

United States  
Environmental Protection  
Agency

Office of Air Quality  
Planning and Standards  
Research Triangle Park, NC 27711

EPA-456/R-01-003  
September 2001  
[www.epa.gov/ttn/atw/pulp/pulppg.html](http://www.epa.gov/ttn/atw/pulp/pulppg.html)

Air



# **PULP AND PAPER COMBUSTION SOURCES NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAP) :**

## **A PLAIN ENGLISH DESCRIPTION**





**PULP AND PAPER COMBUSTION SOURCES  
NATIONAL EMISSION STANDARDS FOR  
HAZARDOUS AIR POLLUTANTS (NESHAP)**

**A Plain English Description**

U. S. Environmental Protection Agency  
Office of Air and Radiation  
Office of Air Quality Planning and Standards  
Research Triangle Park, NC 27711

September 2001

**U.S. Environmental Protection Agency  
Region 5, Library (PL-12J)  
77 West Jackson Boulevard, 12th Floor  
Chicago, IL 60604-3590**

0000 # 48391544



## ***Disclaimer***

This document has been reviewed and approved for publication by the Office of Air Quality Planning and Standards of the U.S. Environmental Protection Agency. When using this document, remember that it is not legally binding and does not replace the *National Emission Standard for Hazardous Air Pollutants (NESHAP) for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills* (January 12, 2001, 66 FR 3180) for purposes of application of the rule to any specific mill.

This document is not intended, nor can it be relied upon, to create any rights enforceable by any party in litigation with the United States. The EPA may change this document at any time without public notice.

Technical corrections to the final pulp and paper combustion sources NESHAP (July 19, 2001, 66 FR 37591) have been published. You should periodically check the Technology Transfer Network (TTN) website at <http://www.epa.gov/ttn/> for other technical corrections and/or other relevant information.



## Contents

	Page
<b>Chapter 1 – Purpose of This Document</b>	1.1 Why should I use this document? . . . . . 1-1 1.2 Is there anything I should know before using this document? . . . . 1-2 1.3 What information does this document include? . . . . . 1-2 1.4 What is the purpose of the pulp and paper combustion sources NESHAP? . . . . . 1-3 1.5 How many sources does the NESHAP affect? . . . . . 1-4 1.6 What if I have questions? . . . . . 1-4 1.7 How do I get additional copies of this document? . . . . . 1-5 1.8 Where can I find additional information about this NESHAP? . . . 1-5 1.9 Where can I find additional information about pulp and paper combustion sources? . . . . . 1-7
<b>Chapter 2 – Background</b>	2.1 What is the background information for kraft and soda pulp mills? 2-1 2.2 What is the background information for sulfite pulp mills? . . . . 2-18 2.3 What is the background information for stand-alone semichemical pulp mills? . . . . . 2-22 2.4 Where can I find the references for this background information? 2-28
<b>Chapter 3 – Brief Overview of the Pulp and Paper Combustion Sources NESHAP</b>	3.1 Which mills are subject to the NESHAP? . . . . . 3-1 3.2 What affected sources must be controlled? . . . . . 3-1 3.3 What are the emission control requirements? . . . . . 3-2 3.4 How do mills demonstrate initial and continuous compliance? . . . 3-3 3.5 What recordkeeping and reporting requirements apply? . . . . . 3-5 3.6 When must mills comply? . . . . . 3-6 3.7 What is a new source? . . . . . 3-6 3.8 What additional requirements apply to new sources? . . . . . 3-7
<b>Chapter 4 – NESHAP Requirements</b>	4.1 What are the standards for kraft and soda combustion sources? . . 4-1 4.2 What are the standards for sulfite and semichemical combustion sources? . . . . . 4-13



	<b>Contents (Continued)</b>	<b>Page</b>
<b>Chapter 5 – Other Federal Regulations Affecting Pulp and Paper Mills</b>	5.1 What other Federal air regulations currently affect pulp and paper mills? . . . . .	5-2
	5.2 What Federal water regulations currently affect pulp and paper mills? . . . . .	5-4
	5.3 What Federal hazardous waste regulations currently affect pulp and paper mills? . . . . .	5-6
	5.4 What upcoming regulations will affect pulp and paper mills and companies? . . . . .	5-7
<b>Chapter 6 – Other Requirements and Information</b>	6.1 Who administers this regulation? . . . . .	6-1
	6.2 Do I need a Title V permit? . . . . .	6-1
	6.3 How do I change my permit to include this rule? . . . . .	6-1
	6.4 What parts of the NESHAP General Provisions apply? . . . . .	6-2
<b>Appendices</b>	A. Final NESHAP and Technical Corrections . . . . .	A-1
	B. List of U.S. Pulp and Paper Mills Subject to the NESHAP . . . . .	B-1
	C. List of EPA Regional Office Contacts . . . . .	C-1
	D. Responses to Commonly Asked Questions . . . . .	D-1
	E. Glossary of Commonly Used Terms . . . . .	E-1
	F. Equipment Diagrams for Chemical Recovery Combustion Sources . . . . .	F-1
	G. Example Calculations . . . . .	G-1
	H. Compliance Timelines for Existing and New Sources . . . . .	H-1
	I. Flowchart Summary of the NESHAP . . . . .	I-1
	J. Inspection Checklists for Pulp and Paper Mills Subject to the NESHAP . . . . .	J-1
	K. Example Notifications and Compliance Reports . . . . .	K-1
	L. Technical Report Data Sheet . . . . .	L-1
<b>List of Figures</b>	Figure F-1. Chemical Recovery Process (with DCE Recovery Furnace) for the Kraft Pulping Process . . . . .	F-3
	Figure F-2. NDCE Recovery Furnace and Associated Equipment . . . . .	F-4
	Figure F-3. DCE Recovery Furnace and Associated Equipment . . . . .	F-5



	<b>Contents (Continued)</b>	<b>Page</b>
Figure F-4.	Smelt Dissolving Tank and Wet Scrubber .....	F-6
Figure F-5.	Two-Stage Air-Sparging Black Liquor Oxidation System .....	F-7
Figure F-6.	Lime Kiln and Wet Scrubber .....	F-8
Figure F-7.	Electrostatic Precipitator .....	F-9
Figure F-8.	Venturi Scrubber .....	F-10
Figure F-9.	Emission Sources for a DCE Recovery Furnace System .....	F-11
Figure F-10.	Emission Sources for an NDCE Recovery Furnace .....	F-12
Figure F-11.	Chemical Recovery Process for the Mg-Based Sulfite Pulping Process .....	F-13
Figure F-12.	Mg-Based Sulfite Recovery Furnace .....	F-14
Figure F-13.	Fluidized-Bed Reactor .....	F-15
Figure F-14.	Mg-Based Sulfite Fluidized-Bed Reactor System .....	F-16
Figure F-15.	Chemical Recovery Process for the NH <sub>3</sub> -Based Sulfite Pulping Process .....	F-17
Figure F-16.	NH <sub>3</sub> -Based Sulfite Recovery Furnace .....	F-18
Figure F-17.	Chemical Recovery Process for the Semichemical Pulping Process .....	F-19
Figure F-18.	Recovery Furnace .....	F-20
Figure F-19.	Rotary Liquor Kiln .....	F-21
Figure F-20.	Black Liquor Gasification System .....	F-22
Figure F-21.	Regenerative Thermal Oxidizer .....	F-23
Figure H-1.	Compliance Timeline for Existing Sources and Area Sources That Become Major Sources .....	H-3
Figure H-2.	Compliance Timeline for New or Reconstructed Sources With Startup After Promulgation Date .....	H-4
Figure I-1.	Mill Applicability .....	I-3
Figure I-2.	Applicability and Compliance Schedule .....	I-4
Figure I-3.	Emission Limits .....	I-5
Figure I-4.	Initial Compliance Requirements .....	I-6
Figure I-5.	Continuous Compliance Requirements .....	I-7
Figure I-6.	Reporting Requirements .....	I-8
Figure I-7.	Recordkeeping Requirements .....	I-9



## List of Tables

## Contents (Continued)

## Page

Table 1.	Hazardous Air Pollutants Emitted from Pulp and Paper Combustion Sources .....	1-3
Table 2.	Location of Pulp and Paper Mills Subject to the NESHAP	1-4
Table 3.	Affected Sources and Process Units Covered by the NESHAP .....	3-2
Table 4.	Formats of the Emission Limits .....	3-3
Table 5.	Initial and Continuous Compliance Requirements .....	3-4
Table 6.	Definition of a New Source .....	3-6
Table 7.	Kraft and Soda Affected Sources .....	4-1
Table 8.	Kraft and Soda Emission Limits .....	4-2
Table 9.	Kraft and Soda Initial Compliance Requirements .....	4-3
Table 10.	Kraft and Soda Continuous Compliance Requirements ...	4-5
Table 11.	Kraft and Soda Recordkeeping Requirements .....	4-8
Table 12.	Kraft and Soda Reporting Requirements .....	4-10
Table 13.	Comparison of NSPS and NESHAP Requirements .....	4-11
Table 14.	Sulfite and Semichemical Affected Sources .....	4-13
Table 15.	Sulfite and Semichemical Emission Limits .....	4-14
Table 16.	Sulfite and Semichemical Initial Compliance Requirements	4-15
Table 17.	Sulfite and Semichemical Continuous Compliance Requirements .....	4-16
Table 18.	Other Federal Air Regulations .....	5-2
Table 19.	Federal Water Regulations .....	5-4
Table 20.	Federal Hazardous Waste and Emergency Planning Regulations .....	5-6
Table 21.	Title V Permitting Requirements .....	6-2
Table B-1.	Pulp and Paper Mills .....	B-2
Table C-1.	EPA Regional Office Contacts .....	C-2
Table G-1.	Results of Example Mill A .....	G-9
Table G-2.	Results of Example Mill B .....	G-15



## Chapter 1 – Purpose of This Document

The U.S. Environmental Protection Agency (EPA) published the final national emission standards for hazardous air pollutants (NESHAP) for pulp and paper combustion sources on January 12, 2001. Technical corrections to the final rule were published on July 19, 2001. The NESHAP affects existing and new major chemical recovery combustion sources at kraft, soda, sulfite, and stand-alone semichemical pulp mills. The NESHAP requires these sources to control hazardous air pollutant (HAP) emissions using the maximum achievable control technology (MACT). This chapter discusses the purpose of this document, the information it contains, the purpose of the NESHAP, and sources of further information.

*This document does NOT replace the NESHAP for purposes of making legal interpretations'*

If You Need the Following Information...	Then Read...
Why should I use this document?	Section 1.1
Is there anything I should know before using this document?	Section 1.2
What information does this document include?	Section 1.3
What is the purpose of the pulp and paper combustion sources NESHAP?	Section 1.4
How many sources does the NESHAP affect?	Section 1.5
What if I have questions?	Section 1.6
How do I get additional copies of this document?	Section 1.7
Where can I find additional information about this NESHAP?	Section 1.8
Where can I find additional information about pulp and paper combustion sources?	Section 1.9

### 1.1 Why should I use this document?

This document can help plant owners and operators (you) understand the **Pulp and Paper Combustion Sources NESHAP** (also known as 40 CFR part 63, subpart MM) by helping you determine **five** main things:

1. If the rule applies to your plant and process;
2. What compliance options are available for different emission points;
3. How to set mill-specific emission limits under the bubble compliance alternative;
4. What to monitor, record, and report; and
5. Dates by which you must meet requirements.



Stay informed about new or revised requirements by visiting "What's New" pages of the OECA and Air Toxics websites:

<http://es.epa.gov/oeca/wn2.html>  
and  
<http://www.epa.gov/ttn/atw/atwnew.html>

## 1.2 Is there anything I should know before using this document?

When using this document, remember that it doesn't replace the final rule and that it covers only requirements published on or before July 19, 2001. You should keep up with new requirements printed after this date by periodically checking the Federal Register and the Code of Federal Regulations (CFR). You can download Federal Register notices by going to the Government Printing Office (GPO) website at [http://www.access.gpo.gov/su\\_docs/aces/aces140.html](http://www.access.gpo.gov/su_docs/aces/aces140.html).

We have included the final rule (January 12, 2001, 66 FR 3180) and the technical corrections (66 FR 37591) in **Appendix A**, so that you can reference the rule while using this document.

## 1.3 What information does this document include?

A list of information contained in this document is provided below. Everyone should read **Chapter 3** because it provides the overview of the NESHAP. After reading Chapter 3, you should decide what other sections of the document you need to read.

If You Need the Following Information...	Then Read...
The purpose of this document	Chapter 1
Background	Chapter 2
A brief overview of the NESHAP	Chapter 3
NESHAP requirements	Chapter 4
Other Federal regulations affecting pulp and paper mills	Chapter 5
Other requirements and information	Chapter 6
Final NESHAP and technical corrections	Appendix A
List of U.S. pulp and paper mills subject to the NESHAP	Appendix B
List of EPA Regional Office contacts	Appendix C
Responses to commonly asked questions	Appendix D
Glossary of commonly used terms	Appendix E
Equipment diagrams for chemical recovery combustion sources	Appendix F
Example calculations, including how to use the PM bubble compliance alternative	Appendix G
Compliance timelines for existing and new sources	Appendix H
Flowchart summary of the NESHAP	Appendix I
Inspection checklists for pulp and paper mills subject to the NESHAP	Appendix J
Example notifications and compliance reports	Appendix K



*A major source is a stationary source that has the potential to emit 10 tons per year of any one HAP or 25 tons per year of total HAP.*

#### 1.4 What is the purpose of the pulp and paper combustion sources NESHAP?

The purpose of this NESHAP is to reduce HAP emissions from chemical recovery combustion sources at pulp and paper mills, thus reducing public health hazards. The EPA regulated these chemical recovery combustion sources because chemical pulp mills were judged to be major sources of HAPs listed in section 112 of the Clean Air Act (CAA). Section 112(d) of the CAA directs EPA to establish NESHAP for major stationary sources.

The CAA requires the NESHAP to reflect the maximum degree of emission limitation that is achievable. This level of control is commonly referred to as MACT. The "MACT floor" is the minimum control level allowed for NESHAP as specified in section 112(d)(3) of the CAA. In determining MACT, EPA may also consider control options more stringent than the MACT floor, based on considerations of cost, human health impacts, environmental impacts, and energy requirements.

Pulp and paper combustion sources emit 22,500 tons of HAP annually that impact both air quality and public health. The pulp and paper combustion sources NESHAP will reduce 1997 emissions of HAP from pulp and paper mills by 2,700 tons per year (a 12 percent reduction). **Table 1** lists the HAP emitted in the largest quantities from pulp and paper combustion sources and also lists HAP metals that are emitted from pulp and paper combustion sources. The NESHAP limits gaseous organic HAP emissions from new recovery furnaces at kraft and soda mills and from new and existing combustion sources at semichemical mills. The NESHAP also limits HAP metals emissions from both existing and new combustion sources at kraft, soda, and sulfite mills.

