Law
306 East College Avenue
Post Office Box 1169
Tallahassee, Florida 32302
(904) 222-5510

BEST AVAILABLE COPY

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHA
GOVERN

VICTORIA J. TSCHINK
SECRETA

WAIVER OF 90 DAY TIME LIMIT
UNDER SECTIONS 120.60(2) AND 403.0876, FLORIDA STATUTES

License (Permit, Certification) Application No. AC-45-61-75

Applicant's Name: Container Corporation of America - Fernandina

The undersigned has read Sections 120.60(2) and 403.0876, Florida Statutes, and fully understands the applicant's rights under that section.

With regard to the above reference license (permit, certification) application, the applicant hereby with full knowledge and understanding of (his) (her) (its) rights under Sections 120.60(2) and 403.0876, Florida Statutes, waives the right under Sections 120.60(2) and 403.0876, Florida Statutes, to have the application approved or denied by the State of Florida Department of Environmental Regulation within the 90 day time period prescribed in Sections 120.60(2) and 403.0876, Florida Statutes. Said waiver is made freely and voluntarily by the applicant, is in (his) (her) (its) self-interest, and without any pressure or coercion by anyone employed by the State of Florida Department of Environmental Regulation.

This waiver shall expire on the 8th day of July 1983.

The undersigned is authorized to make this waiver on behalf of the applicant.

Signature

Edgar M. Moore
Please Type Name of Signee

June 8, 1983
Date

Sworn to and subscribed
before me this 8th day
of June 1983.

E. Latulle Hobby

Notary Public, State of Florida
My Commission Expires Feb. 25, 1986
Bonded Thru Troy Fain - Insurance, Inc.

DER Form 17-1.201(8)
Effective November 30, 1982

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

IN RE:)
)
CONTAINER CORPORATION OF) Appl. No.: AC-45-61-75
AMERICA - FERNANDINA)
)

ORDER

Pursuant to Florida Administrative Code Rule 17-1.29, the Petitioners' Requests for Extensions of Time and the time in which Applicant is required to publish notice to File a Petition for Administrative Proceeding in regard to the above referenced Notice of Intended Agency Action are hereby granted. The Petitioners may file a Petition for Administrative Proceeding no later than 5:00 p.m. June 9, 1983. Filing shall be deemed complete upon receipt of a petition by the Office of General Counsel of the Department.

DATED this 9th day of May, 1983, at Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

Terry Cole

TERRY COLE
Assistant Secretary

2600 Blair Stone Road
Tallahassee, Florida 32301
(904)488-4805

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing Order has been furnished by United States Mail to Edgar M. Moore, Esquire, Post Office Box 1169, Tallahassee, Florida 32302, this 9th day of May, 1983.

Nancy E. Wright
NANCY E. WRIGHT
Assistant General Counsel

State of Florida Department
of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301
(904)488-9730

WAIVER OF 90 DAY TIME LIMIT
UNDER SECTION 120.60(2), FLORIDA STATUTES

License (Permit, Certification) Application No. AC-45-61-75
Applicant's Name: Container Corporation of America - Fernandina

The undersigned has read Section 120.60(2), Florida Statutes, and fully understands the Applicant's rights under that section.

With regard to the above referenced license (permit, certification) application, the Applicant hereby with full knowledge and understanding of (his) (her) (its) rights under Section 120.60(2), Florida Statutes, waives the right under Section 120.60(2), Florida Statutes, to have the application approved or denied by the State of Florida Department of Environmental Regulation within the 90 day time period prescribed in Section 120.60(2), Florida Statutes. Said waiver is made freely and voluntarily by the Applicant, is in (his) (her) (its) self-interest, and without any pressure or coercion by anyone employed by the State of Florida Department of Environmental Regulation.

This waiver shall expire on the 9th day of June 1983.

The undersigned is authorized to make this waiver on behalf of the applicant.

Ed M Moore
Signature

Edgar M. Moore
Name of Signee

May 9, 1983
Date

Sworn to and subscribed
before me this 9th day
of May 1983.

Section 120.60, Florida Statutes

(2) When an application for a license is made as required by law, the agency shall conduct the proceedings required with reasonable dispatch and with due regard to the rights and privileges of all affected parties or aggrieved persons. Within 30 days after receipt of an application for a license, the agency shall examine the application, notify the applicant of any apparent errors or omissions, and request any additional information the agency is permitted by law to require. Failure to correct an error or omission or to supply additional information shall not be grounds for denial of the license unless the agency timely notified the applicant within this 30 day period. The agency shall notify the applicant if the activity for which he seeks a license is exempt from the licensing requirement and return any tendered application fee within 30 days after receipt of the original application or within 10 days after receipt of the timely requested additional information or correction of errors or omissions. Every application for license shall be approved or denied within 90 days after receipt of the original application or receipt of the timely requested additional information or correction of errors or omissions. Any application for a license not approved or denied within the 90-day period or within 15 days after conclusion of a public hearing held on the application, whichever is latest, shall be deemed approved and, subject to the satisfactory completion of an examination, if required as a prerequisite to licensure, [2](the license) shall be issued. The Public Service Commission, when issuing a license, and any other agency, if specifically exempted by law, shall be exempt from the time limitations within this subsection. Each agency, upon issuing or denying a license, shall state with particularity the grounds or basis for the issuance or denial of same, except where issuance is a ministerial act. On denial of a license application on which there has been no hearing, the denying agency shall inform the applicant of any right to a hearing pursuant to s. 120.57.

BEFORE THE DEPARTMENT OF ENVIRONMENTAL REGULATION
STATE OF FLORIDA

IN RE: APPLICATION NO. AC-45-61-75

CONTAINER CORPORATION OF
AMERICA - FERNANDINA

MOTION FOR EXTENSION OF TIME

The undersigned, attorney for CONTAINER CORPORATION OF AMERICA, moves the Department to extend to June 9, 1983, the time within which applicant is permitted to request a public hearing and to extend the time for publication of notice for a like period of time.

DATED this 9th day of May, 1983.

EDGAR M. MOORE
MOORE & WILLIAMS, P.A.
Post Office Box 1169
Tallahassee, Florida 32302
(904) 222-5510

ATTORNEY FOR CONTAINER
CORPORATION OF AMERICA

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a copy of the foregoing Motion for Extension of Time was furnished by hand delivery to Ms. Nancy Wright, Attorney-at-Law, Department of Environmental Regulation, Twin Towers Office Building, 2600 Blairstone Road, Tallahassee, Florida 32301, this 9th day of May, 1983.

EDGAR M. MOORE

OORE & WILLIAMS
rofessional Association
Attorneys at Law
06 East College Avenue
Post Office Box 1169
llahassee, Florida 32302
(904) 222-5510

RECEIVED
MAY 9 1983
Dept. of Environmental Regulation
Office of General Counsel

May 5, 1983

P 408 530 344

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL

(See Reverse)

Sent to Ms. Cindy Sawyer	
Street and No. North Eighth Street	
P.O., State and ZIP Code Tallahassee, FL 32034	
Postage	**$**
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to whom and Date Delivered	
Return Receipt Showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	**$**
Postmark or Date Sent 90 day waiver form to Cindy Sawyer 5/6/83	

PS Form 3800, Feb. 1982

AIR POLLUTION RULE SUMMARY

Rule Name ______________________________

FAC Designation(1) ______________________

Project Officer ________________________

Date ___________________________________

---

(1) Use the pre-reformat section numbers

PS Form 3811, Jan. 1979

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

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

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

(CONSULT POSTMASTER FOR FEES)

2. **ARTICLE ADDRESSED TO:**

Ms. Cindy Sawyer
North Eighth Street
Fernandina Beach, FL 32034

3. **ARTICLE DESCRIPTION:**

REGISTERED NO.	CERTIFIED NO.	INSURED NO.
	P408530344	

(Always obtain signature of addressee or agent)

I have received the article described above.

SIGNATURE ☒Addressee ☐Authorized agent

Cindy Sawyer

4. **DATE OF DELIVERY** 5-9-83

POSTMARK

5. **ADDRESS** (Complete only if requested)

6. **UNABLE TO DELIVER BECAUSE:**

CLERK'S INITIALS

☆GPO : 1979-300-459

CCA
Container Corporation of America

Paper Mill Division
North Eighth Street
Fernandina Beach, Florida 32034
Phone: 904 261-5551

DER
APR 25 1983
BAQM

April 20, 1983

Mr. William Thomas
Florida Department of Environmental Regulation
2600 Blair Stone Road
Twin Towers Building
Tallahassee, Florida 32301

Dear Mr. Thomas:

(1) This letter is in response to questions asked in my telephone conversation with you and your staff on April 5, 1983.

(2) The questions concerned the capacity and operating modes of the proposed No. 6 Evaporator and its impact on the balance of the chemical recovery system. As stated in the telephone conversation, the new evaporator will not significantly alter the total amount of black liquor processed in the recovery system. The major purpose of the No. 6 Evaporator is to increase the energy efficiency and operating flexibility of our evaporation system and to allow us to evaporate the dilute streams we now pick up from spill collection systems designed to protect our wastewater treatment system. Of particular significance is that the new evaporator set uses significantly less energy to evaporate a gallon of water than do the existing evaporators, one of which will be retired from service when the new evaporator is installed.

(3) The accompanying diagram demonstrates the "balance" we are trying to achieve. As shown in the diagram, the total evaporative capacity (with No. 2 retired and No. 6 added) is somewhat greater than the normal water flow from the washers. This is essential to afford the evaporative capacity for handling the extra water contributed by the spill collection systems.

(4) Questions were also asked about the potential TRS emissions if the new evaporator set were operated in a mode other than 50% bleed back of its own product liquor to thicken the feed. In particular, I believe you were seeking assurances that even if there were some method of operation that would put the black liquor from all 2000 tons a day of pulp through No. 6 Evaporator so that all of the TRS were released there, the lime kiln would be able to handle the TRS emissions. This calculation has been provided in Attachment 2, which shows that the available oxygen in No. 3 Lime Kiln is over 90 times more than the maximum required to completely react with the TRS.

(5) In view of this and the information in our previous submissions, we believe Conditions 4 and 5 are unnecessary and should be deleted. However, as a

(5) middle-ground we would accept replacing Conditions No. 4 and 5 with a single condition that reads as follows:

> The maximum input of black liquor solids into MEE No. 6 must not exceed 250,000 pounds an hour (calculated at 100% solids).