**Table 1. Hazardous Air Pollutants Emitted from Pulp and Paper Combustion Sources**

Gaseous HAP <sup>a</sup>		HAP Metals	
• Acetaldehyde	• Methyl ethyl ketone	• Antimony	• Lead
• Benzene	• Methyl isobutyl ketone	• Arsenic	• Manganese
• Formaldehyde	• Phenol	• Beryllium	• Mercury
• Hydrochloric acid	• Toluene	• Cadmium	• Nickel
• Methanol	• Xylenes	• Chromium	• Selenium

<sup>a</sup> These 10 compounds represent the most prevalent (highest emitted) HAP from pulp and paper combustion sources; other gaseous HAP are also emitted from these sources, but in lesser quantities.



*The list of mills in Appendix B is for information only. The list was based on the available information and is subject to change, as mills may change ownership or be shut down. The list does not represent an EPA determination that any specific mill is subject to the NESHAP.*

*Identify your State and local contacts using the Membership Directory at the STAPPA/ALAPCO website at <http://www.4cleanair.org>*

The control techniques used to reduce HAP emissions will also reduce emissions of other pollutants. For example, the NESHAP will reduce particulate matter (PM) emissions by 23,200 tons per year, volatile organic compound (VOC) emissions by 34,700 tons per year, and carbon monoxide (CO) emissions by 61,500 tons per year. Emissions of PM, VOC, and CO cause a variety of adverse health effects. Volatile organic compounds are also precursors to the formation of tropospheric (ground level) ozone, which causes adverse health effects.

### 1.5 How many sources does the NESHAP affect?

**Table 2** shows the location of the pulp and paper mills in the United States that are potentially affected by the pulp and paper combustion sources NESHAP. **Appendix B** lists the pulp and paper mills (including facility name, location, and type of pulping process) that were identified as potentially affected sources at the time the final NESHAP was published.

**Table 2.** Location of Pulp and Paper Mills Subject to the NESHAP

State	No. Mills	State	No. Mills	State	No. Mills
Alabama	13	Maine	7	Oklahoma	1
Arkansas	7	Maryland	1	Oregon	5
California	1	Michigan	6	Pennsylvania	4
Florida	6	Minnesota	2	South Carolina	7
Georgia	12	Mississippi	6	Tennessee	3
Idaho	1	Montana	1	Texas	4
Indiana	1	New Hampshire	2	Virginia	6
Iowa	1	New York	2	Washington	9
Kentucky	2	North Carolina	5	Wisconsin	7
Louisiana	9	Ohio	2	Total	133

### 1.6 What if I have questions?

If you are the owner or operator of a pulp and paper mill, you can get additional information from:

- Your State or local air pollution control agency
- Trade associations, such as the American Forest and Paper Association (AF&PA) at <http://www.afandpa.org>; the Technical Association of the



Pulp and Paper Industry at <http://www.tappi.org>; and the National Council of the Paper Industry for Air and Stream Improvement, Inc. (NCASI) at <http://www.ncasi.org>.

If you work for a State or local regulatory agency and have questions regarding the implementation of this NESHAP, you should contact your EPA Regional Office. A list of EPA Regional Office contacts is included in **Appendix C**. A list of commonly asked questions and responses is also provided in **Appendix D**.

### 1.7 How do I get additional copies of this document?

You can get copies of this document from the following sources:

- EPA's Technology Transfer Network (TTN) on the World Wide Web at <http://www.epa.gov/ttn/atw/index.html>. Look under Rules and Implementation.
- Library Services Office (MD-35)  
U.S. Environmental Protection Agency  
Research Triangle Park, North Carolina 27711  
Telephone: (919) 541-2777
- National Technical Information Services (NTIS)  
Technology Administrations  
5285 Port Royal Road  
Springfield, Virginia 22161  
Telephone: (703) 605-6000 or (800) 553-6947  
Fax: (703) 321-8547
- National Center for Publications and Information  
Telephone: 1-800-490-9198  
or <http://www.epa.gov/ncepihom/>

### 1.8 Where can I find additional information about this NESHAP?

You can find information about the basis and purpose of this NESHAP in the Federal Register notices, technical support documents, and technical memoranda. The technical support documents and memoranda are:

- Technical Support Document: Chemical Recovery Combustion Sources at Kraft and Soda Pulp Mills. U. S. Environmental Protection Agency: Office of Air Quality Planning and Standards. Research Triangle Park, NC. Publication No. EPA-453/R-96-012. October 1996.

*Copies are available  
free of charge from the  
EPA library*

*NTIS will charge a fee  
for each document  
requested*



- Draft Technical Support Document: Chemical Recovery Combustion Sources at Sulfite Pulp Mills. U. S. Environmental Protection Agency. Office of Air Quality Planning and Standards. Research Triangle Park, NC. June 22, 1995.
- Memorandum from McManus, S., MRI, to Telander, J., EPA/MICG, December 6, 1996. Profile of U.S. Stand-Alone Semichemical Pulp Mills.
- Memorandum from Telander, J., EPA/MICG, to Docket A-94-67. November 20, 2000. Summary of Public Comments and Responses on the Proposed NESHAP for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills.

Federal Register notices pertaining to the NESHAP are:

- Notice of Proposed Rulemaking—NESHAP; Proposed Standards for Hazardous Air Pollutants from Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills, Vol. 63, No. 72, Fed. Reg., 18754-18793, Wednesday, April 15, 1998.
- Notice of Final Rulemaking—NESHAP; Standards for Hazardous Air Pollutants from Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills, Vol. 66, No. 9, Fed. Reg., 3180-3203, Friday, January 12, 2001.
- Technical Corrections—NESHAP; Standards for Hazardous Air Pollutants from Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills, Vol. 66, No. 139, Fed. Reg., 37591-37593, Thursday, July 19, 2001.

You can get these documents and other relevant documents from:

- EPA's Air Toxics website (ATW) at <http://www.epa.gov/ttn/atw/index.html>
- What's New page of the ATW at <http://www.epa.gov/ttn/atw/atwnew.html> for the most current information
- The Air Docket (A-94-67) which is available for public inspection between 8 a.m. and 4 p.m., Monday through Friday, except for Federal holidays, at:

*Check the ATW for further correction notices and amendments*



Air and Radiation Docket and Information Center (MD-6102)  
U.S. Environmental Protection Agency  
401 M Street SW, Room M-1500, Waterside Mall  
Washington, DC 20460  
Telephone: (202) 260-7548

### **1.9 Where can I find additional information about pulp and paper combustion sources?**

You can get additional information from:

- Smook, G. Handbook for Pulp and Paper Technologists. 2<sup>nd</sup> Edition. Montreal, Quebec, Canada, Canadian Pulp and Paper Association. Atlanta, GA, TAPPI Press. 1992.
- Someshwar, A. and J. Pinkerton. Wood Processing Industry. In: Air Pollution Engineering Manual, Air and Waste Management Association. Buonicore, A. and W. Davis (eds.). New York, Van Norstrand Reinhold. 1992.
- Ingruber, O., M. Kocurek, and A. Wong (eds.). Pulp and Paper Manufacturer: Volume 4--Sulfite Science and Technology. Joint Textbook Committee of the Paper Industry. 1985.
- Green, R. and G. Hough (eds.). Chemical Recovery in the Alkaline Pulping Process. 3<sup>rd</sup> Edition. Prepared by the Alkaline Pulping Committee of the Pulp Manufacture Division. Atlanta, GA, TAPPI Press. 1992.
- Lockwood Post's Directory of the Pulp, Paper and Allied Trades, 2001. San Francisco, Miller Freeman Publications. 2001.
- EPA. 1995. Office of Compliance Sector Notebook Project: Profile of the Pulp and Paper Industry. Publication No. EPA/310-R-95-015. <http://es.epa.gov/oeca/sector/index.html#pulp>. Office of Enforcement and Compliance Assurance, Washington, DC.
- EPA. 1999. Kraft Pulp Mill Compliance Assessment Guide. Publication No. EPA/310-B-99-001. Office of Enforcement and Compliance Assurance, Washington, DC.
- How Paper is Made: An Overview of Pulping and Papermaking from Woodyard to Finished Product. 1997. Available on CD-ROM, Atlanta, GA: TAPPI PRESS.
- EPA. 2001. Pulping and Bleaching System NESHAP for the Pulp and Paper Industry: A Plain English Description. EPA-456/R-01-002. Office of Air Quality Planning and Standards, Research Triangle Park, NC. <http://www.epa.gov/ttn/atw/pulp/pulppg.html>.

*The Pulping and Bleaching System NESHAP for the Pulp and Paper Industry: A Plain English Description covers the requirements in the Pulp and Paper Production NESHAP for non-combustion sources.*



## Chapter 2 – Background

This chapter presents background information on the pulping processes and chemical recovery processes for kraft, soda, sulfite, and stand-alone semichemical pulp mills. A glossary of the terms and acronyms used in this chapter and throughout the document is provided in **Appendix I**. The figures referenced in this chapter are presented in **Appendix F**.

If You Need the Following Information...	Then Read...
Kraft and soda pulp mills	Section 2.1
Sulfite pulp mills	Section 2.2
Stand-alone semichemical pulp mills	Section 2.3
References	Section 2.4

### 2.1 What is the background information for kraft and soda pulp mills?

#### *What is the U.S. population of kraft and soda pulp mills?*

There are 111 kraft and 2 soda pulp mills currently operating in 27 States. **Appendix B** lists the company names and locations for the 113 mills. The kraft process is the dominant pulping process in the United States, accounting for approximately 85 percent of all domestic pulp production.

One reason why the kraft process dominates the paper industry is because of the ability of the kraft chemical recovery process to recover approximately 95 percent of the pulping chemicals and at the same time produce energy in the form of steam. Other reasons for the dominance of the kraft process include its ability to handle a wide variety of wood species and the superior strength of its pulp.

#### *What is the kraft and soda pulping process?*

In the kraft pulping process, cooking liquor is introduced with wood chips into digesters, where the wood chips are “cooked” under pressure. Cooking liquor, which is referred to as “white liquor,” is an aqueous solution of sodium hydroxide (NaOH) and sodium sulfide (Na<sub>2</sub>S) that is used in the pulping area of the mill. The soda pulping process is similar to the kraft process, except that soda pulping is a nonsulfur process that does not use Na<sub>2</sub>S.

After the wood chips have been “cooked,” the contents of the digester are discharged under full digester pressure into the blow tank. As the mass of

*Appendix B includes a list of chemical pulp mills (including kraft and soda pulp mills) in the U.S. Mills that use 100 percent recycled fiber or mechanically pulp wood (e.g., groundwood mills) are not included. This list is subject to change, as mills may change ownership or be shut down.*



softened, cooked chips impacts on the tangential entry of the blow tank, the chips disintegrate into fibers or "pulp." The pulp and spent cooking liquor are subsequently separated in a series of brown stock washers.

At about 11 percent of kraft pulp mills, neutral sulfite semichemical (NSSC) pulping or kraft green liquor pulping is also practiced. The NSSC process involves pulping wood chips in a solution of sodium sulfite and sodium bicarbonate, followed by mechanical defibrating. The kraft green liquor process uses sodium carbonate ( $\text{Na}_2\text{CO}_3$ ) plus  $\text{Na}_2\text{S}$  as the cooking liquor for semichemical pulping.

The kraft and soda pulping processes are discussed in greater detail in **Pulping and Bleaching System NESHAP for the Pulp and Paper Industry: A Plain English Description**. The following sections describe the chemical recovery process at kraft and soda pulp mills.

### ***What is the kraft and soda chemical recovery process?***

Spent cooking liquor, referred to as "weak black liquor," from the brown stock washers is routed to the chemical recovery area at kraft and soda pulp mills. A process flow diagram of the chemical recovery area at a kraft pulp mill is shown in **Figure F-1**. The purpose of the chemical recovery process at kraft and soda pulp mills is to recover cooking liquor chemicals from the black liquor. The process involves concentrating weak black liquor, combusting organic compounds, reducing inorganic compounds, and reconstituting the cooking liquor.

Weak black liquor is a dilute solution (approximately 12 to 15 percent solids) of wood lignins, organic materials, oxidized inorganic compounds (sodium sulfate [ $\text{Na}_2\text{SO}_4$ ],  $\text{Na}_2\text{CO}_3$ ), and white liquor ( $\text{Na}_2\text{S}$  and  $\text{NaOH}$ ). In the kraft and soda chemical recovery process, weak black liquor is first directed through a series of multiple-effect evaporators (MEEs) to increase the solids content to about 50 percent.

In the kraft chemical recovery process, the "strong" (or "heavy") black liquor from the MEE system is either oxidized in the black liquor oxidation (BLO) system if it is further concentrated in a direct contact evaporator (DCE) or routed directly to a nondirect contact evaporator (NDCE), also called a concentrator. Oxidation of the black liquor prior to evaporation in a DCE reduces emissions of total reduced sulfur (TRS) compounds, which are stripped from the black liquor in the DCE when it contacts hot flue gases from the recovery furnace. The solids content of the black liquor following the final evaporator/concentrator typically averages 65 to 68 percent. The soda chemical recovery process is similar to the kraft process, except that the soda process does not require BLO systems, since it is a nonsulfur process that does not result in TRS emissions.

*Only kraft pulp mills that operate DCE recovery furnaces have BLO systems.*



The concentrated black liquor is sprayed into the recovery furnace, where organic compounds are combusted, and the  $\text{Na}_2\text{SO}_4$  is reduced to  $\text{Na}_2\text{S}$ . The black liquor burned in the recovery furnace has a high energy content (5,800 to 6,600 British thermal units per pound [Btu/lb] of dry solids), which is recovered as steam for process requirements, such as cooking wood chips, heating and evaporating black liquor, preheating combustion air, and drying the pulp or paper products. Particulate matter (primarily  $\text{Na}_2\text{SO}_4$ ) exiting the furnace with the hot flue gases is collected in an electrostatic precipitator (ESP) and added to the black liquor to be fired in the recovery furnace. Additional makeup  $\text{Na}_2\text{SO}_4$ , or "saltcake," may also be added to the black liquor prior to firing.

Molten inorganic salts, referred to as "smelt," collect in a char bed at the bottom of the furnace. Smelt is drawn off and dissolved in weak wash water in the smelt dissolving tank (SDT) to form a solution of carbonate salts called "green liquor," which is primarily  $\text{Na}_2\text{S}$  and  $\text{Na}_2\text{CO}_3$ . Green liquor also contains insoluble unburned carbon and inorganic impurities, called dregs, which are removed in a series of clarification tanks.

Decanted green liquor is transferred to the causticizing area, where the  $\text{Na}_2\text{CO}_3$  is converted to  $\text{NaOH}$  by the addition of lime (calcium oxide [ $\text{CaO}$ ]). The green liquor is first transferred to a slaker tank, where  $\text{CaO}$  from the lime kiln reacts with water to form calcium hydroxide ( $\text{Ca}(\text{OH})_2$ ). From the slaker, liquor flows through a series of agitated tanks, referred to as causticizers, that allow the causticizing reaction to go to completion (i.e.,  $\text{Ca}(\text{OH})_2$  reacts with  $\text{Na}_2\text{CO}_3$  to form  $\text{NaOH}$  and calcium carbonate [ $\text{CaCO}_3$ ]).

The causticizing product is then routed to the white liquor clarifier, which removes  $\text{CaCO}_3$  precipitate, referred to as "lime mud." The lime mud is washed in the mud washer to remove the last traces of sodium. The mud from the mud washer is then dried and calcined in a lime kiln to produce "reburned" lime, which is reintroduced to the slaker. The mud washer filtrate, known as weak wash, is used in the SDT to dissolve recovery furnace smelt. The white liquor ( $\text{NaOH}$  and  $\text{Na}_2\text{S}$ ) from the clarifier is recycled to the digesters in the pulping area of the mill.

At the 11 percent of kraft mills where NSSC pulping is also practiced, the NSSC and kraft processes often overlap in the chemical recovery process, when the spent NSSC liquor, referred to as "pink liquor," is mixed with kraft black liquor and burned in the recovery furnace. In such cases, the NSSC chemicals replace most or all of the makeup chemicals. For Federal regulatory purposes, if the weight percentage of pink liquor solids exceeds 7 percent of the total mixture of solids fired and the sulfidity of the resultant green liquor exceeds 28 percent, the recovery furnace is classified as a "cross-recovery furnace."



### ***What are the kraft and soda chemical recovery equipment?***

This section focuses on the four pieces of equipment considered the primary emission sources in the chemical recovery area. The equipment discussed in this section include the recovery furnace, SDT, BLO system (kraft process only), and lime kiln. These equipment are illustrated in **Figures F-2 through F-6**. Air emissions from these equipment are expected to be similar for both the kraft and soda processes, with the exception of TRS emissions. Because the soda process does not use sulfur-containing compounds, no TRS emissions are generated by soda mills.

**Recovery furnace.** The purpose of the kraft recovery furnace is to (1) recover inorganic pulping chemicals (e.g.,  $\text{Na}_2\text{S}$ ) and (2) produce steam. Inputs to the furnace include concentrated black liquor, combustion air, and auxiliary fuel (usually, auxiliary fuel is only used during shutdown or startup). Outputs include molten smelt (primarily  $\text{Na}_2\text{S}$  and  $\text{Na}_2\text{CO}_3$ ), flue gases, and steam. The smelt exits from the bottom of the furnace into an SDT, where the recovery of cooking chemicals continues. Particulate matter (primarily  $\text{Na}_2\text{SO}_4$  and  $\text{Na}_2\text{CO}_3$ ) entrained in the flue gases is also recovered using an ESP and subsequently added to the concentrated black liquor. Steam produced by the recovery furnace is used in other processes around the mill.

Prior to being fired in the recovery furnace, the black liquor is concentrated using an NDCE or DCE. **Figures F-2 and F-3** show the equipment associated with NDCE and DCE recovery furnaces, respectively. The NDCE is an indirect, steam-heated black liquor concentrator. Black liquor typically enters the NDCE at a solids concentration of 50 percent and exits at a concentration of 68 percent or higher. The DCE uses the hot combustion gases exiting the furnace to increase the solids content of the black liquor from about 50 percent to 65 percent.

Direct contact evaporators may be of the cascade or cyclone design. The cascade evaporator consists of a rotating assembly of tubes that are alternately submerged in black liquor and exposed to hot flue gases. A cyclone evaporator is a cylindrical vessel with a conical bottom. Black liquor is sprayed into the side of the evaporator, where it contacts the hot combustion gases that are introduced tangentially, creating a "cyclone" effect. The flue gases exit from the top of the evaporator, and the concentrated black liquor drains down to and exits from the bottom of the evaporator.

To minimize the stripping of TRS compounds when the hot flue gases contact the black liquor in the DCE, most DCEs are preceded by BLO systems, which stabilize the sulfur compounds in the black liquor. Black liquor that is concentrated in NDCEs does not contact the hot flue gases, and, therefore, does not require oxidation. Because the NDCE recovery furnace typically has lower TRS emissions than does the DCE recovery furnace, the NDCE



recovery furnace is also referred to as the “low-odor” design. Since the 1970s, most new recovery furnaces have been designed with NDCEs. An estimated 60 percent of recovery furnaces currently in operation are NDCE furnaces, and 40 percent are DCE furnaces.

Regardless of how the black liquor is concentrated, the chemical reactions that take place inside an NDCE- or DCE-type furnace are the same. The concentrated black liquor is sprayed into the furnace through fixed or oscillating nozzles or “guns” mounted at openings in the furnace walls. Depending upon the design and operation of the recovery furnace, the sprayed black liquor may hit the opposing wall, where it dries and burns before falling to the hearth, or may fall short of the opposing wall and dry and burn in suspension. Combustion air is generally supplied to the furnace at three levels, with two levels located below the black liquor nozzles and one above. Some furnaces may have only two combustion air levels (i.e., one above and one below the liquor nozzles).

The inorganic chemicals in the black liquor are recovered in three distinct zones inside the recovery furnace: (1) the drying zone, (2) the reducing zone, and (3) the oxidizing zone.

The drying zone is the area of the furnace extending from the black liquor spray to just above the molten smelt at the bottom of the furnace. The purpose of the drying zone is to evaporate the water from the liquor droplets.

The reducing zone is just below the drying zone and includes the char bed. The reduction of  $\text{Na}_2\text{SO}_4$  to  $\text{Na}_2\text{S}$  takes place in the reducing zone.

Volatile gases that are released in the drying and reducing zones of the furnace travel to the highly turbulent upper section of the furnace, referred to as the oxidizing zone, where the gases are combusted. The heat generated from the combustion of these gases is then used to generate steam as the combustion gases are drawn through the heat exchanger section of the furnace (i.e., superheater, boiler bank, and economizer).

For NDCE recovery furnaces, the design economizer exit gas temperature ranges from  $177^\circ$  to  $190^\circ\text{C}$  ( $350^\circ$  to  $375^\circ\text{F}$ ). For DCE recovery furnaces, the heat from the recovery furnace is used to evaporate the black liquor. Thus, the required economizer exit gas temperature for DCE recovery furnaces,  $370^\circ$  to  $430^\circ\text{C}$  ( $700^\circ$  to  $800^\circ\text{F}$ ), is much higher than that for NDCE recovery furnaces. Because a large portion of the combustion heat from DCE



recovery furnaces is required for black liquor evaporation, less combustion heat is available to produce steam.

Flue gases exiting the economizer are routed either directly to an add-on PM control device (i.e., for NDCE recovery furnaces) or to a DCE followed by an add-on PM control device (i.e., for DCE recovery furnaces). The recovered PM (primarily  $\text{Na}_2\text{SO}_4$  [saltcake] and  $\text{Na}_2\text{CO}_3$ ) is subsequently added to the concentrated black liquor, and the cleaned flue gas exits through the stack. Approximately 95 percent of the  $\text{Na}_2\text{SO}_4$  is recovered; additional makeup saltcake is added to the concentrated black liquor as needed.

The inorganic chemical in the black liquor,  $\text{Na}_2\text{SO}_4$ , is reduced to  $\text{Na}_2\text{S}$ , a cooking liquor chemical, in the reducing zone (lower section) of the furnace. The  $\text{Na}_2\text{S}$  and other inorganic chemicals, predominantly  $\text{Na}_2\text{CO}_3$ , drain as molten smelt from the furnace bottom to the SDT, where reprocessing into cooking liquor continues.

**Smelt dissolving tank.** Molten smelt is one of the main products from the combustion of black liquor. Smelt, which is predominantly  $\text{Na}_2\text{S}$  and  $\text{Na}_2\text{CO}_3$ , is formed in the bottom of the furnace. Smelt, at approximately  $1900^\circ$  to  $2100^\circ\text{F}$ , filters through the char bed and is continuously discharged through water-cooled smelt spouts into the SDT. In the SDT, smelt is mixed with weak wash water from the recausticizing area to form green liquor, an aqueous solution of  $\text{Na}_2\text{CO}_3$  and  $\text{Na}_2\text{S}$  in about a three-to-one ratio. The green liquor is subsequently transferred to the recausticizing area for reprocessing into cooking liquor (i.e., white liquor). A diagram of an SDT with a wet scrubber is provided in **Figure F-4**.

The SDT is a large, covered vessel located below the recovery furnace. Green liquor is maintained in the tank at a level of about half the depth of the tank. As the smelt exits the water-cooled smelt spouts and falls several feet into the SDT, it is shattered by high-pressure steam or shatter sprays of recirculated green liquor. The steam or shatter sprays break the smelt flow into small droplets and cool the smelt before it falls into and reacts with the liquid in the SDT to form green liquor. Large volumes of steam are generated when the molten smelt and liquid mix. The vapor space above the liquid level provides an opportunity for water vapor and PM resulting from the quenching of smelt to settle out of suspension into the green liquor. An induced-draft fan constantly draws the vapor and entrained PM through an add-on PM control device, generally a wet scrubber. Scrubber water is sprayed into the scrubber and allowed to drain directly into the SDT, where it reacts with smelt to form green liquor.

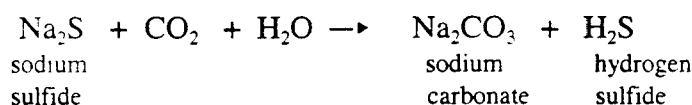
The SDT is constantly agitated to prevent formation of hot spots on the surface of the liquor and to keep solids from accumulating in the bottom of



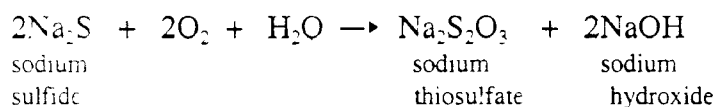
the tank. Surface liquor hot spots can contribute to the formation of explosive hydrogen gas from the dissociation of water reacting with the hot smelt.

Green liquor formed in the SDT is sent to the green liquor clarifier in the causticizing area. Green liquor is converted to white liquor (i.e., NaOH and Na<sub>2</sub>S) in the causticizing area.

**Black liquor oxidation system.** The BLO system reduces malodorous TRS emissions from DCE recovery furnaces at kraft pulp mills. Total reduced sulfur compounds (primarily hydrogen sulfide [H<sub>2</sub>S]) are stripped from black liquor when hot flue gases from the recovery furnace contact the black liquor in the DCE. Hydrogen sulfide is stripped by the reaction between residual Na<sub>2</sub>S in the black liquor and carbon dioxide (CO<sub>2</sub>) and water (H<sub>2</sub>O) in the recovery furnace flue gas, as follows:



The BLO system minimizes the stripping of TRS compounds in the DCE by stabilizing the sulfur compounds in the black liquor prior to evaporation in the DCE. The main reaction that takes place in the BLO system is the oxidation of Na<sub>2</sub>S to nonvolatile sodium thiosulfate (Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>), as follows:



The oxidation efficiency of the BLO process is measured by the percent conversion of Na<sub>2</sub>S to Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub> in the black liquor on a pound per gallon (lb/gal) basis. Oxidation efficiencies greater than 99 percent are common. Sulfidity levels of the black liquor entering the DCE are targeted to less than 0.002 lb/gal in order to meet TRS emission limits for DCE recovery furnaces. Oxidizing black liquor results in a slight increase (2 to 3 percent) in the solids content of the black liquor and reduces its heating value by 2 to 5 percent.

The BLO system is typically located after the MEE system, a process referred to as “strong” black liquor oxidation. A small number of mills oxidize black liquor prior to evaporation in the MEE system, which is referred to as “weak” black liquor oxidation. Other options are to oxidize both weak and strong black liquor or to oxidize the black liquor between effects of the MEE system. With weak BLO systems, the effects of partial reversing of the oxidation reaction (i.e., oxidized sulfur compounds reducing to H<sub>2</sub>S) that occurs in the MEE system can be minimized by adding a second oxidation step, such as oxygen (O<sub>2</sub>) polishing of strong black liquor.

*The BLO system stabilizes the sulfur compounds in the black liquor so that they are less likely to be volatilized when the hot gases from the recovery furnace pass through the DCE*



Black liquor can be oxidized using either air or pure (molecular)  $O_2$ . Because of economic considerations, the majority of BLO systems use air as the oxidant. Air BLO systems have higher capital costs than  $O_2$  systems, but their operating costs are usually much lower.

Air-sparging systems are the predominant type of BLO equipment used at kraft pulp mills. **Figure F-5** shows a diagram of an air-sparging BLO system. Air-sparging systems operate by bubbling air, which is sometimes preheated, through the black liquor using multiple diffuser nozzles. Air systems require residence times of several hours or more to obtain high oxidation efficiencies. Because of this relatively long residence time, large oxidation tanks—on the order of 30 feet (ft) in diameter and 40 ft high must be used. Air-sparging systems have one to three tanks (or stages) that operate in series. Air-sparging systems are equipped with mechanical foam breakers for foam control; chemical defoamers (e.g., diesel oil, turpentine, and kerosene) may also be used. Each oxidation tank is vented. Gases exiting the BLO system flow through cyclone separators to have entrained water droplets removed prior to being vented to the atmosphere. Add-on air pollution control devices (APCDs) typically are not used with air oxidation systems.

Oxygen BLO systems require only 30 seconds (sec) to 5 minutes (min) residence time, which enables the use of in-line reactors. Since all the gas (i.e., pure  $O_2$ ) added to the system is consumed in the oxidation reaction, a system vent is not needed.

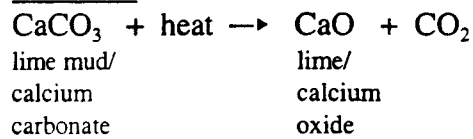
Oxygen polishing is sometimes used as a supplement to air oxidation systems to address (1) stricter TRS standards, (2) an overloaded BLO system resulting from production increases, or (3) peaks in TRS emissions resulting from process upsets or temporary production increases. In-line  $O_2$  polishing systems are used to oxidize strong liquor and may follow either a weak liquor air system or a strong liquor air system.

Emissions from most air-based BLO systems (95 percent) are uncontrolled. Based on available information, TRS emissions from 5 percent of air-based BLO systems (two systems) are currently controlled by using a condenser or mist eliminator to remove the water vapor and then venting the gas stream to a power boiler for incineration. Molecular  $O_2$  systems do not require system vents and, thus, have no emissions directly associated with the BLO system.