(6) This is the quantity of solids that would go into No. 6 Evaporator if all of the thickened liquor from the existing evaporators were used to pre-thicken the feed to No. 6. (In this case, the percent solids in the feed to No. 6 would exceed 23%). As shown by the calculations in Attachment 2, the lime kiln has ample capacity to handle the TRS emissions in this situation, even if it is assumed that all of the TRS were released in No. 6 Evaporator.

(7) Another matter we discussed on the 5th was the testing required in Condition No. 7. It is my understanding that we all agreed that the intent was to have a single before-and-after test to demonstrate that the system does work as theory and past applications indicate it will and that a similar testing provision (other than normal testing to demonstrate compliance with applicable regulations) will not be contained in the operating permit. It was also recognized that testing and operating variability made the before-and-after test meaningful only if there was a large increase in the after-test that was not explainable by a specific change in operating or testing conditions. It was suggested that the agency would add "within normal variability" at the end of the first sentence in Condition No. 7 to make clear that an apparent increase in the after-test that was within the range of normal operating and testing variability would still demonstrate that the system does work.

(8) I also believe it was recognized that particulate emissions from the lime kiln should not be affected by the incineration and we again ask that references to particulate be deleted in Condition No. 7. Our particulate allowable for the lime kilns is not being increased as stated in specific Condition No. 8 and No. 9 and our normal testing will demonstrate compliance.

(9) Finally, I again request that we be allowed to use the ITT Barton Continuous Titrator when testing for TRS. Use of U. S. EPA Method 16 would be costly and is not necessary, particularly since we are agreed that small changes in before and after emissions would not be significant. Since the testing is not mandated by U. S. EPA, but is being required solely to satisfy DER's own policies, there is no legal requirement that Method 16 be used.

(10) With these understandings, and with the addition of the words "within normal variability" and the deletion of references to particulate, Condition No. 7 is acceptable to us.

(11) We do not see the purpose in quarterly reporting of calculated daily product yield in Condition 12 and ask that it be changed to reflect our normal practice of filing an annual operating report to the department.

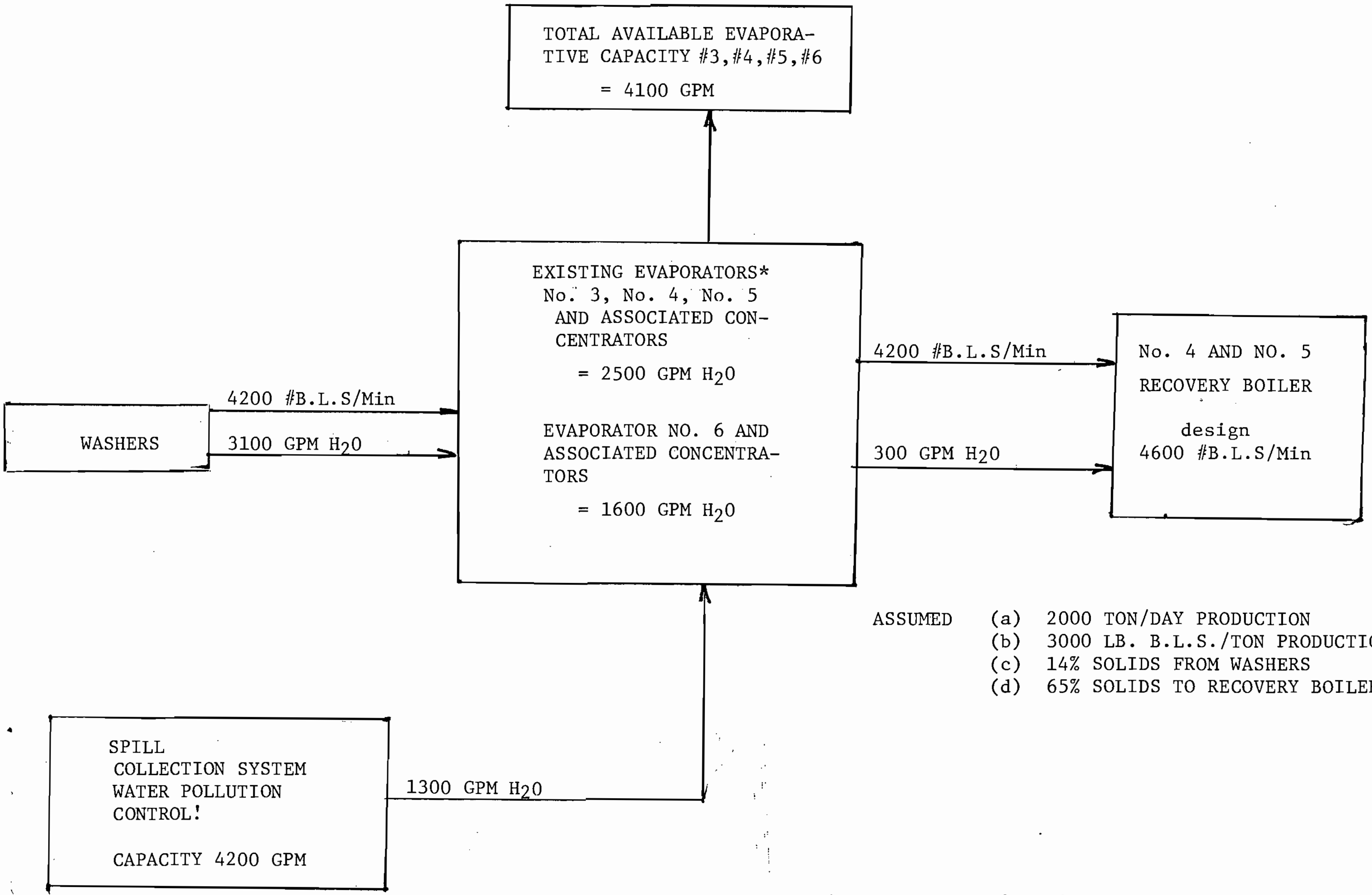
I hope that based on the above, we can quickly resolve this matter in a
mutually acceptable manner. If you have any questions or wish to discuss
(12) any of this further, please call me at (904) 261-5551, extension 324. Also,
we are willing to meet with you at your earliest convenience if this will be
helpful.

Sincerely,

CONTAINER CORPORATION OF AMERICA
Fernandina Beach Mill Division

Eric J. Schmidt
Senior Technical Project Engineer

/jm
Attachment



ASSUMED
- (a) 2000 TON/DAY PRODUCTION
- (b) 3000 LB. B.L.S./TON PRODUCTION
- (c) 14% SOLIDS FROM WASHERS
- (d) 65% SOLIDS TO RECOVERY BOILERS

* EXISTING NO. 2 EVAPORATOR WILL BE RETIRED.

ATTACHMENT 2

Calculation of potential TRS emissions assuming all emissions from black liquor evaporation were from No. 6 Evaporator:

$$2000 \frac{\text{tons pulp}}{\text{day}} \times 0.5 \frac{\text{lb TRS}}{\text{ton pulp}} \times \frac{\text{day}}{\text{24 hrs.}} = 41.7 \frac{\text{\#TRS}}{\text{HR}}$$

$$41.7 \frac{\text{lb TRS}}{\text{hr.}} \times \frac{96.0 \text{ \#}O_2}{68.12 \text{ \#TRS}} = 58.7 \frac{\text{\#}O_2}{\text{HR}}$$

From December 1, 1982 submission, available oxygen in No. 3 Lime Kiln is

$$5364 \frac{\text{lb. } O_2}{\text{hr.}}$$

Therefore, the amount of oxygen is

$$\frac{5364}{58.7} = 91$$

times the amount necessary to completely react with the TRS. In view of the high temperature and long retention time of gases in the kiln, it can easily incinerate all of the TRS that would be produced by black liquor evaporation.

BEST AVAILABLE COPY

DER
APR 11 1983
BAQM

The Florida Times-Union Jacksonville Journal

FLORIDA PUBLISHING COMPANY

Publishers

JACKSONVILLE, DUVAL COUNTY, FLORIDA

STATE OF FLORIDA
COUNTY OF DUVAL

Before the undersigned authority personally appeared George A. Dan who on oath says that he is Retail Advertising Supervisor of The Florida Times-Union, and Jacksonville Journal, daily newspapers published at Jacksonville in Duval County, Florida; that the attached copy of advertisement, being a Legal Notice

in the matter of Notice of proposed agency action

in the ______ Court,

was published in The Florida Times Union

in the issues of April 1, 1983

Affiant further says that the said The Florida Times-Union and Jacksonville Journal are each newspapers published at Jacksonville, in said Duval County, Florida, and that the said newspapers have each heretofore been continuously published in said Duval County, Florida, The Florida Times-Union each day, and Jacksonville Journal each day except Sundays, and each has been entered as second class mail matter at the postoffice in Jacksonville, in said Duval County, Florida, for a period of one year next preceding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in said newspaper.

Sworn to and subscribed before me this 1st day of April A.D. 1983

Naomi J. King
Notary Public,
State of Florida at Large.

George A. Dan

My Commission Expires [illegible]
[illegible]
[illegible] Thru Troy Fain Insurance, Inc.

NOTICE OF PROPOSED AGENCY ACTION

The Department of Environmental Regulation gives notice of its intent to issue a permit to the Container Corporation of America for the construction of a multiple-effect evaporator system #6 (system includes the multiple-effect evaporators, the associated condenser(s) and hotwell(s), and a concentrator) at the applicant's existing facility in Fernandina Beach, Nassau County, Florida. This permit will include conditions to assure compliance with Chapter 17-2, Florida Administrative Code. A determination of Best Available Control Technology (BACT) was not required.

A person who is substantially affected by the department's proposed permitting decision may request a hearing in accordance with Section 120.57, Florida Statutes, and Chapters 17-1 and 28-5, Florida Administrative Code. The request for hearing must be filed (received) in the Office of General Counsel of the department at 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32301, within fourteen (14) days of publication of this notice. Failure to file a request for hearing within this time period shall constitute a waiver of any right such person may have to request a hearing under Section 120.57, Florida Statutes.

The application, technical evaluation and department intent are available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at the following locations:

DER Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301
DER Northeast District
3426 Bills Road
Jacksonville, FL 32207

Comments on this action shall be submitted in writing to Bill Thomas of Tallahassee office within thirty (30) days of this notice.

CCA

Container Corporation of America

Paper Mill Division
North Eighth Street
Fernandina Beach, Florida 32034
Phone: 904 261-5551

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

DER
MAR 21 1983
BAQM

March 15, 1983

Mr. William Thomas
Bureau of Air Quality Management
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32301-8241

Re: Container Corporation of America
Fernandina Beach Mill -- Evaporator
System No. 6 -- Proposed
Permit/Certification No. AC 45-61751

Dear Mr. Thomas:

We acknowledge receipt of Florida Department of Environmental Regulation Proposed Permit/Certification Number AC 45-61751 as transmitted by Mr. C. H. Fancy's letter of February 22, 1983.