**Lime kiln.** The lime kiln is part of the causticizing process, in which green liquor from the SDT is converted to white liquor. The function of the lime kiln is to oxidize lime mud ( $CaCO_3$ ) to reburned lime ( $CaO$ ), a process known as calcining:

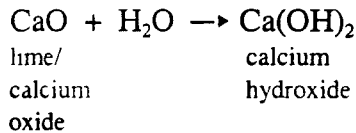


Lime kiln:

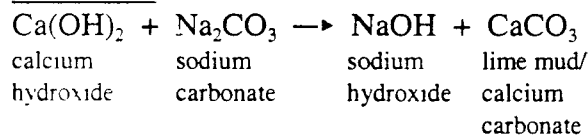


The CaO produced in the lime kiln is used in the causticizing reactions that take place in the green liquor slaker and causticizers to produce the NaOH used in the white liquor. The reactions are as follows:

Slaker:



Causticizer:



The lime kiln typically produces about 95 percent of the lime needed for the causticizing reaction. Either make-up lime or limestone is purchased to account for losses.

Prior to calcining, lime mud from the causticizing tanks is washed and dewatered. Lime mud washers reduce the sodium and sulfide content of the lime mud, which lowers TRS emissions from the lime kiln. The lime mud is typically dewatered to about 70 percent solids using a rotary vacuum precoat drum filter. (Newer precoat filters can achieve 75 to 85 percent solids.) The precoat drum filter is partially submerged in the lime mud slurry; as it rotates, a vacuum draws air through the filter (screen), and a small layer of lime mud deposits on the surface of the screen. The lime mud solids deposited on the screen are then removed with a fixed blade. In addition to dewatering the lime mud, the precoat filter also helps reduce TRS emissions by oxidizing any remaining  $\text{Na}_2\text{S}$  to  $\text{Na}_2\text{S}_2\text{O}_3$  using air that is pulled through the filter. The precoat filter is backwashed periodically to prevent crusting of the lime on the screens, which inhibits air passage.

Rotary lime kilns, as shown in **Figure F-6**, are typically used at kraft pulp mills. In a rotary lime kiln, lime mud from the precoat filter is introduced at the feed end (cold end) and flows downward towards the discharge end (hot end). Natural gas or fuel oil are the fuels typically used to fire the kiln.



Primary combustion air is introduced through a concentric tube around the fuel pipe, and preheated secondary combustion air is introduced through the bottom of the firing hood.

The majority of lime kilns at kraft pulp mills (66 percent) also burn noncondensable gases (NCGs) from various process vents, such as digester and evaporator vents. The NCG streams may be introduced into the kiln through a dedicated nozzle or combined and fed with either primary or secondary air. The components of the NCG stream include TRS compounds, turpentine, methanol, acetone, alpha-pinene, water vapor, nitrogen, and  $O_2$ . To avoid excessive sulfur dioxide ( $SO_2$ ) formation in the lime kiln, the NCG gas stream may be scrubbed prior to incineration to remove TRS compounds. Packed columns with white liquor as the scrubbing fluid are commonly used. The TRS removal efficiency is typically about 70 percent.

Rotary lime kilns have three internal zones: (1) the drying zone, (2) the heating zone, and (3) the calcining zone.

In the drying zone, water is evaporated from the lime mud as it passes through metal chains that are suspended from the kiln shell in a curtain or garland arrangement. The lime mud is dried to about 95 percent or greater solids as it passes through the chains, which are heated by the hot flue gases that flow countercurrent to the lime mud. In addition to providing additional heat transfer area for drying the lime mud, the chains also help reduce the amount of lime dust exiting with flue gases.

In the heating zone, other heat transfer devices, such as tumblers and lifters, are used to heat the dried mud uniformly in preparation for calcining.

In the calcining zone, the calcining reaction requires a minimum temperature of  $1500^{\circ}F$ ; temperatures greater than about  $2100^{\circ}F$  can cause overburning, which leads to a less-reactive lime product. Ideally, calcination produces lime pellets that are about 0.75 inches (in.) in diameter; however, if the lime mud is improperly dried and heated, large lime balls may be produced. The hot lime product is cooled by incoming secondary air as it passes under the burner towards the discharge end of the kiln. Newer kilns use integral tube coolers to preheat secondary combustion air while cooling the discharged lime pellets. In this heat exchange process, the air is heated to about  $600^{\circ}F$  and the lime is cooled to about  $375^{\circ}F$ . The reburned lime product from the integral tube coolers, or from the kiln discharge hoppers in the absence of coolers, is transported to the lime storage bin and subsequently introduced into the green liquor slaker.

Combustion gases exit the lime mud feed end of the kiln at temperatures of approximately  $300^{\circ}$  to  $400^{\circ}F$ . The exhaust gases consist of combustion products, TRS,  $CO_2$  released during calcination, water vapor evaporated



from the mud, and entrained lime dust. Particulate matter in the exhaust gas is mainly sodium salts,  $\text{CaCO}_3$  (lime mud), and  $\text{CaO}$  (lime).

Add-on PM control devices are required to meet Federal and State PM standards. Venturi scrubbers are the most commonly used control device, and water is typically used as the scrubbing fluid. The exhaust stream may be scrubbed with a caustic solution with the added benefit of lowering TRS and  $\text{SO}_2$  emissions. However, Federal and State TRS standards can be met through good lime mud washing practices, which reduces the sulfide content of the lime mud feed. If a wet scrubber is used, a cyclone separator may be installed upstream. The dust collected by the separator is returned directly to the lime kiln. In recent years, the use of ESPs has been more prevalent. The ESP is generally mounted on top of the lime kiln feed building, and the captured dry PM is rerouted to the kiln by gravity feed.

Rotary lime kilns are the most commonly used type of lime kiln at kraft and soda pulp mills, accounting for about 98 percent of the kilns. Fluidized-bed calciners are also used by the kraft pulp industry (2 percent).

#### ***What are the APCDs and equipment modifications?***

This section describes the predominant APCDs and equipment modifications applied to sources in the chemical recovery areas at kraft and soda pulp mills. The predominant APCDs include ESP and venturi scrubbers. The equipment modifications include wet to dry ESP system conversions and DCE to NDCE recovery furnace system conversions.

***Electrostatic precipitator.*** Electrostatic precipitators are a demonstrated control technique for reducing PM emissions from kraft recovery furnaces and lime kilns. The PM emitted from the recovery furnace is primarily composed of  $\text{Na}_2\text{SO}_4$  (saltcake) and  $\text{Na}_2\text{CO}_3$ , and the PM emitted from the lime kiln is primarily composed of sodium salts,  $\text{CaCO}_3$  (lime mud) and  $\text{CaO}$  (lime). While none of these compounds are HAPs, HAP metals are also emitted in small quantities from the recovery furnace and lime kiln.

Electrostatic precipitators can control HAP metal emissions but provide no control of gaseous HAP emissions. Properly designed and operated ESPs used on kraft recovery furnaces and lime kilns routinely achieve PM removal efficiencies of 99 percent or greater.

The ESPs used to control PM emissions from kraft recovery furnaces and lime kilns are generally classified as plate-wire ESPs. In plate-wire ESPs, the flue gas flows between parallel sheet metal plates and high-voltage electrodes. The flue gas passes between collecting plates into a field of ions that have been negatively charged by the high-voltage electrodes located



*A dry ESP system refers to an ESP with a dry bottom (i.e., no black liquor, water, or other fluid is used in the ESP bottom) and a dry particulate return system (i.e., no black liquor, water, or other fluid is used to transport the collected PM to the mix tank).*

between the plates. Each paired set of electrodes and plates forms a separate electrostatic field within the ESP.

Electrostatic precipitators used to control PM emissions from kraft recovery furnaces typically have two parallel precipitator chambers (i.e., flue gas passages) with three or four electrostatic fields per chamber. Lime kiln ESPs typically have one chamber with two or three electrostatic fields.

As the flue gas passes through each electrostatic field, the particles suspended in the flue gas are bombarded by the ions, imparting a negative charge to the particles. The negatively charged particles then migrate towards the positively charged or grounded "collecting" plates, where the particles transfer a portion of their charge, depending upon their resistivity. The particles are kept on the collecting plates by the electrostatic field and the remaining charge. At periodic intervals, the collection plates are knocked ("rapped"), and the accumulated PM falls into the bottom of the ESP. The recovered PM is subsequently recycled to the black liquor in recovery furnace applications or, in lime kiln applications, fed back to the kiln.

The ESPs used on recovery furnaces may be designed with either a wet or dry bottom. In wet-bottom ESPs, the collected PM falls directly into a pool of liquid, which may be black liquor or water, in the bottom of the ESP. In dry-bottom ESPs, the collected PM falls to the (dry) bottom of the ESP and is transferred from the ESP bottom to a mix tank (containing black liquor) via drag-chain or screw conveyors. Black liquor is sometimes used to transport the dry collected PM to the mix tank. More recent ESP installations employ a dry PM return system to transport the PM to the mix tank. Because the PM removed by the ESP is recycled to the black liquor in the mix tank, the ESP is an integral part of the chemical recovery loop as well as an APCD.

The design of the plate-wire ESP used to control PM emissions from recovery furnaces and lime kilns may include either weighted-wire electrodes or rigid electrodes. With the weighted-wire design, the wire electrodes are suspended inside the ESP, and weights are attached to the wires to maintain tension. In the rigid-electrode design, the discharge electrodes are rigid tubes with pointed corona emitters welded to the surface. Each tube replaces two weighted wires. Although the weighted-wire design has been available for more than 50 years, rigid-electrode ESPs have only been available since the late 1970s.

The rigid-electrode ESP represents the current stage of development in ESP technology and offers the following advantages over the weighted-wire design: a higher tolerance of in-service abuse (no wires to break), better collection efficiencies, and better cleaning characteristics. **Figure F-7** is a diagram of a typical rigid-electrode, plate-wire ESP.



The size of the ESP is often expressed in terms of the specific collecting area (SCA), which is defined as the total collecting plate surface area divided by the flue gas flow rate. Specific collecting areas of the ESPs used to control PM emissions from kraft recovery furnaces and lime kilns typically range from about 200 to 800 square feet per 1,000 actual cubic feet per minute (ft<sup>2</sup>/1,000 acfm).

The SCAs of ESP used to control emissions from DCE recovery furnaces tend to be somewhat lower than those associated with NDCE recovery furnaces. The average SCA for ESP used to control emissions from DCE recovery furnaces is approximately 15 percent lower than for NDCE recovery furnaces. The primary reason for the difference is that the DCE removes 20 to 40 percent of the PM before the ESP; therefore, the inlet loading of PM to the ESP operating on a DCE recovery furnace is lower than that of an NDCE recovery furnace. The lower SCAs for DCE recovery furnaces may also be because DCE recovery furnaces tend to be older than NDCE recovery furnaces, and most are not subject to the New Source Performance Standards (NSPS) for Kraft Pulp Mills.

The average lifetime of an ESP in service on a kraft recovery furnace varies depending upon the type of ESP bottom (i.e., wet vs. dry), the inlet temperature of the gases, and maintenance practices. The lifetime of ESPs used to control PM emissions from recovery furnaces with NDCEs, which tend to operate with dry-bottom ESPs, typically ranges from 12 to 15 years. After that point, major repairs or a rebuild may be required. Recovery furnaces with DCEs tend to have cooler inlet gases and wet-bottom ESPs; these two factors promote corrosion through condensation of acid gases and shorten the life of the ESP. The lifetime of an ESP on a DCE recovery furnace typically ranges from 7 to 10 years.

Lime kiln ESPs operate in a "milder" environment (i.e., hotter temperatures prevent any acid gases from condensing and corroding the ESP, and the primary constituent of the PM collected is lime, which creates an alkaline environment that further protects the ESP from acid gas corrosion). Therefore, lime kiln ESPs have fewer corrosion problems than do recovery furnace ESPs. The expected lifetime of a lime kiln ESP is typically more than 15 years.

*The use of ESPs as particulate control devices on lime kilns has steadily increased in recent years as mill managers have chosen to equip new lime kilns with ESPs and replace some older venturi scrubbers on existing lime kilns with ESPs.*

Although venturi scrubbers have traditionally been the most common add-on PM control device used on kraft lime kilns, the use of ESPs to control PM emissions from lime kilns has steadily increased since about 1980. The trend towards ESPs as add-on PM control devices at new lime kiln installations and as replacement control devices for older scrubbers is primarily related to the lower energy costs, reduced maintenance, and increased reliability of the ESPs in comparison to venturi scrubbers that provide equivalent control. An added benefit is that lime kiln ESPs produce a dry product that can be



recycled directly to the kiln, whereas the wastewater produced by the venturi scrubber is typically recycled to the mud washers before the kiln to recover the lime particulate in the spent scrubbing fluid. Additional energy is needed to remove the excess water in the lime mud filter and to complete evaporation in the kiln. (Additional information about venturi scrubbers is provided in the following section.)

**Venturi scrubber.** Venturi scrubbers are a demonstrated control technique for reducing PM emissions from lime kilns and SDTs. Venturi scrubbers are also used on several recovery furnaces in combination with an ESP.

In addition to venturi scrubbers, the pulp and paper industry uses other types of wet scrubbers, such as impingement plate, cyclone, flooded disc, and packed-bed, to control PM emissions from lime kilns and SDTs. However, venturi scrubbers are the most prevalent type of wet scrubber used to control PM from these sources, and the other scrubber types do not control PM emissions more effectively than venturi scrubbers.

Venturi scrubbers are designed to remove PM primarily by impaction through high-energy contact between the scrubbing liquid and suspended PM in the gas stream. A diagram of a typical venturi scrubbing system is shown in **Figure F-8**. A venturi scrubbing system typically consists of a venturi scrubbing vessel and cyclonic separator. The venturi scrubbing vessel has three sections: (1) a converging section, (2) a throat section, and (3) a diverging section.

The exhaust gas enters the converging section and, as the cross-sectional area of the scrubber vessel decreases, gas velocity increases. Scrubbing liquid is introduced either at the entrance to the converging section or at the throat. The exhaust gas, which is pulled through the venturi vessel by the system's ID fan and forced to move at extremely high velocities in the throat, shears the scrubbing liquid from the walls, atomizing the liquid.

Particulate matter and gaseous pollutants are transferred from the gas stream to the liquid droplets via impaction and diffusive mass transfer in the throat section as the exhaust stream turbulently mixes with the atomized scrubbing liquid. The throat section may be constructed so that the size of the throat opening is adjustable. With an adjustable-throat (or variable-throat) venturi, the gas velocity across the throat can be maintained at a constant speed as the gas flow rate changes, thereby maintaining the desired PM collection efficiency.