We have reviewed the proposed permit for our mill's No. 6 evaporator and have the following comments about the specific conditions listed on Page 4 of the proposed permit:

SPECIFIC CONDITIONS 4, 5, and 12

Because Specific Conditions 8 and 9 prohibit any additional pollutant allowable emissions from Lime Kiln No. 2 or Lime Kiln No. 3 when incinerating total reduced sulfur (TRS) gases from the evaporator, the quantities of liquor input and product yield are of no consequence. We therefore request that Specific Conditions 4, 5, and 12 be deleted.

SPECIFIC CONDITION 7

The noncondensable gases from a multiple-effect evaporator contain no particulate matter nor does any result from the incineration of the contained TRS in the lime kiln. We therefore request deletion of all references to particulate matter limitations in the permit.

United States Environmental Protection Agency (EPA) data [Standards Support and Environmental Impact Statement Volume I: Proposed Standards of Performance for Kraft Mills, EPA - 450/2-76-0140a, September, 1976, page 9-38] shows well operated lime kilns to have a range of TRS emissions from less than 1 ppm to about 24 ppm, on a four hour average. Indeed, EPA concluded [ibid, page 6-26] "TRS remaining from incomplete combustion of the noncondensables is difficult to distinguish from TRS normally emitted by the lime kiln."

Because of this variability of lime kiln TRS emissions, the compliance testing required by Specific Condition 7 would be meaningless. Indeed, it would only be a source of expensive analytical controversy which probably could not be resolved by any amount of testing.

The same problem arises in attempting to document no detectable increase in lime kiln SO_2 emissions when burning TRS emissions from the evaporator. Any differences between before and after startup tests, whether plus or minus, would reflect the normal variability of the lime-kiln emissions rather than any residuals from the evaporator gases.

There presently are no SO_2 emission limitations for either existing or new lime kilns. Indeed, EPA has twice concluded that no new source standards are warranted since the "best demonstrated technology (BDT)", venturi scrubbers, is already employed in nearly all cases. Thus, even if TRS incineration did increase SO_2 emissions (which is most unlikely since the kiln is equipped with an alkaline venturi scrubber) the kiln would already be equipped with what U.S. EPA has determined to be the best control technology. Moreover, if the proposed post startup test for either TRS or SO_2 showed a "plus" number we could rightfully assert that it was the result of normal lime kiln variability and retest until a "minus" number was obtained. This would be costly and of no true value to FDER, the public, or the mill.

For the above reasons, and since the "no additional pollutant allowable emissions" requirement is contained in Specific Conditions 8 and 9, we request that Specific Condition No. 7 be eliminated.

SPECIFIC CONDITIONS 8 and 9

We request that a final sentence be added to each Condition, reading "Compliance with 40 CFR 60.283 (a) (1) (iii) shall be deemed compliance with this requirement."

SPECIFIC CONDITION 10

Although 40 CFR 60.284 (b) (1) contains this monitoring requirement, EPA has completed their review of the kraft mill New Source Performance Standards and are proposing to revise this "to require combustion temperature monitoring only when effluent gasses are combusted in an incinerator." ["Review and Proposed Revision of Standards of Performance for New Stationary Sources: Kraft Pulp Mills", Draft, U.S. EPA, March 1, 1983]

We therefore request that Specific Condition No. 10 be deleted.

To avoid any delays in the construction of the evaporator, prompt response to our comments will be appreciated. If you have any questions, please contact Mr. W. M. Kendrick (904/261-5551) here at the mill.

Sincerely,

M. L. Woehle
Vice President & Resident Manager

MLW/ma

cc: Steve Smallwood - FDER Tallahassee
Clair Fancy - FDER Tallahassee
John Ketteringham - FDER Northeast District

No. 0157976

RECEIPT FOR CERTIFIED MAIL

**NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL**

(See Reverse)

SENT TO
Mr. Max Woehle

STREET AND NO.

P.O., STATE AND ZIP CODE

POSTAGE			$
CONSULT POSTMASTER FOR FEES	CERTIFIED FEE		¢
	OPTIONAL SERVICES	SPECIAL DELIVERY	¢
		RESTRICTED DELIVERY	¢
	RETURN RECEIPT SERVICE	SHOW TO WHOM AND DATE DELIVERED	¢
		SHOW TO WHOM, DATE, AND ADDRESS OF DELIVERY	¢
		SHOW TO WHOM AND DATE DELIVERED WITH RESTRICTED DELIVERY	¢
		SHOW TO WHOM, DATE AND ADDRESS OF DELIVERY WITH RESTRICTED DELIVERY	¢
TOTAL POSTAGE AND FEES			$

POSTMARK OR DATE

2/23/83

PS Form 3800, Apr. 1976

PS Form 3811, Jan. 1979

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

1. The following service is requested (check one.)
☒ Show to whom and date delivered.............____¢
☐ Show to whom, date and address of delivery...____¢
☐ RESTRICTED DELIVERY
Show to whom and date delivered.............____¢
☐ RESTRICTED DELIVERY.
Show to whom, date, and address of delivery.$____

(CONSULT POSTMASTER FOR FEES)

2. ARTICLE ADDRESSED TO:
Mr. Max Woehle
North Eighth St.
Fernandina Beach, FL 32034

3. ARTICLE DESCRIPTION:

REGISTERED NO.	CERTIFIED NO.	INSURED NO.
	0157976	

(Always obtain signature of addressee or agent)

I have received the article described above.
SIGNATURE ☐ Addressee ☒ Authorized agent

4.

5. DATE OF DELIVERY

POSTMARK

FERNANDINA BEACH, FL
FEB
1983

6. ADDRESS (Complete only if requested)

7. UNABLE TO DELIVER BECAUSE:

CLERK'S INITIALS
GSC

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

☆GPO : 1979-300-459

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

February 22, 1983

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. Max Woehle
General Manager
Container Corporation of America
North Eighth Street
Fernandina Beach, Florida 32034

Dear Mr. Woehle:

Attached is one copy of the Technical Evaluation and Preliminary Determination, and proposed permit for the construction of a multiple-effect evaporator system #6 at Container Corporation's existing facility in Fernandina Beach, Nassau County, Florida.

Before final action can be taken on your proposed permit, you are required by Florida Administrative Code Rule 17-1.62(3) to publish the attached Notice of Proposed Agency Action in the legal advertising section of a newspaper of general circulation in Nassau County no later than fourteen days after receipt of this letter. The department must be provided with proof of publication within seven days of the date the notice is published. Failure to publish the notice will be grounds for denial of the permit.

The Preliminary Determination and proposed permit constitute a proposed action of the department and is subject to administrative hearing under the provisions of Chapter 120, Florida Statutes, if requested within fourteen days from receipt of this letter. Any petition for hearing must comply with the requirements of Florida Administrative Code Rule 28-5.201 and be filed with the Office of General Counsel, Florida Department of Environmental Regulation, Twin Towers Office Building, 2600 Blair Stone Road, Tallahassee, Florida 32301. Failure to file a request for hearing within fourteen days shall constitute a waiver of your right to a hearing. Filing is deemed complete upon receipt by the Office of General Counsel.

Please submit, in writing, any comments which you wish to have considered concerning the department's proposed action to Bill Thomas of the Bureau of Air Quality Management.

Sincerely,

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

CHF/pa

Attachment

cc: Mr. Roland L. Allen, Jr., P.E., Paper Industry Engineers
Mr. Eric J. Schmidt, Container Corporation of America
Mr. John Ketteringham, DER Northeast District

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

IN RE:)
)
CONTAINER CORPORATION OF) Application No.: AC-45-61-75
AMERICA - FERNANDINA)
)

ORDER

Pursuant to Florida Administrative Code Rule 17-1.29, the Petitioner's Request for Extension of Time and the time in which Applicant is required to publish notice to File a Petition for Administrative Proceeding in regard to the above referenced Notice of Intended Agency Action is hereby granted. The Petitioner may file a Petition for Administrative Proceeding no later than 5:00 p.m. May 9, 1983, or fourteen (14) days after the issuance of a new permit, whichever occurs first. Filing shall be deemed complete upon receipt of a petition by the Office of General Counsel of the Department.

DATED this 10 day of March, 1983, at Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

TERRY COLE
Assistant Secretary

2600 Blair Stone Road
Tallahassee, Florida 32301
(904)488-4805

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to S120.52 (9), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Patti Mullinax 3/10/83
Clerk Date

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a true and correct copy of the foregoing Order has been furnished by United States Mail to Edgar M. Moore, Esquire, Post Office Box 1169, Tallahassee, Florida 32302, this 10th day of March, 1983.

JOHN C. BOTTCHER
Attorney

State of Florida Department
of Environmental Regulation
2600 Blair Stone Road
Tallahassee, Florida 32301
Telephone: (904)488-9730

Technical Evaluation
and
Preliminary Determination

Container Corporation of America
Fernandina Beach, Florida

Application Number:
AC 45-61751

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

February 22, 1983

NOTICE OF PROPOSED AGENCY ACTION

The Department of Environmental Regulation gives notice of its intent to issue a permit to the Container Corporation of America for the construction of a multiple-effect evaporator system #6 (system includes the multiple-effect evaporators, the associated condenser(s) and hotwell(s), and a concentrator) at the applicant's existing facility in Fernandina Beach, Nassau County, Florida. This permit will include conditions to assure compliance with Chapter 17-2, Florida Administrative Code. A determination of Best Available Control Technology (BACT) was not required.

A person who is substantially affected by the department's proposed permitting decision may request a hearing in accordance with Section 120.57, Florida Statutes, and Chapters 17-1 and 28-5, Florida Administrative Code. The request for hearing must be filed (received) in the Office of General Counsel of the department at 2600 Blair Stone Road, Twin Towers Office Building, Tallahassee, Florida 32301, within fourteen (14) days of publication of this notice. Failure to file a request for hearing within this time period shall constitute a waiver of any right such person may have to request a hearing under Section 120.57, Florida Statutes.

The application, technical evaluation and department intent are available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at the following locations:

DER Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32301

DER Northeast District
3426 Bills Road
Jacksonville, FL 32207

Comments on this action shall be submitted in writing to Bill Thomas of Tallahassee office within thirty (30) days of this notice.

RULES OF THE ADMINISTRATIVE COMMISSION
MODEL RULES OF PROCEDURE
CHAPTER 28-5
DECISIONS DETERMINING SUBSTANTIAL INTERESTS

28-5.15 Requests for Formal and Informal Proceedings

(1) Requests for proceedings shall be made by petition to the agency involved. Each petition shall be printed typewritten or otherwise duplicated in legible form on white paper of standard legal size. Unless printed, the impression shall be on one side of the paper only and lines shall be double spaced and indented.

(2) All petitions filed under these rules should contain:

- (a) The name and address of each agency affected and each agency's file or identification number, if known;
- (b) The name and address of the petitioner or petitioners;
- (c) All disputed issues of material fact. If there are none, the petition must so indicate;
- (d) A concise statement of the ultimate facts alleged, and the rules, regulations and constitutional provisions which entitle the petitioner to relief;
- (e) A statement summarizing any informal action taken to resolve the issues, and the results of that action;
- (f) A demand for the relief to which the petitioner deems himself entitled; and
- (g) Such other information which the petitioner contends is material.

I. PROJECT DESCRIPTION

A. Applicant

Container Corporation of America
North 8th Street
Fernandina Beach, Florida 32304

B. Project Description and Location

The applicant intends to construct a multiple-effect evaporator system #6 (MEE #6; system includes the multiple-effect evaporators, associated condenser(s) and hotwell(s), and a concentrator) at its existing mill. The design capacity will be 1000 tons per day (TPD) of air dried pulp (ADP).

The source will be located at the above address in Nassau County. The proposed source location at Fernandina Beach is in that portion of Nassau County which is classified as the "area of influence" for the Duval County particulate nonattainment area. The UTM coordinates are Zone 17-456.213 km East 3394.186 km North.

C. Process Controls

The MEE #6 receives the weak black liquor (WBL), spent cooking liquor, washed from the pulp in the digesters. Instead of the typical input liquor content of 14% black liquor solids (BLS), this mill's operational design requires that the BLS content feed to be 23%, which is achieved by concentrating the WBL with effected and concentrated liquor from the # 6 concentrator at 67% BLS content.

The multiple-effect evaporators, condensers and hotwells evaporate the WBL at 23% solids content to a liquor concentration of 55% BLS. This liquor is then input into the associated concentrator (#6), where the liquor is concentrated to a content of 67% BLS. Removal of large amounts of water from the WBL is necessary to facilitate combustion of the dissolved organic material in the recovery boiler furnace(s).

The total process input liquor rate will be 1,031,300 pounds per hour (lbs/hr) at 23% BLS (237,200 lbs/hr at 100% BLS and 794,100 lbs/hr water). The total product liquor will be 354,000 lbs/hr at 67% BLS from the associated concentrator (237,200 lbs/hr at 100% BLS and 116,900 lbs/hr water). Therefore, the design evaporation capacity is 677,200 lbs/hr water.

Since liquor from the concentrator # 6 (67% BLS) is used to sweeten the WBL from a content of 14% BLS to 23% BLS, the actual product yield of BLS is reduced. Consequently, the yield will be 119,858 lbs/hr at 100% BLS. At 2,850 lbs BLS per ton of ADP, the daily product yield is 1009.3 TPD ADP. However, the applicant requested that the maximum rated capacity for the MEE #6 be

1000 TPD ADP (118,750 lbs/hr at 100% BLS), of which all pollutant emissions were based and calculated.

Air pollutant emissions from the MEE #6 will be vented to the existing Lime Kiln #3, the primary air pollution control device. In the case of a malfunction in Lime Kiln #3, the pollutant emissions will be vented to the existing Lime Kiln #2 as a back-up air pollution control device. The purpose of venting the air pollutant emissions from the MEE #6 to the lime kiln(s) is for incineration. The applicant intends to meet the New Source Performance Standards (NSPS), 40 CFR (Code of Federal Regulations) 60.283(a)(1)(iii), Subpart BB requirements for incineration of TRS (total reduced sulfur) in the lime kiln(s) by subjecting the TRS to a minimum temperature of 1200°F (Fahrenheit) for at least 0.5 seconds.

All of the pollutant emissions from the existing lime kilns are controlled by alkaline venturi scrubbers.

II. RULE APPLICABILITY

The proposed project is subject to preconstruction review under the provisions of Chapter 403, Florida Statutes (FS) and Chapter 17-2, Florida Administrative Code (FAC).

The proposed source is to be located in an area classified as attainment for all pollutants; however, the location is within the "area of influence" of the Duval County particulate nonattainment area. The proposed source will have zero potential and allowable pollutant emissions and therefore, is exempt from the nonattainment rule, Chapter 17-2.510, FAC, because reasonable assurance has been provided that the source will not have a significant impact within the nonattainment area in accordance with Chapter 17-2.510(2)(a)2.b., FAC.

The applicant has chosen to apply the New Source Performance Standards (NSPS), 40 CFR 60.280, Subpart BB to the proposed new source. For the application of incineration of the TRS emissions in the lime kiln(s) (No. 3 Lime Kiln is the primary control device and No. 2 Lime Kiln is the back-up control device), the requirement is that the pollutant emissions be subjected to a minimum temperature of 1200° F for at least 0.5 seconds in accordance with the NSPS, 40 CFR 60.283(a)(1)(iii), Subpart BB. The net result is zero TRS emissions. For SO_2 and particulate matter (PM) emissions, the existing alkaline venturi scrubbers associated with the existing lime kilns, Nos. 3 and 2, will control these pollutants such that there will not be any increases in the allowable SO2 and PM emissions from these sources (Lime Kilns Nos. 3 and 2).

Since the proposed new source, the MEE #6, will net zero potential emissions for all pollutants, the construction will be a non-modification to an existing major facility. Therefore, a permit will be issued on the proposed new source in accordance with Chapters 17-2.210 and 17-4.03, FAC.

III. SUMMARY OF EMISSIONS AND AIR QUALITY ANALYSIS

A. Emission Limitations

Since all of the pollutant emissions from the proposed MEE #6 (system includes the multiple-effect evaporators, the associated condenser(s) and hotwell(s), and a concentrator) will be vented to a lime kiln(s) (No. 3 or No. 2 (back-up device)) for incineration, removal by alkaline venturi scrubbing, or both, there will not be any allowable pollutant emissions permitted.

B. Air Quality Analysis

The proposed source location at Fernandina Beach is in that portion of Nassau County which is classified as the "area of influence" for the Duval County particulate nonattainment area. An air quality analysis was not performed because the proposed source, the MEE #6, will have zero potential and allowable pollutant emissions.

IV. CONCLUSIONS

The emission limits of zero allowable emissions for all pollutants proposed by the applicant for the proposed MEE #6 are acceptable by the Department.

There is reasonable assurance that there will not be any net effect to he air quality standards of the State of Florida. In fact, the applicant indicated that the multiple-effect evaporator system # 2 will be terminated at the existing mill, which will have a decrease in TRS emissions emitted into the atmosphere.

The General and Specific Conditions listed in the proposed permit will assure compliance with all applicable requirements of Chapter 17-2, FAC.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

PERMITTEE: Container Corporation
North Eighth Street
Fernandina Beach, Florida 32034

I.D. Number:
Permit/Certification Number: AC 45-61751
Date of Issue:
Expiration Date: January 31, 1984
County: Nassau
Latitude/Longitude: 30° 40' 53" N/81° 27' 26" W
Section/Township/Range:
Project: Multiple-Effect Evaporator System #6 (MEE #6; system includes the multiple-effect evaporators, the associated condenser(s) and hotwell(s), and a concentrator).

This permit is issued under the provisions of Chapter(s) 403, Florida Statutes, and Florida Admin istrative Code Rule(s) 17-2 and 17-4. The above named permittee is hereby authorized t perform the work or operate the facility shown on the application and approved drawing(s), plans, and other document attached hereto or on file with the department and made a part hereof and specifically described as follows:

This permit is for the construction/installation of the multiple-effect evaporator system #6 (MEE #6) at the applicant's existing kraft pulp mill in Nassau County. The MEE #6 includes the multiple-effect evaporators, the associated condenser(s) and hotwell(s), and a concentrator. The UTM coordinates are Zone 17-456.213 km East and 3394.186 km North.

Construction shall be in accordance with the permit application and plans, documents, amendments, and drawings except as otherwise noted on page 4 of the "Specific Conditions".

Attachments are as follows:

1. Application to Construct Air Pollution Sources, DER Form 1.122(16).
2. C. H. Fancy's Letter of Incompleteness dated November 22, 1982.
3. Eric J. Schmidt's letter dated December 1, 1982.
4. Eric J. Schmidt's letter dated December 17, 1982.
5. Eric J. Schmidt's letter dated January 27, 1983.

PERMITTEE: Container Corporation of America
North Eighth Street
Fernandina Beach, Florida 32034

I.D. Number:
Permit/Certification Number: AC 45-61751
Date of Issue:
Expiration Date: January 31, 1984

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth herein are "Permit Conditions" and as such are binding upon the permittee and enforceable pursuant to the authority of Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is hereby placed on notice that the department will review this permit periodically and may initiate enforcement action for any violation of the "Permit Conditions" by the permittee, its agents, employees, servants or representatives.

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

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Nor does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit does not constitute a waiver of or approval of any other department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute state recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express state opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, plant or aquatic life or property and penalties therefor caused by the construction or operation of this permitted source, nor does it allow the permittee to cause pollution in contravention of Florida Statutes and department rules, unless specifically authorized by an order from the department.

6. The permittee shall at all times properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized department personnel, upon presentation of credentials or other documents as may be required by law, access to the premises, at reasonable times, where the permitted activity is located or conducted for the purpose of:

   a. Having access to and copying any records that must be kept under the conditions of the permit;

   b. Inspecting the facility, equipment, practices, or operations regulated or required under this permit; and

   c. Sampling or monitoring any substances or parameters at any location reasonably necessary to assure compliance with this permit or department rules.

   Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately notify and provide the department with the following information:

   a. a description of and cause of non-compliance; and

b. the period of noncompliance, including exact dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the department for penalties or revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source, which are submitted to the department, may be used by the department as evidence in any enforcement case arising under the Florida Statutes or department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes.

10. The permittee agrees to comply with changes in department rules and Florida Statutes after a reasonable time for compliance, provided however, the permittee does not waive any other rights granted by Florids Statutes or department rules.

11. This permit is transferable only upon department approval in accordance with Florida Administrative Code Rules 17-4.12 and 17-30.30, as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the department.

12. This permit is required to be kept at the work site of the permitted activity during the entire period of construction or operation.