From the throat section, the exhaust stream passes through the diverging section of the venturi scrubbing vessel, where the velocity decreases. Diffusion, which is an effective collection mechanism for fine particles and also the primary mechanism of gaseous pollutants transfer, usually occurs in



the diverging section, where the velocities of the gas stream and liquid droplets are almost equal. Collection of fine particles by the liquid droplets is possible because the path of fine particles is influenced primarily by Brownian motion rather than by the path of the gas stream. (Brownian motion is the random displacement of gas molecules due to currents and eddies in the atmosphere.)

An entrainment separator, typically a cyclonic separator, is needed to collect the PM entrained in the droplets because the high velocity of the exhaust stream from the venturi scrubbing vessel would have a tendency to exhaust the droplets.

The performance of the venturi scrubber in terms of PM collection is strongly affected by the pressure drop across the scrubber throat, the liquid-to-gas (L/G) ratio, and the particle size distribution. Particulate matter collection efficiency generally increases as the throat velocity and turbulence of the gas stream increase, as indicated by an increased pressure drop across the scrubber.

Typical venturi scrubber L/G ratios for PM control range from 3 to 10 gallons per 1,000 actual cubic feet (gal/kacf). While L/G ratios up to 20 gal/kacf can be used, increasing the L/G ratio beyond 10 gal/kacf usually does not significantly improve PM collection efficiency. However, venturi scrubbers with L/G ratios ranging from 20 to 40 gal/kacf are used where absorption of gaseous pollutants in addition to PM control is desired. Liquid-to-gas ratios below 3 gal/kacf are usually not sufficient to cover the throat section.

For lime kiln applications, PM collection efficiencies for venturi scrubbers average 99 percent, based on data reported for four lime kiln scrubbers. Variable-throat venturi scrubbers with pressure drops that range from 10 to 30 in. H<sub>2</sub>O and average 20 in. H<sub>2</sub>O are typically used for controlling PM emissions from lime kilns. Typical L/G ratios are between 10 and 20 gal/kacf. Water is the typical scrubbing fluid for lime kilns, but caustic and weak wash are also used. The scrubbing fluid is recirculated, and the scrubber blowdown is recycled to the lime mud washer.

For SDT applications, reported PM removal efficiencies for venturi scrubbers range from 97 to greater than 99 percent. The average pressure drop for SDT venturi scrubbers is 8 in. H<sub>2</sub>O. Liquid-to-gas ratios range from 8 to 10 gal/kacf. Weak wash (from the lime mud washer) is the scrubbing fluid for the majority of SDT venturi scrubbers.

**Wet to dry ESP system conversion.** When hot recovery furnace flue gases come in contact with ESP control systems, gaseous organic HAPs (primarily methanol) may be stripped from any black liquor or contaminated process



water present in the ESP system and emitted to the atmosphere. Electrostatic precipitator control systems include the ESP plus the PM return system associated with the ESP. One method of controlling gaseous organic HAP emissions from ESP systems is to prevent their generation by eliminating the black liquor or HAP-contaminated process water from the system.

Since the 1980s, the industry trend has been toward the use of dry-bottom ESPs (i.e., no black liquor or water is used in the bottom of the ESP, which eliminates the ESP bottom as a source of gaseous HAP emissions). However, the older design dry-bottom ESP control systems sometimes use black liquor in the PM return system to sluice and transport the PM captured in the dry-bottom ESP back to the saltcake mix tank. As a result, gaseous organic HAPs may be stripped from the black liquor as the hot recovery furnace flue gases are pulled through the ESP by the induced draft fan. The gaseous organic HAP emissions could be controlled by converting to a dry PM return system. Dry PM return systems eliminate the use of black liquor in the PM return system, so that the captured PM does not contact any black liquor until it reaches the mix tank. These newer PM return systems also are equipped with rotary valves (through which the dry captured PM passes) that provide an air lock between the ESP and the remainder of the PM return system and the mix tank (which contains black liquor).

Based on the available emission test data, eliminating the black liquor from the ESP control system reduces total gaseous organic HAP emissions by approximately 72 percent. Methanol emission reductions account for most of the estimated HAP emission reduction. In addition to their lower HAP emission potential, NDCE recovery furnaces with dry-bottom ESPs and dry PM return also have lower TRS emissions than NDCE recovery furnaces with black liquor in the ESP control system.

***DCE to NDCE furnace conversion.*** The conversion from a DCE recovery furnace system to an NDCE recovery furnace system (often referred to as a "low-odor conversion") offers significant emission reduction and operational benefits.

As shown in **Figures F-9 and F-10**, DCE recovery furnace systems have more gaseous organic HAP emission points than NDCE recovery furnace systems. (The HAP emission points are shaded in the figures.) By eliminating two of these emission points, the DCE and BLO system, a DCE to NDCE furnace conversion is an effective measure for reducing HAP emissions from the recovery furnace system. Gaseous organic HAPs such as methanol can be stripped off in the DCE and wet-bottom ESP by contact between the hot flue gases and the black liquor. The BLO vents are also an emission source for methanol and other gaseous organic HAPs because gaseous organic HAPs can be stripped from the black liquor and vented as the oxidizing air is forced up through the black liquor. The wet-bottom ESP



commonly associated with DCE recovery furnaces can be converted to a dry-bottom ESP with a dry PM return system, thereby eliminating the ESP system as another emission source for methanol and other gaseous organic HAPs.

The conversion from a DCE recovery furnace system to an NDCE recovery furnace system results in substantial reductions for all of the gaseous organic HAP compounds. Based on the available emission test data, the conversion from a DCE recovery furnace system to an NDCE recovery furnace system reduces total gaseous organic HAP emissions by approximately 93 percent. Methanol emissions reductions account for most of the estimated gaseous organic HAP emission reduction. In addition to a lower HAP emission potential, NDCE recovery furnaces have lower TRS emissions.

Conversion from a DCE recovery furnace system to an NDCE recovery furnace system is a common modification; an estimated 24 percent of existing NDCE recovery furnaces were originally installed as DCE recovery furnaces. These conversions have been performed for several reasons, including compliance with Federal and State TRS emission standards and increased energy efficiency. Other factors influencing the decision to convert a DCE recovery furnace to an NDCE design include the age of the existing DCE recovery furnace system, the condition of the system, the cost of the conversion, and whether additional capacity is needed at the mill.

The major modifications involved in converting a DCE recovery furnace system to an NDCE recovery furnace system are (1) replacing the DCE with a concentrator and associated equipment, (2) extending or replacing the economizer, (3) rebuilding or replacing the ESP, and (4) removing the BLO system. Removal of the DCE is the driving force behind the latter three major modifications.

The DCE is replaced with a concentrator, which can achieve the desired black liquor solids content without direct contact between recovery furnace exhaust gases and black liquor. Eliminating contact between the hot exhaust gases and black liquor is desirable because the emissions that result from stripping are also eliminated. Operational benefits of replacing the DCE with a low-pressure, steam-driven concentrator include the higher solids content achievable, improved energy utilization, and reduced energy costs. The concentrator, which may be one of several types, including falling film and forced circulation, is installed as part of the evaporator plant.

The economizer is modified to recover additional heat from the flue gas that has become available with removal of the DCE. The additional heat recovered in the economizer can be used to produce more low-cost, high-pressure steam. Direct contact evaporator recovery furnaces typically operate at thermal efficiencies of 53 to 58 percent, whereas NDCE recovery furnaces typically operate at thermal efficiencies of 63 to 68 percent.



Auxiliary equipment that is required when expanding an economizer includes additional soot blowers, hoppers, and conveyors, which collect and transport the additional ash from the economizer.

The ESP is modified to handle the greater PM loading that results from the removal of the DCE. The DCE acts as a PM control device, collecting 20 to 40 percent of PM emissions from the recovery furnace. Thus, removal of the DCE, without upgrading the ESP, would likely result in increased PM emissions from the recovery furnace stack. Because of the increased PM emissions and a possible change in gas flow rate, the ESP may need to be either upgraded or replaced.

With the removal of the DCE, the BLO system is no longer needed; therefore, the emissions associated with the air-sparging BLO systems are eliminated. The operational benefits associated with removing an air-sparging BLO system are the elimination of the high costs associated with operating this system and the increased heating value of the black liquor.

## **2.2 What is the background information for sulfite pulp mills?**

### ***What is the U.S. population of sulfite pulp mills?***

There are 10 sulfite pulp mills currently operating in 6 States. Over the years, the number of sulfite mills has steadily declined; over 40 percent of sulfite mills (7 mills) have shut down in the last 10 years. Of the 10 sulfite mills currently operating, 8 mills have chemical recovery combustion equipment to recover pulping chemicals, while the other 2 mills do not recover pulping chemicals. These eight mills are discussed in the remainder of this section. **Appendix B** lists the company names and locations for the eight mills.

### ***What is the sulfite pulping process?***

At the currently operating sulfite chemical pulp mills, an acid cooking liquor is used to cook the wood chips. The sulfite pulping process currently used in U.S. mills can be classified as either acid sulfite or bisulfite. In the acid sulfite process, the initial pH level of the cooking liquor is 1 to 2. In the bisulfite process, the cooking liquor initial pH is 2 to 6. In addition to initial pH level, sulfite cooking liquors are also classified by the chemical base. In preparing sulfite cooking liquors, cooled SO<sub>2</sub> gas is absorbed in water containing one of four chemical bases—magnesium (Mg), ammonia (NH<sub>3</sub>), sodium (Na), or calcium (Ca). The following sections describe the chemical recovery processes at sulfite pulp mills.



Flow diagrams for the sulfite chemical recovery process and associated equipment can be found in Figures F-11 through F-16.

### **What is the sulfite chemical recovery process?**

The function of the chemical recovery process at sulfite pulp mills is to recover chemicals from spent sulfite cooking liquor (also called red liquor). Sulfur dioxide in spent cooking liquor can be recovered for all four liquor types (Mg,  $\text{NH}_3$ , Na, and Ca). The bases Mg and Na can also be recovered. However, it is not practical to recover Ca, and  $\text{NH}_3$  is destroyed when the spent liquor is combusted.

Existing mills that use combustion equipment to recover cooking liquor chemicals use either Mg- or  $\text{NH}_3$ -based processes. At Ca-based sulfite mills, by-products recovery (e.g., lignin chemicals and alcohol) is practiced, but chemical recovery combustion equipment is not used. Additionally, there are currently no Na-based sulfite mills operating in the United States.

There are five Mg-based sulfite mills and three  $\text{NH}_3$ -based sulfite mills currently operating, for a total of eight sulfite mills subject to the pulp and paper combustion sources NESHAP. The system used to recover cooking chemicals is particular to the base.

### **What is the Mg-based sulfite chemical recovery process?**

**Chemical recovery process.** A simplified process flow diagram for Mg-based sulfite mills is provided in **Figure F-11**. As shown in the figure, spent liquor is burned in a recovery furnace or fluidized-bed reactor. Combustion of the spent liquor produces heat for steam generation and also exhaust gases that contain magnesium oxide ( $\text{MgO}$ ) particulate and  $\text{SO}_2$  gas. If a recovery furnace is used, the major portion of the  $\text{MgO}$  is recovered from the exhaust gases as a fine white powder using multiple cyclones. If a fluidized bed reactor is used,  $\text{MgO}$  is collected in a cyclone and as pulverized bed material. The  $\text{MgO}$  is then slaked with water to form magnesium hydroxide ( $\text{Mg}(\text{OH})_2$ ), which is used as circulating liquid in a series of absorption towers and/or venturi scrubbers designed to recover  $\text{SO}_2$  from the recovery furnace exhaust gases.

Prior to passing through the absorption towers/venturi scrubbers, exit gases from the  $\text{MgO}$  PM removal equipment enter a cooling tower. Cooling the gases increases  $\text{SO}_2$  absorption. In the absorption towers/venturi scrubbers,  $\text{SO}_2$  is recovered by reaction with  $\text{Mg}(\text{OH})_2$  to form a magnesium bisulfite solution. The magnesium bisulfite solution is then routed to a fortification tower where it is fortified with makeup  $\text{SO}_2$  from a sulfur burner and subsequently used as cooking liquor in a digester. The fortification tower and sulfur burner area of the mill are typically referred to as the "acid plant." However, the term acid plant is used loosely, and the acid plant may be defined to include the  $\text{SO}_2$  absorption towers/venturi scrubbers. Some mills have installed equipment downstream of the  $\text{SO}_2$  absorption equipment, such



as a fiber-bed mist elimination system or an educted venturi scrubber, to further reduce PM and/or SO<sub>2</sub> prior to discharge to the atmosphere.

**Chemical recovery equipment.** Three of the five Mg-based sulfite mills operate recovery furnaces to recover MgO and SO<sub>2</sub> from spent cooking liquor and produce steam. A diagram of a Mg-based sulfite recovery furnace is shown in **Figure F-12**.

As with kraft recovery furnaces, the furnaces may be a DCE furnace or an NDCE furnace, depending upon the final evaporation equipment following the MEE system. Alternatively, a mill may use neither a DCE nor NDCE. At these mills, the desired red liquor solids content is achieved solely with the MEE system. The magnesium-based sulfite recovery furnaces differ from kraft and soda recovery furnaces in that there are no smelt beds. Red liquor is fired at a solids content of between 52 and 60 percent.

Two of the six Mg-based sulfite mills operate fluidized-bed reactors. There is one reactor at each of the two mills. Red liquor is fired at a solids content of 50 percent in the first reactor and 45 percent in the second reactor. The general features of a fluidized-bed reactor are shown in **Figure F-13**. A diagram of a fluidized-bed reactor system for the Mg-based sulfite process is shown in **Figure F-14**.

At these two mills, spent liquor is fed through the top of the reactor chamber. Fluidizing gas at a carefully controlled flow rate passes up through the bed of solid particles setting the bed in fluid motion. The fluidized bed resembles a boiling liquid. The organic matter in the spent liquor is converted to carbon dioxide and water, and the magnesium complexes formed during pulping are decomposed to form MgO particulate and SO<sub>2</sub> gas. The MgO particulate is collected as pulverized bed material. Exhaust gases pass through a cyclone, which collects MgO entrained in the exhaust gases, and then through a waste heat boiler for steam production.

**APCDs.** All of the Mg-based sulfite mills have MgO particulate removal equipment following the chemical recovery combustion device. With the recovery furnaces, multiple cyclones are used to remove the MgO particulate from the recovery furnace flue gas. With the fluidized-bed reactors, MgO is collected in a cyclone and as pulverized bed material.

Of the four Mg-based sulfite mills for which information is available, all four have installed SO<sub>2</sub> recovery equipment downstream of the MgO recovery system. The SO<sub>2</sub> recovery equipment includes either absorption tower(s) and/or multiple-stage venturi scrubbers and uses Mg(OH)<sub>2</sub>, produced from the recovered MgO, as the SO<sub>2</sub> absorption fluid.