13. This permit also constitutes:

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

14. The permittee shall comply with the following monitoring and record keeping requirements:

a. Upon request, the permittee shall furnish all records and plans required under department rules. The retention period for all records will be extended automatically, unless otherwise stipulated by the department, during the course of any unresolved enforcement action.

b. The permittee shall retain at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation), copies of all reports required by this permit, and records of all data used to complete the application for this permit. The time period of retention shall be at least three years from the date of the sample, measurement, report or application unless otherwise specified by department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the date(s) analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the department, such facts or information shall be submitted or corrected promptly.

PERMITTEE: Container Corporation of America
North Eighth Street
Fernandina Beach, Florida 32034

I.D. Number:
Permit/Certification Number: AC 45-61751
Date of Issue:
Expiration Date: January 31, 1984

SPECIFIC CONDITIONS:

1. Construction/installation should reasonably conform to the application, plans, documents, and amendments submitted for the multiple-effect evaporator system #6 (MEE #6; system includes the multiple-effect evaporators, the associated condenser(s) and hotwell(s), and a concentrator).

2. The applicant should report any delays in construction/installation and completion to the DER's Northeast District office.

3. Annual hours of operation will be 8760.

4. Maximum process input liquor rate must not exceed 1,031,300 lbs per hour (lbs/hr) at 23 percent (%) black liquor solids(BLS) into the MEE #6.

5. Maximum product yield from the concentrator #6 must not exceed 118,750 lbs/hr at 100% BLS and 1000 tons per day (TPD) of air dried pulp (ADP; based on the applicant's yield of 2850 lbs BLS/ton ADP).

6. Combustion temperature and retention time in the pollutant control device(s), Lime Kilns Nos. 3 and 2 (back-up device to No. 3), must be a minimum of 1200° F and 0.5 seconds respectively.

7. The allowable emissions for all pollutants shall be below the minimum detectable limit. Due to this constraint, stack mass emission tests shall be conducted on the Lime Kilns, No. 3 and No. 2, before and after start-up of the MEE #6 for the pollutants PM (particulate matter), SO_2, and TRS. Test methods shall be EPA Methods 1, 2, 3, 4, 5 or 17, 6, and 16 in accordance with the NSPS, 40 CFR 60.285, Subpart BB and as described in Appendix A of this part. At least 30 days prior to the date of compliance testing, the DER's Northeast District office or its designee shall be notified in order to witness the test(s).

8. The primary pollutant control device is the Lime Kiln No. 3. The operating permit for the Lime Kiln No. 3, AO 45-10035, shall be amended to reflect its operational change by the addition of the pollutants from the MEE #6; however, no additional pollutant allowable emissions from the lime kiln or its control device, an alkaline venturi scrubber, shall be permitted.

9. The back-up pollutant control device to Lime Kiln No. 3 is Lime Kiln No. 2. The operating permit for the Lime Kiln No. 2, AO 45-10034, shall be amended to reflect its operational change by the addition of the pollutants from the MEE #6; however, no additional pollutant allowable emissions from the lime kiln or its control device, an alkaline venturi scrubber, shall be permitted.

10. A monitoring device which measures the combustion temperature at the point of incineration of effluent gases shall be installed and operated in accordance with the NSPS, 40 CFR 60.284(b)(1), Subpart BB.

11. Reports of periods of time in excess of 5 minutes and their duration during which the combustion temperature at the point of incineration is less than 1200°F must be documented and promptly reported to the DER's Northeast District office.

12. Records of the daily product yield in ADP (based on 2850 lbs BLS/ton ADP) from the concentrator #6 shall be kept and submitted by the 14th of January, April, July, and October of each calendar year to the DER's Northeast District office.

13. The applicant will demonstrate compliance with the conditions of the construction permit and submit a complete application for an operating permit to the DER's Northeast District office prior to 90 days of the expiration date of the construction permit. The permittee may continue to operate in compliance with all terms.

PERMITTEE: Container Corporation of America
North Eighth Street
Fernandina Beach, Florida 32034

I.D. Number:
Permit/Certification Number: AC 45-61751
Date of Issue:
Expiration Date: January 31, 1984

SPECIFIC CONDITIONS:

Issued this ____ day of ____________, 19____.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

____

5 Attachments

DER Form 17-1.201(5) Effective November 30, 1982

CCA

Container Corporation of America

Paper Mill Division

North Eighth Street
Fernandina Beach, Florida 32034

Phone: 904 261-5551

January 27, 1983

Mr. Bruce Mitchell
Florida Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Twin Towers Building
Tallahassee, Florida 32301

DER
JAN 31 1983
BAQM

Re: No. 6 Evaporator Permit Application

Dear Mr. Mitchel:

As a result of our meeting of January 25, 1983, this letter is submitted as an amendment to our original permit application. The purpose of this amendment is to clarify the calculation of uncontrolled emissions from the evaporator set. As you suggested, the emission factor used is from AP-42. This factor was developed based on evaporators operating over a normal range of 14% input solids and 67% output solids. As we have discussed, our operation uses recycled product liquor to concentrate input liquor to around 23% solids. The following calculations demonstrate the equivalent size of the No. 6 Evaporator Set in order to obtain the rated capacity in terms of normal solids concentrations. This value can then be used to calculate uncontrolled emissions.

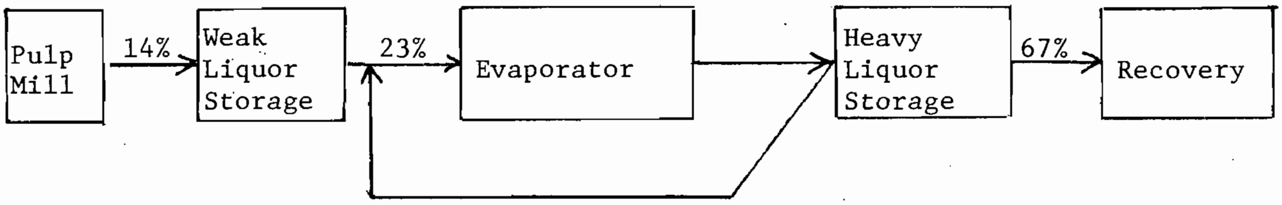
If you have any questions concerning this calculation, please feel free to call me at the number shown above.

Sincerely,

CONTAINER CORPORATION OF AMERICA
Fernandina Beach Mill Division

Eric J. Schmidt
Environmental Department Group Leader

/jm



I. EVAPORATOR DESIGN DATA

Input Liquor = 1,031,300 #/hr at 23% solids = 237,200 #/hr. solids
+794,100 #/hr. water

Product Liquor = 354,100 #/hr at 67% solids = 237,200 #/hr solids
+116,900 #/hr water

II. DESIGN EVAPORATION CAPACITY

Water input - water output = Evaporation capacity

794,100 #/hr - 116,900 #/hr = 677,200 #/hr.

III. SIZING CALCULATION

F = Feed to evaporator (#/hr)
P = Product of evaporator (#/hr)
W = Water evaporated (#/hr)
S_F = Solids in feed (#/hr)
S_P = Solids in product (#/hr)

Assumed: $F = W + P$
$S_F + S_P = S$
$S_F = F(.14)$
$S_P = P(.67)$

$S_f/.14 = W + S_p/.67$

$S_f/.14 = 677{,}200\ \#/\text{hr} + S_p/.67$

$S_f/.14 - S\ /.67 = 677{,}200\ \#/\text{hr}$

$S(1/.14 - 1/.67) = 677{,}200\ \#/\text{hr}$

$S(7.14 - 1.49) = 677{,}200\ \#/\text{hr}$

$$S = \frac{677{,}200\ \#/\text{hr}}{5.65}$$

$S = 119{,}858\ \#/\text{hr}$

$$119{,}858\ \#/\text{hr solids} \times 24\ \#\text{R/day} \times \frac{\text{ton ADP}}{3000\ \#\text{ solids}} = 959\ \text{T/D}$$

IV. UNCONTROLLED EMISSION CALCULATION

Assume 1,000 T/D rated capacity

$$1{,}000\ \text{ADP}\quad \text{T/D} \times \frac{0.5\ \#\text{TRS}}{\text{Ton ADP}} \times \frac{\text{Day}}{24\ \text{hrs.}} = 20.8\ \frac{\text{lb. TRS}}{\text{hr.}}$$

CCA

Container Corporation of America

Paper Mill Division

North Eighth Street
Fernandina Beach, Florida 32034

Phone: 904 261-5551

December 17, 1982

File

Mr. Clair Fancy
Deputy Bureau Chief
Bureau of Air Quality Management
Florida Department of Environmental Regulation
2600 Blair Stone Road
Twin Towers Building
Tallahassee, Florida 32301

DER
DEC 22 1982
BAQM

Re: No. 6 Evaporator Set Permitting

Dear Mr. Fancy:

As a result of our meeting with your staff on December 15, 1982, I have attached a revised Page No. 3 of the permit application. Please note the change made to Section B2.

This submittal should provide the information needed to issue the construction permit. If you have any further questions, please do not hesitate to call.

Sincerely,

CONTAINER CORPORATION OF AMERICA
Fernandina Beach Mill Division

Eric J. Schmidt
Senior Technical Project Engineer

/jm
Attachments
cc: Mr. Bruce Mitchell

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		100%	See B1	

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

1. Total Process Input Rate (lbs/hr): 1,031,300 lbs hr. B.L. at 24% solids
2. Product Weight (lbs/hr): 237,000 lbs. hr. B.L. solids

C. Airborne Contaminants Emitted:

Name of Contaminant	Emission[1]		Allowed Emission[2] Rate per Ch. 17-2, F.A.C.	Allowable[3] Emission lbs/hr	Potential Emission[4]		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
T.R.S.	0	0	5.0 PPM	N/A	62.5	274	

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles[5] Size Collected (in microns)	Basis for Efficiency (Sec. V, It[5]
Incineration in	T.R.S.	100	N/A	EP-450
Existing Lime Kiln				
#3				

[1] See Section V, Item 2.

[2] Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. – 0.1 pounds per million BTU heat input)

[3] Calculated from operating rate and applicable standard

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

[5] If Applicable

Based on a study[18] conducted on one cross-recovery furnace, cross-recovery furnaces which experience green liquor sulfidities in excess of 28 percent and liquor mixtures of more than 7 percent NSSC on an air dry ton basis can not achieve the same TRS levels as straight kraft recovery furnaces. Emission data reported in the study indicate that TRS emission levels of 25 ppm, corrected to 8 percent oxygen, can be achieved from well controlled cross recovery furnaces.

A [illegible] liquid control technique [illegible] existing furnaces that are not capable of [illegible] necessary TRS regulations.