Of the four Mg-based sulfite mills for which information is available, two have installed an APCD downstream of the SO<sub>2</sub> absorption equipment. At one mill, an educted venturi scrubber provides additional control of air pollutants. Gas streams from all three recovery furnaces operated at the mill are routed to this scrubber. The second mill operates a packed-bed scrubber and mist eliminator following the SO<sub>2</sub> absorption equipment. Neither of the two mills that have fluidized-bed reactors have additional equipment downstream of the SO<sub>2</sub> recovery equipment.

***What is the NH<sub>3</sub>-based process sulfite chemical recovery process?***

***Chemical recovery process.*** A simplified process flow diagram for NH<sub>3</sub>-based sulfite mills is included as **Figure F-15**. As shown in the figure, spent liquor is fired in a recovery furnace. Combustion of the spent liquor produces heat for steam generation and also combustion gases that contain recoverable SO<sub>2</sub>. The NH<sub>3</sub> base is consumed during combustion, forming nitrogen and water. A small amount of ash is produced and periodically removed from the furnace bottom. Sulfur dioxide is recovered from cooled flue gas in an absorption tower/scrubbing system by reaction with fresh aqueous NH<sub>3</sub> to form an ammonium bisulfite solution. The ammonium bisulfite solution is fortified with makeup SO<sub>2</sub> from a sulfur burner and used as cooking liquor in a digester. Exit gases from the absorption tower/scrubbing system are typically routed to a fiber-bed mist eliminator system for PM removal and mist elimination prior to being discharged to the atmosphere. Some mills have installed a scrubber or mesh-pad mist eliminator upstream of the fiber-bed mist eliminator system for additional emission control.

***Chemical recovery equipment.*** All three NH<sub>3</sub>-based sulfite mills operate recovery furnaces to recover SO<sub>2</sub> from spent cooking liquor and produce steam. There are a total of four NH<sub>3</sub>-based sulfite recovery furnaces—two mills operate one recovery furnace and one mill operates two furnaces. **Figure F-16** is a diagram of an NH<sub>3</sub>-based sulfite recovery furnace. Spent red liquor is fired at solids concentrations ranging from 50 to 60 percent.

The NH<sub>3</sub>-based sulfite recovery furnaces do not have smelt beds. However, a small amount of ash is produced and is periodically removed from the furnace bottom. Approximately 80 percent of the SO<sub>2</sub> in the spent liquor can be recovered.

***APCDs.*** All of the NH<sub>3</sub>-based sulfite mills have some type of gas cooling system and SO<sub>2</sub> absorption system, typically a multi-sectioned tower with the lower sections for cooling and the upper sections for SO<sub>2</sub> absorption. Of the two NH<sub>3</sub>-based sulfite mills for which equipment information is available, both mills have fiber-bed mist eliminator systems for controlling PM emissions located downstream of the absorption/cooling system. These



systems consist of multiple tanks containing numerous filter elements (on the order of 20/tank). The filter elements, also called "candles," are densely packed with glass or polyester fibers. Liquid condensing from the stack gases continually removes some of the captured PM from the filter elements. In addition, the filter elements are periodically washed to remove PM. At one mill, a reverse-jet scrubber precedes the fiber-bed mist eliminator system, serving as a precleaner. This scrubber removes particulate and absorbs SO<sub>2</sub>.

## **2.3 What is the background information for stand-alone semichemical pulp mills?**

### ***What is the U.S. population of stand-alone semichemical pulp mills?***

There are 13 stand-alone semichemical mills currently operating in 10 States. Twelve of these 13 mills have chemical recovery equipment to recover pulping chemicals, while the other mill burns spent liquor in a power boiler and does not have chemical recovery. These 12 mills are discussed in the remainder of this section. **Appendix B** lists the company names and locations for the 12 mills.

All of the stand-alone semichemical mills are currently producing corrugating medium, which is the inside layer of corrugated containers. Corrugating medium is also produced by semichemical pulping operations collocated at kraft mills. Semichemical pulping operations that are collocated at kraft mills are discussed under the kraft and soda pulp mills section.

### ***What is the semichemical pulping process?***

Semichemical pulp mills use a combination of chemical and mechanical methods to pulp wood. Hardwoods are typically pulped because they require fewer chemicals and less energy than softwoods. Wood chips first are partially softened in a digester with chemicals, steam, and heat. Once chips are softened, mechanical methods complete the pulping process. The pulp is washed after digestion to remove cooking liquor chemicals and organic compounds dissolved from the wood chips. This virgin pulp is then mixed with 20 to 35 percent recovered fiber (e.g., double-lined kraft clippings) or repulped secondary fiber (e.g., old corrugated containers) to enhance machinability. Washer filtrate, called "black liquor," is routed to a chemical recovery process to reclaim the remaining cooking chemicals for reuse in the digester.

At currently operating mills, the chemical portion of the semichemical pulping process uses either a nonsulfur or NSSC process. The nonsulfur process uses either Na<sub>2</sub>CO<sub>3</sub> only or mixtures of Na<sub>2</sub>CO<sub>3</sub> and NaOH for cooking the wood chips. The NSSC process uses a sodium-based sulfite



*Flow diagrams of the chemical recovery process and associated equipment used at stand-alone semichemical mills can be found in Figures F-17 through F-21*

cooking liquor. The nonsulfur process is currently used at 11 of the 12 U.S. stand-alone semichemical mills that practice chemical recovery, while the NSSC process is used at the remaining mill. Many NSSC mills have converted to the nonsulfur process because the nonsulfur process results in less corrosion and odor than the NSSC process. The following sections describe the chemical recovery process at stand-alone semichemical pulp mills.

### ***What is the semichemical chemical recovery process?***

**Figure F-17** contains a diagram of a typical chemical recovery process at a stand-alone semichemical pulp mill. Black liquor from the pulping process contains water, leftover cooking chemicals, and dissolved organic wood compounds. By recovering cooking chemicals in black liquor for reuse in the pulping process, the chemical recovery process reduces production costs and adverse environmental impacts.

Black liquor is concentrated in a MEE system, then in a DCE and/or NDCE, to between 39 and 60 percent solids. Semichemical black liquor containing greater than 60 percent solids is too viscous to be pumped. At most mills, black liquor solids have a solids content of 50 percent or less. The black liquor is then fired in a chemical recovery combustion unit. In addition to burning spent liquor, some chemical recovery combustion units also are designed to produce steam for use in mill processes. Units that produce steam produce no more steam than is needed to operate the combustion unit and evaporate the liquor. These units require auxiliary fuels, such as natural gas or fuel oil, to produce the energy required for steam production due to the relatively low energy content of semichemical spent liquor.

Cooking liquor chemicals from the chemical recovery combustion units are recovered as either smelt or ash. The recovered smelt or ash is mixed with water in a dissolving tank. The recovered chemicals are combined with makeup chemicals to form fresh cooking liquor, which is routed to the digester.

### ***What are the semichemical chemical recovery equipment?***

Four different types of chemical recovery combustion units are operated at the 12 stand-alone semichemical pulp mills employing chemical recovery—fluidized-bed reactors, recovery furnaces, smelters, and rotary liquor kilns. Either ash or smelt dissolving tanks are also operated at these mills.

Operating times vary for the different types of chemical recovery combustion units currently in use. Recovery furnaces and rotary liquor kilns run almost continuously; these units are shut down for an average of less than 20 days



per year. Fluidized-bed reactors and smelters require frequent cleaning and maintenance; consequently, these units must be shut down more frequently than other chemical recovery combustion units. Two smelters at one mill are typically shut down for 131 days each per year. Each unit is in operation approximately 65 percent of the time; the operating times of the smelters overlap to maintain continuous production of smelt. Each smelter runs continuously for 14 to 30 days, then is shut down for maintenance. Fluidized-bed reactors average 14 shutdowns per year, with each shutdown lasting an average of 11 days. During shutdowns, recovered chemicals stored in pellet silos are used to produce fresh cooking liquor.

**Fluidized-bed reactors.** Five stand-alone semichemical mills (all nonsulfur-based) use fluidized-bed reactors. The general design of a fluidized-bed reactor is presented in **Figure F-13**.

Fluidized-bed reactors are used extensively because they recover chemicals in solid pellets, which can be stored in silos until the chemicals are needed to make fresh cooking liquor. This practice requires less storage space than when recovered chemicals are routed directly to a dissolving tank and stored in solution.

Five mills operate Copeland fluidized-bed reactors. The other two mills use Dorr Oliver Fluosolids reactors, although one of the two mills modified its Dorr Oliver reactor to operate similar to a Copeland reactor. No process information was available for the NSSC mill, which operates a Copeland fluidized-bed reactor.

At mills using Copeland fluidized-bed reactors, concentrated black liquor at 39 to 52 percent solids is fired into the Copeland reactor at 38 to 68 gallons per minute (gal/min) from a single spray gun located at the top of the reactor. As the liquor falls towards the bed, evaporation and some combustion occurs, causing the liquor to pelletize. Fluidizing gas rises through the bed of solid pellets, setting the bed in fluid motion.

Combustion temperatures reported by the mills average 1300°F, but can reach a maximum of 1340°F. Sodium carbonate melts at approximately 1350°F; consequently, raising the combustion temperature above 1350°F would result in slagging and fouling of the combustion chamber. Therefore, for mills using the nonsulfur pulping process, 1350°F is the maximum combustion temperature for combustion units that do not produce smelt (e.g., fluidized-bed reactors). Water sprays located in the dome of the combustion chamber keep the temperature below the melting point.

The soda ash ( $\text{Na}_2\text{CO}_3$ ) pellets are recovered from the reactor and stored in silos. The pellets are eventually routed to an ash dissolving tank (ADT) to form a  $\text{Na}_2\text{CO}_3$  solution. Then, makeup chemicals ( $\text{NaOH}$  and/or  $\text{Na}_2\text{CO}_3$ )



are added to make cooking liquor. Information is available on supplemental fuels for three of the four active Copeland fluidized-bed reactors; all three reactors use natural gas.

The Dorr Oliver Fluosolids reactor operates by the same basic principles as the Copeland fluidized-bed reactor. However, with the Dorr Oliver system, concentrated black liquor (e.g., at 60 percent solids) is injected into the lower section of the fluidized bed through multiple firing nozzles, while Copeland fluidized-bed reactors fire black liquor from the top of the combustion chamber through a single nozzle. Soda ash pellets are continuously withdrawn by a transfer pipe and routed either to a silo or directly to an ADT. The temperature in the bed averages 1300°F.

**Recovery furnaces.** Recovery furnaces are designed to recover cooking liquor chemicals by burning concentrated black liquor and produce process steam with the heat of combustion. The arrangement of a typical recovery furnace is presented in **Figure F-18**.

Before the black liquor enters the recovery furnace, the solids content of the black liquor is increased to approximately 58 percent in a concentrator, a heat exchanger in which steam is used to evaporate water in the black liquor. The concentrated black liquor is sprayed into the furnace through fixed or oscillating nozzles or “guns” mounted on the walls of the furnace. Depending on the design and operation of the recovery furnace, the sprayed black liquor may hit the opposing wall, where it dries and burns before falling to the hearth, or may fall short of the opposing wall and dry and burn in suspension. Combustion air is generally supplied to the furnace at three levels, with two levels located below the black liquor nozzles and one above.

The area of the furnace extending from the black liquor spray to just above the molten smelt at the bottom of the furnace is called the drying zone. The purpose of the drying zone is to evaporate water from the liquor droplets. Volatile organic compounds released in the drying zone travel to the highly turbulent upper section of the furnace, called the oxidizing zone, where they are combusted at a temperature of approximately 1800°F.

Three recovery furnaces are currently operating at stand-alone semichemical mills. At least two of these recovery furnaces use supplemental fuel to aid combustion and produce steam. One furnace burns fuel oil with natural gas as the backup fuel, while the other furnace normally burns natural gas and uses “residual oil” as the backup fuel. (No information is available on the third recovery furnace.)

At least two of the recovery furnaces currently in use are of the NDCE design. The two recovery furnaces are essentially identical, with the exception of the type of liquor firing nozzle. One furnace has two oscillating



nozzles, while the other furnace has one stationary nozzle. The main cooking liquor chemical (i.e.,  $\text{Na}_2\text{CO}_3$ ) is recovered as smelt, which forms in the bottom of the furnace. The smelt flows into an SDT, where it is mixed with water to form green liquor. From the SDT, the green liquor is sent to a clarifier and then to a dregs washer for purification before it is mixed with make-up chemicals and reused in the digester.

**Smelters.** Smelters operate in a manner similar to recovery furnaces, except that smelters do not produce excess steam for mill processes and are actually net users of heat. For example, one smelter currently in operation requires approximately 10,000 pounds per hour (lb/hr) of steam to operate, while only producing 7,000 to 8,000 lb/hr of steam.

One nonsulfur-based semichemical mill operates two smelters to recover  $\text{Na}_2\text{CO}_3$  from spent liquor. These units are actually converted small kraft recovery furnaces. The smelt produced in the furnaces flows into an SDT, where it is combined with evaporator condensate to produce green liquor. Green liquor is then sent to a clarifier for purification before it is mixed with makeup chemicals ( $\text{Na}_2\text{CO}_3$ ,  $\text{NaOH}$ ) to produce fresh cooking liquor.

Each smelter fires black liquor at 57 percent solids, at an average feed rate of 27 gal/min. Each smelter operates about 65 percent of the time; for continuous production of cooking liquor, the startup of one smelter overlaps the shutdown of the other smelter.

**Rotary liquor kilns.** A diagram of a rotary liquor kiln is presented in **Figure F-19**. Number 2 fuel oil is burned in the lower end of the kiln. An induced-draft fan at the upper end draws combustion air into the lower end and draws combustion gases through the kiln. Approximately halfway between the lower and upper ends, black liquor is fired into the kiln at about 50 percent solids. Sodium carbonate ash falls to the lower end of the kiln; the ash then is routed to an ADT. Combustion gases are routed to a waste heat boiler to produce steam.

Two nonsulfur-based semichemical mills use rotary liquor kilns for chemical recovery. The combustion temperature of the kiln averages 1200°F, but reaches a maximum temperature of 1400°F. Black liquor is fired into the kiln at an average of 18 gal/min. Number 2 fuel oil is used as auxiliary fuel.

**Black liquor gasification system.** In order to comply with the pulp and paper combustion sources NESHAP, a mill which currently uses smelters to handle the black liquor is investigating replacing its smelters with a black liquor gasification system. A diagram of the proposed black liquor gasification system is provided in **Figure F-20**. This technology uses steam reforming to convert the organics in black liquor to a hydrogen-rich gas fuel, leaving the residual pulping chemicals (primarily  $\text{Na}_2\text{CO}_3$ ) for reuse. The



gas can then be used as a clean-burning energy source for heat in the gasification unit and as an alternative boiler fuel, replacing fossil-fuel based (non-renewable) natural gas. The benefits of gasification are expected to include increased efficiency in energy conversion and chemical recovery, elimination of the smelt-water explosion hazard, reduced operation and maintenance costs, and lower environmental emissions (including PM, HAP, TRS, SO<sub>2</sub>, CO, CO<sub>2</sub>, VOC, and nitrogen oxides [NO<sub>x</sub>]).

***Dissolving tanks.*** Inorganics recovered in the chemical recovery combustion unit as smelt or ash are routed to a dissolving tank where the recovered cooking chemicals are dissolved in water as the first step in formulating fresh cooking liquor. The chemical solution is then sent to a makeup tank where fresh liquor chemicals are added to the solution. At some mills, the solution is first sent to a clarifier for purification. After make-up chemicals are added, the fresh cooking liquor is stored in one or more tanks until it is needed for pulping.

#### ***What are the APCDs?***

Exhaust streams from chemical recovery combustion units are typically routed through one or more APCDs before being exhausted to the atmosphere. These devices were installed primarily to control either PM emissions or mist present in the exhaust stream. Cyclones, venturi scrubbers, and wet and dry ESPs are used to control PM emissions.

Some of these APCDs also function as process equipment. For example, venturi scrubbers also serve as DCEs (which increase the solids content of black liquor) for all but one of the semichemical mills that use venturi scrubbers. Also, at some mills, the PM recovered in cyclones and dry ESPs is collected and mixed with black liquor. Mesh pad and chevron mist eliminators are used to remove moisture droplets from the exhaust stream.

As mentioned in a previous section, inorganics recovered in the combustion unit as smelt or ash are routed to a dissolving tank where the recovered cooking chemicals are mixed with water to form green liquor. When hot smelt or ash (at 1000° to 1800°F) contacts the green liquor (at 160° to 190°F), vapors are formed, which must be vented. These vapors contain VOC as well as PM. Most dissolving tanks are vented directly to the atmosphere, but three mills route tank vents to add-on PM control devices. One of these mills controls PM emissions with a wet scrubber, another controls PM emissions with a shower scrubber, and a third vents emissions to a spray condenser and a chevron separator.

Two semichemical mills have recently installed regenerative thermal oxidizers (RTO) to reduce HAP emissions from fluidized-bed reactors.



**Figure F-21** shows a diagram of the RTO used in a pilot study at one of these mills.

The RTO is a thermal oxidizer that recovers heat from oxidation of VOC. The heat is recovered by passing the treated gas stream through a bed of ceramic stoneware, prior to exhaust, which heats the bed close to or at the oxidation temperature of the exhaust stream. The gas flow is then reversed and the inlet gas stream is passed over the heated bed, which preheats the stream prior to oxidation. Oxidation is completed in a central chamber, where a burner system maintains a preset oxidation temperature.

In some cases, the concentration of VOC and/or CO in the inlet gas stream is sufficient to cause the emission stream to autoignite in the ceramic bed. If the VOC loading is sufficient, the RTO can operate in a self-sustaining mode, in which the energy released provides all the heat required for complete combustion. A wet ESP is also necessary because the RTO requires a high degree of PM control for proper operation.

In a pilot study which preceded the RTO installation at one mill, the RTO was found to reduce VOC emissions by an average of 97 percent and CO emissions by 99 percent. The wet ESP reduced PM emissions by 90 percent.

#### **2.4 Where can I find the references for this background information?**

You can find the references for the background information in this chapter from the following sources:

*All of the references listed in Section 2.4 can be obtained from the Air Docket (A-94-67) listed in Section 1.8. The first two references can be downloaded from EPA's website at [www.epa.gov/ttn/atw/pulp/pulppg.html](http://www.epa.gov/ttn/atw/pulp/pulppg.html).*

- Technical Support Document: Chemical Recovery Combustion Sources at Kraft and Soda Pulp Mills. U. S. Environmental Protection Agency. Office of Air Quality Planning and Standards. Research Triangle Park, NC. Publication No. EPA-453/R-96-012. October 1996.
- Draft Technical Support Document: Chemical Recovery Combustion Sources at Sulfite Pulp Mills. U. S. Environmental Protection Agency. Office of Air Quality Planning and Standards. Research Triangle Park, NC. June 22, 1995.
- Memorandum from McManus, S., MRI, to Telander, J., EPA/MICG, December 6, 1996. Profile of U.S. Stand-Alone Semichemical Pulp Mills.
- U.S. Environmental Protection Agency. Project XL Site-Specific Rulemaking for Georgia-Pacific Corporation's Facility in Big Island, VA. Direct final rule. 66 FR 16400. Washington, DC. U.S. Government Printing Office. Monday, March 26, 2001.
- Presentation overheads. Georgia-Pacific, Big Island, VA. Project XL-Full Scale Steam Reformer Black Liquor Gasification. November 4, 1999.



*When using this document, remember that it is not legally binding and does not replace the pulp and paper combustion sources NESHAP for purposes of application of the rule to any specific mill.*

*The January 12, 2001 final NESHAP and the July 19, 2001 technical corrections to the final NESHAP are included in **Appendix A**. Refer to the ATW for further correction notices and amendments.*

*This document is not intended, nor can it be relied upon, to create any rights enforceable by any party in litigation with the United States. The EPA may change this document at any time without public notice.*

*The NESHAP covers chemical recovery combustion sources at kraft, soda, sulfite, and stand-alone semichemical pulp mills. Stand-alone semichemical mills are those semichemical pulp mills that are not integrated with a kraft pulp mill.*

## **Chapter 3 – Brief Overview of the Pulp and Paper Combustion Sources NESHAP**

This chapter presents a brief overview of the NESHAP for chemical recovery combustion sources at kraft, soda, sulfite, and stand-alone semichemical pulp mills. The overview includes a summary of NESHAP provisions for applicability, emission control requirements, initial and continuous compliance, recordkeeping and reporting, compliance dates, and new source requirements.

<b>If You Need the Following Information...</b>	<b>Then Read...</b>
Which mills are subject to the NESHAP?	Section 3.1
What affected sources must be controlled?	Section 3.2
What are the emission control requirements?	Section 3.3
How do mills demonstrate initial and continuous compliance?	Section 3.4
What recordkeeping and reporting requirements apply?	Section 3.5
When must mills comply?	Section 3.6
What is a new source?	Section 3.7
What additional requirements apply to new sources?	Section 3.8

### **3.1 Which mills are subject to the NESHAP?**

The pulp and paper combustion sources NESHAP applies to existing and new major source kraft, soda, sulfite, and stand-alone semichemical pulp mills with chemical recovery processes that involve the combustion of spent pulping liquor. A major source is any mill that emits, or has the potential to emit (considering Federally enforceable controls) 10 tons per year or more of any HAP, or 25 tons per year or more of any combination of HAP.

### **3.2 What affected sources must be controlled?**

The NESHAP has separate emission limits for each affected source or each process unit within an affected source. Process units include each existing NDCE recovery furnace, DCE recovery furnace system, SDT, or lime kiln within a chemical recovery system affected source. See **Table 3** for the affected sources and process units that are regulated by the NESHAP. The control requirements for each affected source or process unit are explained in detail in **Chapter 4**.



For new sources, the affected source is defined as each individual chemical recovery combustion unit; for existing sources, the affected source is defined as the collection of chemical recovery combustion sources at the mill.

**Table 3. Affected Sources and Process Units Covered by the NESHAP**

For this Type of Mill . . .	These Affected Sources Are Covered at Existing Sources . . .	And these Affected Sources Are Covered at New Sources . . .
Kraft or soda	Chemical recovery system <ul style="list-style-type: none"> <li>• NDCE recovery furnace</li> <li>• DCE recovery furnace system</li> <li>• SDT</li> <li>• Lime kiln</li> </ul>	<ul style="list-style-type: none"> <li>• NDCE recovery furnace and associated SDT</li> <li>• DCE recovery furnace system and associated SDT</li> <li>• Lime kiln</li> </ul>
Sulfite	Sulfite combustion unit	Sulfite combustion unit
Stand-alone semichemical	Semichemical combustion unit	Semichemical combustion unit

### 3.3 What are the emission control requirements?

Surrogate compounds were selected for each of the regulated HAP pollutants. Particulate matter was selected as a surrogate for HAP metals for kraft, soda, and sulfite combustion units; methanol was selected as a surrogate for gaseous organic HAP compounds for kraft and soda NDCE recovery furnaces and DCE recovery furnace systems, and total hydrocarbon (THC) emissions were selected as a surrogate for gaseous organic HAP emissions for semichemical combustion units.

The NESHAP provides separate emission limits for each affected source or process unit. For existing affected sources at kraft or soda pulp mills, a mill can choose whether to comply with the individual PM emission limits for each process unit (i.e., each NDCE recovery furnace, DCE recovery furnace system, SDT, and lime kiln) or comply with a PM bubble compliance alternative for the entire affected source (i.e., chemical recovery system).

The format (e.g., outlet concentration, mass emission rate, or percent reduction) of the emission limits varies depending on the type of affected source or process unit. See **Table 4**. The formats of the emission limits for kraft and soda affected sources and process units were chosen to be consistent with the NSPS for kraft pulp mills. The emission limits for each affected source or process unit are presented in **Chapter 4**.

See **Chapter 4** and **Appendix G** for more information on the PM bubble compliance alternative.



Only new kraft and soda recovery furnaces and new and existing semichemical combustion units are subject to gaseous organic HAP emission limits.

**Table 4. Formats of the Emission Limits**

For the Following Affected Source or Process Unit...	The Regulated Pollutant Is...	And the Mill Is Subject to the Following Type of Emission Limit...
Chemical recovery system	HAP metals	Outlet concentration (grains per dry standard cubic foot [gr/dscf])
NDCE recovery furnace	HAP metals	Outlet concentration (gr/dscf)
	Gaseous organic HAPs	Mass emission rate (pounds per ton of black liquor solids [lb/ton BLS])
DCE recovery furnace system	HAP metals	Outlet concentration (gr/dscf)
	Gaseous organic HAPs	Mass emission rate (lb/ton BLS)
SDT	HAP metals	Mass emission rate (lb/ton BLS)
Lime kiln	HAP metals	Outlet concentration (gr/dscf)
Sulfite combustion unit	HAP metals	Outlet concentration (gr/dscf)
Semichemical combustion unit	Gaseous organic HAPs	<ul style="list-style-type: none"> <li>• Mass emission rate (lb/ton BLS) or</li> <li>• Percent reduction</li> </ul>

### 3.4 How do mills demonstrate initial and continuous compliance?

In general, mills must conduct an initial performance test and then continuously monitor opacity or control device operating parameters, as applicable.

**Initial performance test.** A performance test is required for most sources regulated by this NESHAP. The performance test serves two purposes:

1. To demonstrate that the control device complies with the emission limit. **Table 5** presents the surrogate pollutants that must be measured.
2. To establish the operating parameter values (e.g., pressure drop and liquid flow rate for scrubbers) that must be monitored to demonstrate continuous compliance with the standard.



*An initial performance test is required for all chemical recovery combustion sources, with one exception. A performance test is not required to demonstrate compliance with the gaseous organic HAP emission limit for new kraft and soda recovery furnaces if the recovery furnace is an NDCE furnace equipped with a dry ESP system.*

**Table 5. Initial and Continuous Compliance Requirements**

For the Following Affected Source or Process Unit...	The Regulated Pollutant Is...	And a Performance Test Is Required at this Frequency <sup>a</sup> ...	And a Mill Must Test <sup>b</sup> for this Surrogate Pollutant...	And these Parameters Must Be Continuously Monitored...
Chemical recovery system	HAP metals	Initially	Particulate matter	Opacity or operating parameters
NDCE recovery furnace	HAP metals	Initially	Particulate matter	Opacity or operating parameters
	Gaseous organic HAPs	Initially/ None <sup>c</sup>	Methanol/ None <sup>c</sup>	Method approved by the Administrator/ None <sup>c</sup>
DCE recovery furnace system	HAP metals	Initially	Particulate matter	Opacity or operating parameters
	Gaseous organic HAPs	Initially <sup>c</sup>	Methanol	Method approved by the Administrator
SDT	HAP metals	Initially	Particulate matter	Operating parameters
Lime kiln	HAP metals	Initially	Particulate matter	Opacity or operating parameters
Sulfite combustion unit	HAP metals	Initially	Particulate matter	Operating parameters
Semichemical combustion unit	Gaseous organic HAPs	Initially	Total hydrocarbon	Operating parameters

<sup>a</sup> The U.S. EPA or the delegated authority may require an owner or operator to conduct performance tests at the affected facility at any other time when the action is authorized under Section 114 of the CAA (§63.7(a)(3) of the NESHAP General Provisions [40 CFR part 63, subpart A]).

<sup>b</sup> Performance tests are conducted using the following methods: Method 5, 29, or 17 (PM); Method 308 (methanol); and Method 25A (THC). If Method 17 is used, you must add a constant value of 0.004 gr/dscf to the results, and the stack temperature must be no greater than 400°F.

<sup>c</sup> An initial performance for methanol is required for new NDCE recovery furnaces equipped with a wet ESP system and new DCE recovery furnace systems but is not required for new NDCE recovery furnaces equipped with a dry ESP system. Similarly, continuous monitoring is also not required for new NDCE recovery furnaces equipped with a dry ESP system.



The NESHAP specifies the required monitoring parameters for most control devices. If a mill decides to use alternative monitoring parameters other than those listed in the NESHAP, then the mill must submit for approval to the Administrator the list of alternative parameters to be monitored.

If a mill decides to use an alternative control device other than those listed in the NESHAP, then the mill must submit for approval to the Administrator a monitoring plan that includes a description of the control device, test results verifying its performance, the operating parameters to be monitored, and the frequency of measuring and recording to establish continuous compliance with the NESHAP.

During the performance test, mills must test simultaneously for emissions and monitor the appropriate operating parameters to establish the parameter values (e.g., the specific pressure drop and liquid flow rate) that constitute continuous compliance.

**Continuous monitoring.** Continuous monitoring is used to demonstrate that a mill is in compliance with the NESHAP at all times. Mills must continuously monitor opacity or operating parameters, as applicable, and report instances where the average values deviate from the values established during the initial performance test.

The NESHAP includes a two-tiered monitoring approach. Each monitoring tier specifies maximum opacity values (for ESPs only) and a maximum frequency with which the opacity or monitoring parameters may exceed established levels. If the conditions of the first monitoring tier are exceeded, then mills would be required to implement corrective action to bring the opacity or monitoring parameter levels back to established levels. Exceedance of the conditions of the second monitoring tier would constitute a violation of the standard.