6.1.2 Digester and Multiple-Effect Evaporator Systems

The digesters and multiple-effect evaporators will be considered together because non-condensable gases discharged from these two sources are normally combined for treatment. At least half the mills are incinerating the gases to destory odors. Most commonly, the gases are burned in the lime kiln. However, a few special gas-fired incinerators are also used, either as backup for the kiln when it is shutdown, or as the full time control device.

Retrofitting an existing mill to handle and incinerate these non-condensable gases is apparently no significant problem. Generally, it is simply a matter of ducting the gases to the kiln or incinerator and installing necessary condensers and gas holding equipment. The

Attachment
Rcd 12/15/82

non-condensable gases are added to the primary air to the kiln. This retrofit situation has now been performed at over sixty mills.

The blow gases from batch digesters are generated in strong bursts that normally exceed the capacity of the lime kiln. For this reason, special gas handling equipment has been developed to make the gas flows more uniform.[20] Adjustable volume gasholders, with movable diaphragms or floating tops, receive the gas surges, and a small steady stream is bled to the kiln. Although the non-condensable gases form explosive mixtures in air, possible explosion hazards have been minimized by the development of appropriate gasholding systems, flame arrestors and rupture disks in the gasholding ducts, and flame-out controls at the lime kiln. Incineration of these gases in existing process equipment such as the lime kiln is particularly attractive since no additional fuel is required to achieve effective emission control.

Scrubbers are used at a few existing mills. White liquor, the usual scrubbing medium, is effective for removing hydrogen sulfide and methyl mercaptan, but not dimethyl sulfide or dimethyl disulfide.[21] At least 3 mills scrub the noncondensable gases before incineration to: (1) recover sulfur, (2) condense steam, and (3) remove turpentine vapors and mist, thereby reducing the explosion hazards.

Combustion of noncondensable gases in a lime kiln or gas-fired incinerator provides nearly complete destruction of TRS compounds. During an EPA test (conducted for NSPS) on a separate incinerator burning noncondensables from a digester system and a multiple effect evaporator system, the residual unburned TRS was less than 5 ppm (0.01 g/kg ADP)[22]. The TRS test results (4-hour averages) of the four tests conducted ranged between 0.5 and 3.0 ppm, and averaged 1.5 ppm (dry gas basis). During the tests, the incinerator was operating at 1000°F (measured) with a calculated retention time for the gases of at least 0.5 seconds.

Scrubber efficiencies are much lower than properly operated incinerators because only hydrogen sulfide and methyl mercaptan react with the alkaline medium. The composition of noncondensible gases is highly variable, but on the average hydrogen sulfide and methyl mercaptan comprise about half the TRS compounds.[23] Uncontrolled emissions are (9,500 ppm) from the digester system and (6700 ppm) from the multiple-effect evaporator system.[24] Since caustic scrubbing is only effective in controlling hydrogen sulfide and methyl mercaptan, alkaline scrubber efficiencies are, therefore, roughly 50 percent. TRS emissions from a scrubber are calculated to be about 0.63 g/kg ADP (0.59 g/kg ADP from digester system and 0.04 g/kg ADP from multiple-effect evaporator system) or about 7500 ppm.

6.1.3 Lime Kiln

TRS emissions, principally hydrogen sulfide, can originate from two areas in the lime kiln installation, the lime kiln proper and a scrubber that serves as the particulate control device. TRS emissions from the lime kiln installation are controlled by maintaining proper process conditions. The most important parameters that were identified in an industry (National Council of the Pulp and Paper Industry for Air and Stream Improvement) study [25] include the temperature at the

CCA

Container Corporation of America

Paper Mill Division
North Eighth Street
Fernandina Beach, Florida 32034
Phone: 904 261-5551

December 1, 1982

Bruce

Mr. C. H. Fancy
Bureau of Air Quality Management
Florida Department of Environmental Regulation
2600 Blair Stone Road
Twin Towers Building
Tallahassee, FL 32301

DER
DEC 07 1982
BAQM

No. No. 6 Evaporator Permit

Dear Mr. Fancy:

This letter is written in response to your questions concerning the air pollution permit application for our No. 6 Evaporator. These responses should supply you with all of the information you requested and allow you to issue the permit shortly. Our present plans call for initial construction to begin in early Spring, 1983 and as such, the timely processing of the permit is essential.

Q1. Submit the present volume flow through and combustion air required in the lime kiln(s) that will be receiving the emissions from the new evaporator.

A. In view of the small amount of T.R.S. relative to the size of the kilns, there is ample oxygen to provide for complete combustion of the T.R.S. In an attempt to comply with your request to demonstrate this, I have performed the following calculations.

Based upon actual stack gas analyses of the No. 3 Kiln, performed over a number of years, the average gas flow is 24,000 ft^3/min. at standard conditions. The average oxygen content is 4.5%. Therefore, 24,000 ft^3/min. (standard conditions) x

$$.045 \times \frac{1.0\#\ O_2}{12.08\ ft^3} = 89.4\ \#O_2/min = 5364\ \#O_2/hr$$

Based on the estimated T.R.S. emissions of 62.5#/hr and assuming T.R.S. is H_2S, the oxygen demand can be calculated as follows:

$$2H_2S + 3O_2 \xrightarrow{Heat} 2H_2O + 2SO_2$$

using the appropriate molecular weights

$$62.5\ \#/hr\ \ H_2S \times \frac{96.0\ \#O_2}{68.12\ \#H_2S} = 88\ \frac{\#O_2}{HR}$$

Therefore, there is sufficient O_2 available in No. 3 Kiln to combust the T.R.S. associated with the new evaporator. A similar calculation for No. 2 Lime Kiln shows greater than 3,000 #/hr available O_2 for combustion.

Q2. From the additional volume of air throughput from the new evaporator, show by calculations that the residence time and temperature parameters will meet the NSPS, Subpart BB requirement to completely incinerate. The excess air required will have to be calculated and included in the new source's volume.

A. The NSPS requires a .5 second retention at 1,200°F. The hot end temperature of the kilns exceeds 2,000°F and as such the T.R.S. should be destroyed with only minimal retention time; but, in an effort to demonstrate this fact, I have calculated the minimum retention time by using the worst case temperature of 2,200°F over the entire length of the kiln. Again, the calculations are based on actual test data for stack gas flow rates.

No. 3 Kiln volume = 22,691 ft.^{3}

Gas flow = 24,000 SCFM

To calculate the volume that the stack gas would occupy in the kiln assume 2,200°F

$$24{,}000\ \frac{\text{Ft}^3}{\cancel{\text{min}}} \times \frac{1{,}477^\circ\text{K}}{294^\circ\text{K}} = 120{,}000\ \text{Ft.}^3$$

$$\frac{22{,}691\ \text{Ft.}^3}{120{,}000\ \text{Ft.}^3/\text{min}} \doteq .189\ \text{min} = 11.3\ \text{seconds}$$

The kiln temperature actually varies from 2,200°F at the hot end to 400°F at the cold end and as such the actual kiln retention time is greater than 11.3 seconds. A similar calculation yields a 19.8 second retention time for No. 2 Kiln.

The 1,200°F temperature is exceeded for at least one third of the total time. Therefore, the .5 second/1,200°F requirement is easily met by both kilns.

Q3. Identify the existing lime kiln(s) that will be receiving the new evaporator's emissions. What is its current operating permit number(s)?

The design of the T.R.S. control system for #6 evaporator will allow the use of either #3 or #2 lime kiln as the combustion source, #3 lime kiln will be the primary control with #2 lime kiln used as a backup.

Q4. What is the current total process input rate and product rate in the existing to-be-retired No. 2 evaporator set?

A. The #2 evaporator set is rated at 150 A.D.T./day which corresponds to an input rate of 80,000 lbs/hr black liquor at 24% solids and a product rate of 28,800 #/hr black liquor at 65% solids.

Q5. Calculate and submit the potential SO_2 emissions from the existing lime kiln that will be receiving the new evaporator's emissions. Calculate and submit the potential SO_2 emissions from the new evaporator.

A. As stated many times in the literature (see attachment), the alkaline-based scrubber used for particulate control on the lime kilns effectively removes any SO_2 associated with T.R.S. combustion or sulfur-bearing fuel oil used to fire the kiln; however, to comply with your request to estimate SO_2 emissions, I have made the following calculations:

The SO_2 emissions from <u>#2 lime kiln:</u>

$$30.48 \frac{\text{gal}}{\text{hr}} \times \frac{8.052\#}{\text{gal}} \times \frac{.03 \text{ lbs}}{\text{lb oil}} \times \frac{64.0860\ SO_2}{32 \text{ lbs}} = \frac{15.6 \text{ lb}SO_2}{\text{hr}}$$

<u>#3 Lime Kiln</u>

$$43.57 \text{ gal/hr} \times 8.052 \frac{\#}{\text{gal}} \times \frac{.03 \text{ lbs}}{\text{lb oil}} \times \frac{64.08 \text{ lb } SO_2}{32 \text{ lb}} = \frac{22.3 \text{ lb}SO2}{\text{hr}}$$

The SO_2 emissions from the T.R.S. associated with the <u>#6 evaporator:</u>

$$2H_2S + 3O_2 \xrightarrow{\text{Heat}} 2H_2S = 2SO_2$$

Using the appropriate molecular weights, the amount of SO_2 generated by burning 62.5 #/hr of H_2S is:

$$62.5 \text{ \#/hr} \times \frac{128.12 \ \#SO_2}{68.12 \ \#H_2S} = 117.5 \text{ \#/hr } SO_2$$

The SO_2 will be effectively controlled by the scrubber on the kilns and will result in virtually zero SO_2 emissions.

Sincerely,

Eric J. Schmidt
Environmental Department
Group Leader

/ma

No. 0157768

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL

(See Reverse)

SENT TO
Max Woehle

STREET AND NO.
North 8th St.

P.O., STATE AND ZIP CODE
Fernandina Beach, FL

POSTAGE				$
CONSULT POSTMASTER FOR FEES	CERTIFIED FEE			¢
	OPTIONAL SERVICES	SPECIAL DELIVERY		¢
		RESTRICTED DELIVERY		¢
		RETURN RECEIPT SERVICE	SHOW TO WHOM AND DATE DELIVERED	¢
			SHOW TO WHOM, DATE, AND ADDRESS OF DELIVERY	¢
			SHOW TO WHOM AND DATE DELIVERED WITH RESTRICTED DELIVERY	¢
			SHOW TO WHOM, DATE AND ADDRESS OF DELIVERY WITH RESTRICTED DELIVERY	¢
TOTAL POSTAGE AND FEES				$

POSTMARK OR DATE

11/23/82

PS Form 3800, Apr. 1976

PS Form 3811, Jan. 1979

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

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

   (CONSULT POSTMASTER FOR FEES)

2. ARTICLE ADDRESSED TO:

Mr. Max Woehle
North 8th Street
Fernandina Beach, FL 32034

3. ARTICLE DESCRIPTION:

REGISTERED NO.	CERTIFIED NO.	INSURED NO.
	0157768	

(Always obtain signature of addressee or agent)

I have received the article described above.
SIGNATURE ☐Addressee ☐Authorized agent

4. DATE OF DELIVERY
11/24/82

POSTMARK

5. ADDRESS (Complete only if requested)

6. UNABLE TO DELIVER BECAUSE:

CLERK'S INITIALS

RETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

☆GPO : 1979-300-459

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

November 22, 1982

Mr. Max Woehle, General Manager
Container Corporation of America
North 8th Street
Fernandina Beach, Florida 32034

Re: Completeness Review for AC 45-61751 (Evaporator #6)

Dear Mr. Woehle:

The Bureau has received an application to construct an air pollution source at your existing mill in Fernandina Beach, Nassau County, Florida. As discussed by phone with Mr. Eric Schmidt on November 19, 1982, the following items were requested as points of incompleteness and shall be submitted as an amendment to the referenced construction application:

1. Submit the present volume flow through and combustion air required in the lime kiln(s) that will be receiving the emissions from the new evaporator.
2. From the additional volume of air throughput from the new evaporator, show by calculations that the residence time and temperature parameters will meet the NSPS, Subpart BB requirement to completely incinerate. The excess air required will have to be calculated and included in the new source's volume.
3. Identify the existing lime kiln(s) that will be receiving the new evaporator's emissions. What is its current operating permit number(s)?
4. What is the current total process input rate and product rate in the existing to-be-retired No. 2 evaporator set?
5. Calculate and submit the potential SO_2 emissions from the existing lime kiln that will be receiving the new evaporator's emissions. Calculate and submit the potential SO_2 emissions from the new evaporator.

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

Sincerely,

CH Fancy

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

BM/bjm

cc: Eric J. Schmidt
Walter M. Kendrick
John Ketteringham
Martha H. Hall

STATE OF FLORIDA

DEPARTMENT OF ENVIRONMENTAL REGULATION

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

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

October 26, 1982

Mr. Max Woehle
General Manager
Container Corporation of America
North Eighth Street
Fernandina Beach, Florida 32034

Dear Mr. Woehle:

This is to acknowledge receipt of your application to construct a new evaporator set and digester at your Fernandina Beach Mill. Your receipt for the processing fee of $100.00 is attached. The permit processing number assigned to this application is AC 45-61751.

If we may be of further assistance, please feel free to call at (904)488-1344.

Sincerely,

Patty Adams

Patty Adams
Bureau of Air Quality
Management

PA/ks

Attachment

Fernandina
Mill

CCA

Container Corporation of America

Pay

C

CCA$100 00 CTS

02050 OCT. 13, 1982

To the
Order of FLA DEPT OF ENVR REGULATION

Authorized Signature

S. T. B

Authorized Signature

66-35
531

Wachovia Bank & Trust Company, N.A. Asheville, NC

[redacted]

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

Nº 33629

RECEIPT FOR APPLICATION FEES AND MISCELLANEOUS REVENUE

Received from Container Corporation of America Date October 25, 1982

Address N. 8th. Street, Fernandina, Beach, FL 32034 Dollars $ 100.00

Applicant Name & Address Same as above.

Source of Revenue

Revenue Code 0101 Application Number AC 45-61751

By Patricia G. Adams

CCA

Container Corporation of America

Paper Mill Division

North Eighth Street
Fernandina Beach, Florida 32034

Phone: 904 261-5551

October 19, 1982

Mr. Clair Fancy
Deputy Bureau Chief
Bureau of Air Quality Management
Florida Department of Environmental Regulation
2600 Blair Stone Road
Twin Towers Building
Tallahassee, Florida 32301

DER
OCT 25 1982
BAQM

Re: No. 6 Evaporator Set Permitting

Dear Mr. Fancy:

As we discussed in our meeting of June 17, 1982, we plan to construct a new evaporator set and digester at our Fernandina Beach Mill. We have received a copy of your letter to James Wilburn, U.S.E.P.A., Region IV concerning the status of the proposed digester, and in the absence of a prompt reply to your letter, we would like to submit a construction permit application for the No. 6 Evaporator Set portion of the project at this time.

As we discussed, the No. 6 Evaporator set will replace an older existing Evaporator Set No. 2, and will be controlled by incineration in an existing lime kiln. The projected total reduced sulfur emission impact from this project will be a reduction of 41.4 tons/year.

In response to your staff's questions concerning additional sulfur emissions from the lime kiln and recovery boiler, we believe that the small amount of SO_2 that could be generated in the kiln would be effectively removed by the kiln's lime based wet scrubber. The added SO_2 emissions from any anticipated increased black liquor throughout to the existing recovery boilers would only potentially impact a long term average and not in any way increase the peak emissions associated with the boilers. Air quality modeling has been performed using peak values for the recovery boilers for both short and long term averaging times. The modeling demonstrates attainment of Florida's Ambient Air Quality Standards.

A second ongoing project at the mill is construction of a coal fired boiler, which has allowed us to retire our No. 3 Recovery Boiler. As we discussed in our meeting, the T.R.S. emissions associated with the No. 3 Recovery should be "banked" to be used as possible future offsets. The estimated allowable emissions from the boiler is 65 tons/year.

We appreciate the effort your staff has made in this permitting process and should you have any further questions, please do not hesitate to call.

Sincerely,

CONTAINER CORPORATION OF AMERICA
Fernandina Beach Mill Division

Eric Schmidt
Senior Technical Project Engineer

/jm

EVAPORATOR

AC 45-61751

DER
OCT 25 1982
BAQM

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Air Pollution [✓] 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; Peeking Unit No. 2, Gas Fired) Evaporator #6

SOURCE LOCATION: Street North Eighth Street City Fernandina Beach, FL

UTM: East 7 356 775.0 456.213 North 2 308 189.0 3394.186

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

APPLICANT NAME AND TITLE: Container Corporation of America

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 [illegible] 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:

Max Woehle, General Manager
Name and Title (Please Type)

Date: 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 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.

(Affix Seal)

Roland L. Allen, Jr.
Certificate No. 7570

Signed:

Roland L. Allen, Jr.
Name (Please Type)

Paper Industry Engineers, Inc.
Company Name (Please Type)

P. O. Box 49366, Atlanta, GA 30359
Mailing Address (Please Type)

Florida Registration No. 7570

Date: Telephone No. 404/939-9002

---

[1] See Section 17-2.02(15) and (22), Florida Administrative Code, (F.A.C.)

BEST AVAILABLE COPY

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.

Construction of a new evaporator set with off gas incineration. This construction will replace two existing evaporators and will result in a net reduction in TRS emissions.

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

Start of Construction (1-83) Completion of Construction (4-83)

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.)

57,000 uninstalled estimate

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

None

E. Is this application associated with or part of a Development of Regional Impact (DRI) pursuant to Chapter 380, Florida Statutes, and Chapter 22F-2, Florida Administrative Code? _____ Yes XX No

F. Normal equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52 ; if power plant, hrs/yr _____ ;

if seasonal, describe: _____

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

1. Is this source in a non-attainment area for a particular pollutant?	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 Deteriorization" (PSD) requirements 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

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		100%	See B1	

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

1. Total Process Input Rate (lbs/hr): 1,031,300 lbs hr. B.L. at 24% solids
2. Product Weight (lbs/hr): 354,100 lbs. hr. B.L. at 65% solids

C. Airborne Contaminants Emitted:

Name of Contaminant	Emission[1]		Allowed Emission[2] Rate per Ch. 17-2, F.A.C.	Allowable[3] Emission lbs/hr	Potential Emission[4]		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/hr	T/yr	
T.R.S.	0	0	5.0 PPM	N/A	62.5	274	

D. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles[5] Size Collected (in microns)	Basis for Efficiency (Sec. V, It[5]
Incineration in	T.R.S.	100	N/A	EP-450
Existing Lime Kiln				
#3				

---

[1] See Section V, Item 2.

[2] Reference applicable emission standards and units (e.g., Section 17-2.05(6) Table II, E. (1), F.A.C. – 0.1 pounds per million BTU heat input)

[3] Calculated from operating rate and applicable standard

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

[5] If Applicable

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	
None			

*Units Natural Gas, MMCF/hr; Fuel Oils, barrels/hr; Coal, 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 N/A Maximum ______

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

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack): No. 3 Lime Kiln

Stack Height: 60 ft. Stack Diameter: 4.5 ft.

Gas Flow Rate: 55392 ACFM Gas Exit Temperature: 190 ºF.

Water Vapor Content: ______ % Velocity: 57.7 FPS

SECTION IV: INCINERATOR INFORMATION

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

Description of Waste ______

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

Approximate Number of Hours of Operation per day ______ days/week ______

Manufacturer ______

Date Constructed ______ Model No. ______

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

Stack Height: ______________ ft. Stack Diameter ______________ Stack Temp. ______________

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

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

Type of pollution control device: [ ] Cyclone [ ] Wet Scrubber [ ] Afterburner [ ] Other (specify) ______________

Brief description of operating characteristics of control devices: ______________

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

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight — show derivation.

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

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

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

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

6. An 8½" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.

7. An 8½" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).

8. An 8½" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

9. An application fee of $20, unless exempted by Section 17-4.05(3), F.A.C. The check should be made payable to the Department of Environmental Regulation.

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

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 60 applicable to the source?
☐ Yes ☐ 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:
5. Useful Life:
6. Operating Costs:
7. Energy:
8. Maintenance Cost:
9. Emissions:

Contaminant	Rate or Concentration

*Explain method of determining D 3 above.

10. Stack Parameters

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

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

1.

a. Control Device:

b. Operating Principles:

c. Efficiency*:
d. Capital Cost:

e. Useful Life:
f. Operating Cost:

g. Energy*:
h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

2.

a. Control Device:

b. Operating Principles:

c. Efficiency*:
d. Capital Cost:

e. Useful Life:
f. Operating Cost:

g. Energy**:
h. Maintenance Costs:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

*Explain method of determining efficiency.

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

3.

a. Control Device:

b. Operating Principles:

c. Efficiency*:
d. Capital Cost:

e. Life:
f. Operating Cost:

g. Energy:
h. Maintenance Cost:

*Explain method of determining efficiency above.

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

4.

a. Control Device

b. Operating Principles:

c. Efficiency*:

d. Capital Cost:

e. Life:

f. Operating Cost:

g. Energy:

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

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

F. Describe the control technology selected:

1. Control Device:

2. Efficiency*:

3. Capital Cost:

4. Life:

5. Operating Cost:

6. Energy:

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

*Explain method of determining efficiency above.

(7) Emissions*:

Contaminant	Rate or Concentration

(8) Process Rate*:

b.

(1) Company:

(2) Mailing Address:

(3) City:

(4) State:

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

CALCULATION SHEET #6 EVAPORATOR SET

Potential Emission Calculation:

$$1000\ \frac{\text{ton}}{\text{day}}\ \text{air dried pulp/day} \times 1.5\ \frac{\text{lb. TRS}}{\text{Ton ADP}} \times \frac{\text{1 day}}{\text{24 hr.}} = 62.5\ \frac{\text{lbs.}}{\text{hr.}}$$

$$62.5\ \frac{\text{lb.}}{\text{hr.}}\ \text{T.R.S.} \times \frac{\text{1 Ton}}{\text{2000 lb.}} \times \frac{\text{24 hr.}}{\text{Day}} \times 365\ \frac{\text{Day}}{\text{Yr.}} = 274\ \frac{\text{Tons}}{\text{Yr.}}$$

Efficiency: 100% efficiency*

Maximum Emission Calculation:

100% control efficiency yields zero emissions.

Actual Emission Calculation:

100% control efficiency yields zero emissions.

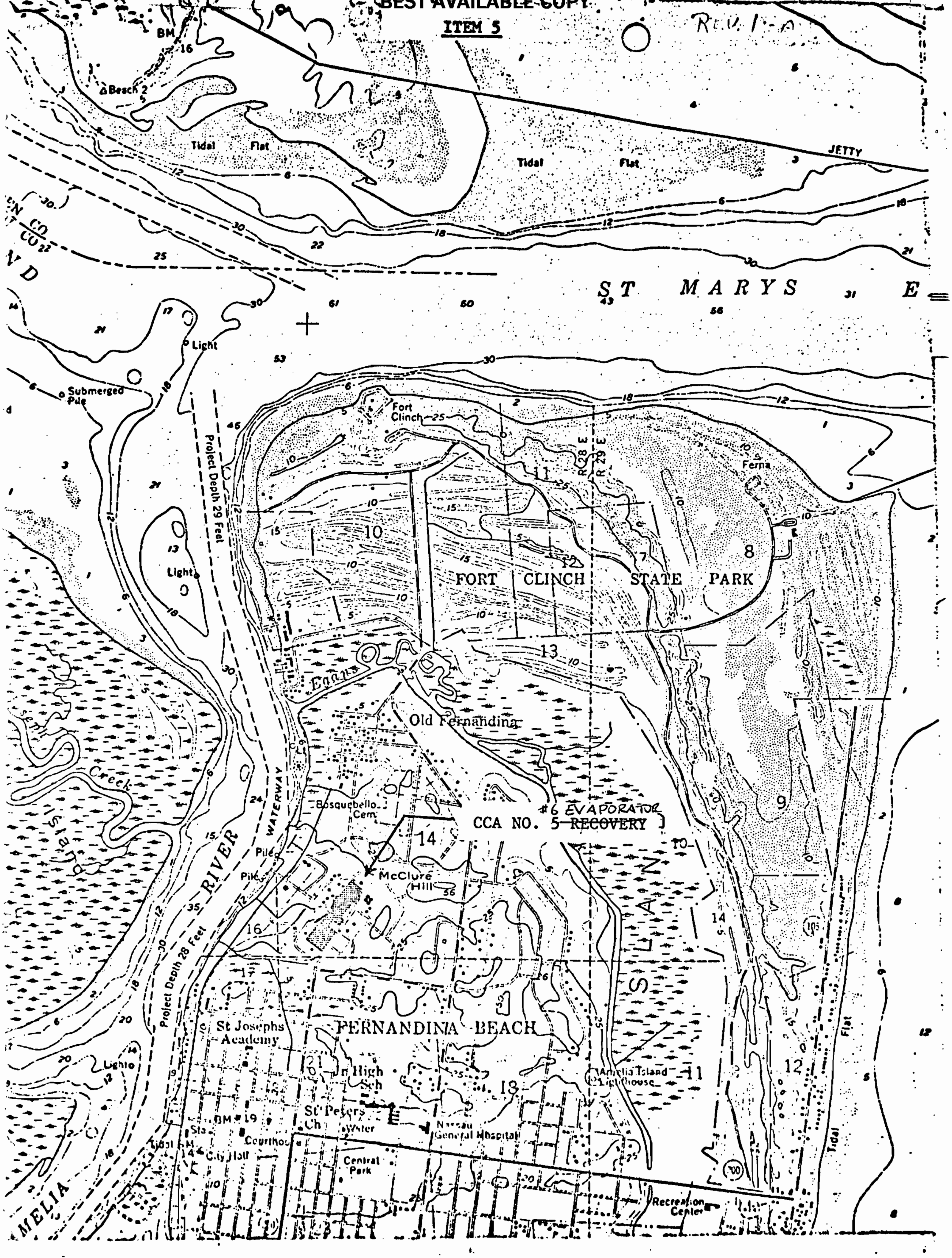
Total Project Emissions Impact:

	Increase	Decrease
Construct #6 Evaporator Set	0	0
Retire #2 Evaporator Set	0	227 #/day T.R.S.

Total = Reduce mills T.R.S. emissions by 227 #/day or 41.4 T/yr.

* P. xxiii Atmospheric emissions from the pulp and paper manufacturing industry E.P.A. 450/1-73-002. The emission factor for controlled T.R.S. emissions after lime kiln incineration is zero.

ITEM 5


R.V. 1-A
BM
16
Beach 2
Tidal Flat
Tidal Flat
JETTY
ST MARYS E
Light
Submerged Pile
Light
Project Depth 29 Feet
Fort Clinch
R 28 E
R 29 E
Ferna
10
11
12
7
8
FORT CLINCH STATE PARK
13
Egans
Old Fernandina
9
#6 EVAPORATOR
CCA NO. 5 ~~RECOVERY~~
Bosquebello Cem
14
McClure Hill
56
Pile
Pile
Creek
RIVER
WATERWAY
16
17
Project Depth 28 Feet
Light
St Josephs Academy
FERNANDINA BEACH
Jr High Sch
18
Amelia Island Lighthouse
11
12
St Peters Ch
BM
19
Courthouse
City Hall
Water
Nassau General Hospital
Central Park
Recreation Center
Tidal Flat
AMELIA

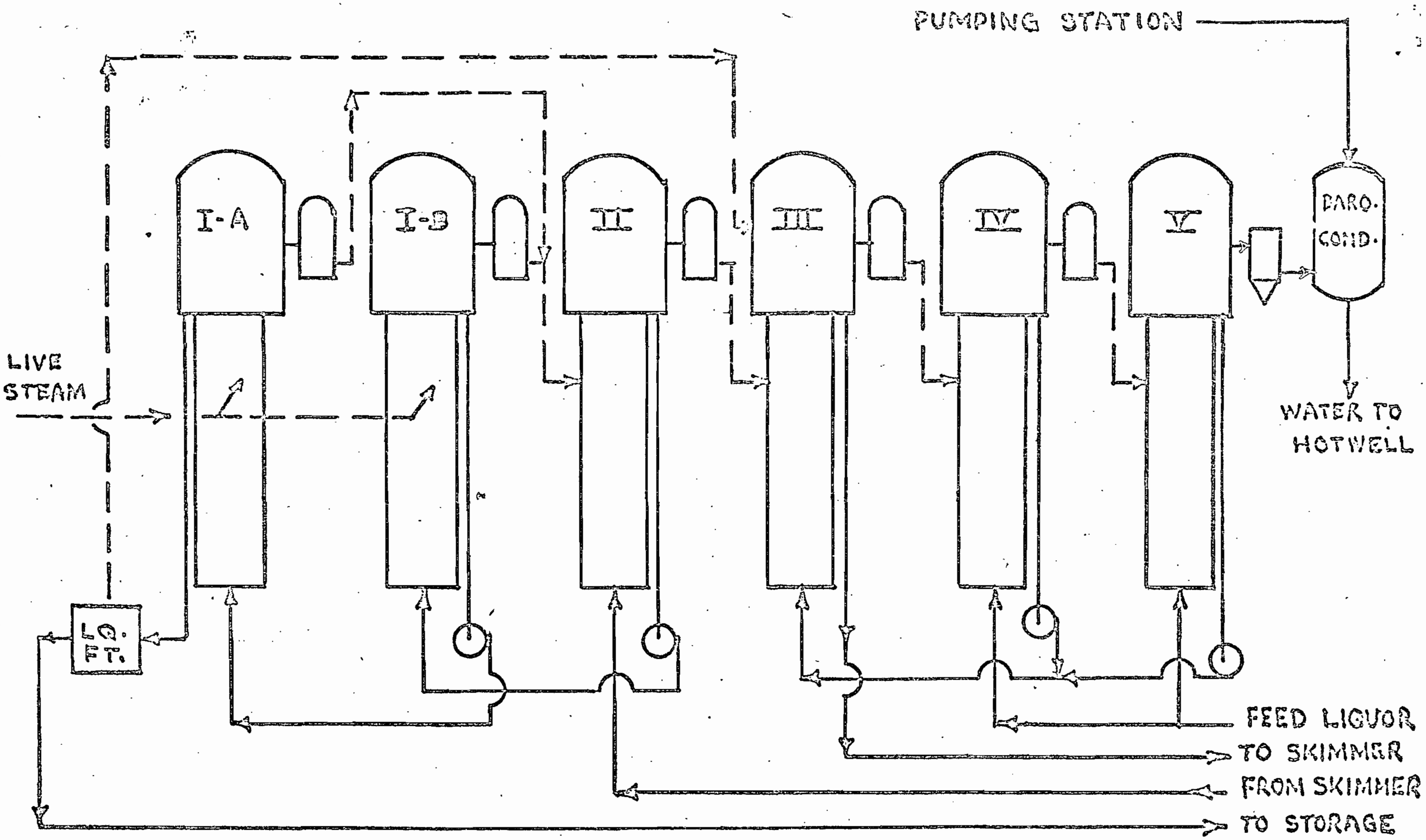


FIGURE 10

FLOW DIAGRAM ~ NO. 1 SET M.E. EVAPORATORS