### **3.5 What recordkeeping and reporting requirements apply?**

Mills must comply with the recordkeeping and reporting requirements of the NESHAP General Provisions (40 CFR part 63, subpart A) and those of the pulp and paper combustion sources NESHAP. These requirements include initial notifications, retaining records of performance tests and monitoring data, and periodic reporting of periods of excess emissions. Table 1 of the final rule in **Appendix A** identifies which sections of the NESHAP General Provisions apply and which are overridden by this NESHAP.



### 3.6 When must mills comply?

Existing affected sources must comply by March 13, 2004. New affected sources must comply at startup or by March 13, 2001, whichever is later. The initial notification is due by July 11, 2001 for existing sources.

**Appendix H** provides the detailed milestone compliance timelines for existing and new sources.

### 3.7 What is a new source?

What constitutes a new or reconstructed source for each type of mill that is subject to this NESHAP is defined in **Table 6** below.

**Table 6.** Definition of a New Source

A New Source at this Type of Mill...	Is the Construction or Reconstruction of Any One of the Following...	That Commences After...
Kraft or soda	<ul style="list-style-type: none"><li>• NDCE recovery furnace</li><li>• DCE recovery furnace system</li><li>• SDT</li><li>• Lime kiln</li></ul>	April 15, 1998
Sulfite	Sulfite combustion unit	April 15, 1998
Stand-alone semichemical	Semichemical combustion unit	April 15, 1998

**What does reconstruction mean?** Reconstruction means replacement of components to the extent that the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable new source. If this condition is met, upon construction, an existing source immediately becomes subject to the MACT standards for new sources irrespective of any change in the emission of HAPs. See §§63.2 and 63.5 of the NESHAP General Provisions (40 CFR part 63, subpart A).

The pulp and paper combustion sources NESHAP defines each kraft, soda, sulfite, or semichemical combustion unit as the equipment to which the 50 percent criterion is applied. For example, consider a mill that is converting its existing DCE recovery furnace system (i.e., DCE recovery furnace and BLO unit) to an NDCE recovery furnace. To determine if reconstruction occurs, the replacement costs of the conversion would be compared to the construction costs for a new NDCE recovery furnace. If the replacement cost is less than 50 percent, then the NDCE recovery furnace is treated as an existing source and is subject to the same existing source emission limit as before. However, if the cost exceeds 50 percent, then the replacement project would be deemed as a reconstruction of the recovery furnace, and the



NDCE recovery furnace would be subject to the new source emission limits, even if emissions after the reconstruction are the same or decrease.

### 3.8 What additional requirements apply to new sources?

New sources at pulp and paper mills have more stringent compliance requirements than existing sources. These include:

- **More stringent emission limits.** For kraft, soda, and sulfite combustion sources, the emission limits are more stringent for new sources than for existing sources.
- **No PM bubble compliance alternative.** New kraft and soda combustion sources cannot use the PM bubble compliance alternative.
- **Gaseous organic HAP emission limit.** New kraft and soda recovery furnaces are subject to a gaseous organic HAP emission limit, while existing recovery furnaces are not.
- **Opacity monitoring requirement.** New kraft and soda recovery furnaces are subject to a more stringent opacity monitoring requirement than existing kraft and soda recovery furnaces.
- **Earlier compliance dates.** New sources must comply at the date of startup or on March 13, 2001, whichever is later.
- **Preconstruction approval.** The owner or operator of mills subject to the pulp and paper combustion sources NESHAP must submit an application to EPA for approval to construct any new source that is subject to this rule. The preconstruction approval process applies only if the new or reconstructed source in and of itself is a major source. Construction must not commence until the EPA Administrator approves the application. The EPA Administrator will approve the application after determining that the source, if properly constructed, will not cause a violation of the NESHAP. The requirements for the submission and approval of construction applications are contained in §63.5(e) and (f) of the NESHAP General Provisions (40 CFR part 63, subpart A).



## Chapter 4 – NESHAP Requirements

*When using this document, remember that it is not legally binding and does not replace the pulp and paper combustion sources NESHAP for purposes of application of the rule to any specific mill.*

*The final NESHAP and the technical corrections are provided in **Appendix A**, and a flowchart summary of the NESHAP is provided in **Appendix I**. Inspection checklists detailing how to comply with the NESHAP are provided in **Appendix J**.*

*This document is not intended, nor can it be relied upon, to create any rights enforceable by any party in litigation with the United States. The EPA may change this document at any time without public notice.*

*Other on-site combustion sources not associated with chemical recovery such as power boilers, are not covered by this NESHAP.*

The pulp and paper production source category includes three subcategories: (1) kraft and soda pulp mills, (2) sulfite pulp mills, and (3) stand-alone semichemical pulp mills. The NESHAP contains emission standards for chemical recovery combustion sources in each of these subcategories. This chapter presents a summary of these emission standards and the compliance requirements (initial and continuous compliance, recordkeeping and reporting) that are associated with them.

If You Need the Following Information...	Then Read...
Standards for kraft and soda combustion sources	Section 4.1
Standards for sulfite and semichemical combustion sources	Section 4.2

### 4.1 What are the standards for kraft and soda combustion sources?

The NESHAP requires that mills control the HAP metal and/or gaseous organic HAP emissions from their kraft and soda combustion sources. This section describes the emission points that must be controlled, the emission limits, and the compliance requirements.

#### ***Which kraft and soda combustion sources must be controlled?***

The NESHAP specifies that each of the following kraft and soda affected sources in **Table 7** must be controlled:

**Table 7. Kraft and Soda Affected Sources**

The Following Emission Points Must Be Controlled...
<b>Existing Sources</b>
• Chemical recovery system <sup>a</sup>
<b>New Sources</b>
• NDCE recovery furnace and associated SDT
• DCE recovery furnace system <sup>b</sup> and associated SDT
• Lime kiln

<sup>a</sup> The chemical recovery system includes all existing NDCE and DCE recovery furnaces, SDTs, and lime kilns at a kraft or soda pulp mill.

<sup>b</sup> The DCE recovery furnace system includes the DCE recovery furnace and any BLO system, if present, at the kraft or soda pulp mill.



### What are the emission limits for kraft and soda combustion sources?

The emissions from the kraft and soda combustion sources must meet the emission limits shown in **Table 8** below.

**Table 8. Kraft and Soda Emission Limits**

These Emission Points...	Must Meet these Requirements...
<b>Existing Sources</b>	
<ul style="list-style-type: none"> <li>• Chemical recovery system</li> </ul>	<ul style="list-style-type: none"> <li>• <b>NDCE recovery furnace/DCE recovery furnace</b> Reduce outlet PM emissions to <math>\leq 0.044</math> gr/dscf at 8% oxygen (<math>O_2</math>)</li> <li>• <b>SDT</b> Reduce outlet PM emissions to <math>\leq 0.20</math> lb/ton BLS</li> <li>• <b>Lime kiln</b> Reduce outlet PM emissions to <math>\leq 0.064</math> gr/dscf at 10% <math>O_2</math></li> </ul>
	OR
	<b>PM bubble compliance alternative:</b> Comply with mill-specific PM limit (lb/ton BLS) based on the calculated value of the sum of the individual emission limits for recovery furnaces, SDTs, and lime kilns. (See <b>Appendix G</b> for examples of how mills can use the PM bubble compliance alternative.)
<b>New Sources</b>	
<ul style="list-style-type: none"> <li>• NDCE recovery furnace/DCE recovery furnace system</li> </ul>	<ul style="list-style-type: none"> <li>Reduce outlet PM emissions to <math>\leq 0.015</math> gr/dscf at 8% <math>O_2</math> <b>and</b></li> <li>Reduce outlet gaseous organic HAP emissions to <math>\leq 0.025</math> lb/ton BLS (as measured by methanol)</li> </ul>
<ul style="list-style-type: none"> <li>• SDT</li> </ul>	Reduce outlet PM emissions to $\leq 0.12$ lb/ton BLS
<ul style="list-style-type: none"> <li>• Lime kiln</li> </ul>	Reduce outlet PM emissions to $\leq 0.010$ gr/dscf at 10% $O_2$

### When must mills comply with the kraft and soda combustion source standards?

Existing combustion sources at kraft and soda pulp mills must comply with the NESHAP by March 13, 2004. New combustion sources at kraft and soda pulp mills that have a startup date after March 13, 2001 must comply with the NESHAP immediately upon startup. New combustion sources at kraft and soda pulp mills that have a startup date after April 15, 1998 but before March 13, 2001 must comply with the NESHAP by March 13, 2001.

*The PM bubble compliance alternative is only applicable to existing sources.*

*New sources are subject to more stringent emission limits.*



For testing purposes, PM is used as a surrogate for HAP metals, and methanol is used as a surrogate for gaseous organic HAP.

EPA Methods 1-4, 5, 17, and 29 are described in Appendix A to 40 CFR part 60.

### **How does a mill demonstrate initial compliance with the kraft and soda combustion source standards?**

A mill must demonstrate compliance through an initial performance test for each kraft or soda combustion source, except for NDCE recovery furnaces equipped with a dry ESP system. The initial performance test has two objectives:

1. **To demonstrate that the kraft or soda combustion source complies with the emission limit.** Refer to Table 9.
2. **To establish the operating parameter values that must be monitored to demonstrate continuous compliance.** For example, for kraft or soda combustion sources equipped with wet scrubbers, the test would establish the minimum scrubber pressure drop and scrubbing liquid flow rate that indicates compliance with the applicable PM standard.

**Table 9. Kraft and Soda Initial Compliance Requirements**

<b>To Demonstrate Initial Compliance with this Emission Limit...</b>	<b>Conduct an Initial Performance Test Following this Method...</b>	<b>To Measure these Parameters...</b>
<b>Existing Sources</b>		
<ul style="list-style-type: none"> <li>• <b>NDCE recovery furnace/ DCE recovery furnace</b> Reduce outlet PM emissions to <math>\leq 0.044</math> gr/dscf at 8% O<sub>2</sub></li> </ul>	Method 5, 29, or 17 <sup>a</sup> <b>and</b> Methods 1 through 4	Particulate matter concentration at the control device outlet corrected to 8% O <sub>2</sub>
<ul style="list-style-type: none"> <li>• <b>SDT</b> Reduce outlet PM emissions to <math>\leq 0.20</math> lb/ton BLS</li> </ul>	Method 5, 29, or 17 <sup>a</sup> <b>and</b> Methods 1 through 4 <b>and</b> Method of measuring BLS firing rate	Particulate matter mass emission rate at the control device outlet
<ul style="list-style-type: none"> <li>• <b>Lime kiln</b> Reduce outlet PM emissions to <math>\leq 0.064</math> gr/dscf at 10% O<sub>2</sub></li> </ul>	Method 5, 29, or 17 <sup>a</sup> <b>and</b> Methods 1 through 4	Particulate matter concentration at the control device outlet corrected to 10% O <sub>2</sub>
<ul style="list-style-type: none"> <li>• <b>Chemical recovery system PM bubble compliance alternative</b> Comply with mill-specific PM limit (lb/ton BLS) based on the calculated value of the sum of the individual emission limits for recovery furnaces, SDTs, and lime kilns.</li> </ul>	Method 5, 29, or 17 <sup>a</sup> <b>and</b> Methods 1 through 4 <b>and</b> Methods of measuring BLS firing rate and CaO production rate	Particulate matter mass emission rates at the control device outlets for all recovery furnaces, SDTs, and lime kilns included in the PM bubble.



Table 9. (Continued)

*EPA Method 308 is described in Appendix A to 40 CFR Part 60.*

To Demonstrate Initial Compliance with this Emission Limit...	Conduct an Initial Performance Test Following this Method...	To Measure these Parameters...
<b>New Sources</b>		
<ul style="list-style-type: none"> <li>• <b>NDCE recovery furnace/ DCE recovery furnace</b> Reduce outlet PM emissions to <math>\leq 0.015</math> gr/dscf at 8% O<sub>2</sub></li> </ul>	Method 5, 29, or 17 <sup>a</sup> and Methods 1 through 4	Particulate matter concentration at the control device outlet corrected to 8% O <sub>2</sub>
<ul style="list-style-type: none"> <li>• <b>NDCE recovery furnace/ DCE recovery furnace system</b> Reduce outlet gaseous organic HAP emissions to <math>\leq 0.025</math> lb/ton BLS (as measured by methanol)</li> </ul>	Method 308 and Methods 1 through 4 and Method of measuring BLS firing rate	Methanol mass emission rate at the control device outlet
<ul style="list-style-type: none"> <li>• <b>SDT</b> Reduce outlet PM emissions to <math>\leq 0.12</math> lb/ton BLS</li> </ul>	Method 5, 29, or 17 <sup>a</sup> and Methods 1 through 4 and Method of measuring BLS firing rate	Particulate matter mass emission rate at the control device outlet
<ul style="list-style-type: none"> <li>• <b>Lime kiln</b> Reduce outlet PM emissions to <math>\leq 0.010</math> gr/dscf at 10% O<sub>2</sub></li> </ul>	Method 5, 29, or 17 <sup>a</sup> and Methods 1 through 4	Particulate matter concentration at the control device outlet corrected to 10% O <sub>2</sub>

<sup>a</sup> If Method 17 is used, you must add a constant value of 0.004 gr/dscf to the results, and the stack temperature must be no greater than 400°F.

#### **How does a mill demonstrate continuous compliance with the kraft and soda combustion source standards?**

*Mills can use previous performance test data to set the operating parameter levels for monitoring as long as the processes and control equipment have not changed since the tests were conducted.*

Mills must install continuous monitoring systems to measure opacity and control device operating parameters. Mills must also establish a range of values for each operating parameter to be monitored based upon the values recorded during the initial performance test or during previous qualifying tests. The mill may conduct multiple performance tests to establish ranges of operating parameter values. The mills also may expand or replace the operating parameter levels through subsequent performance tests. **Table 10** presents the monitoring requirements for each emission limit.

Mills can monitor parameters other than those listed in Table 10 only if they receive written approval from the Administrator. Also, mills that comply with the NESHAP through operational changes or with control devices not described in the NESHAP must submit a monitoring plan that proposes which parameters will be monitored, the range of these parameters, and the frequency with which these parameters will be monitored, subject to approval by the Administrator.



*The NESHAP includes a two-tiered monitoring approach. If the conditions of the first tier are exceeded, then corrective action must be taken. Exceedance of the second tier conditions results in a violation of the standard.*

**Table 10. Kraft and Soda Continuous Compliance Requirements**

To Demonstrate Continuous Compliance With this Emission Limit...	Then Continuously Monitor these Parameters...	You Must Take Corrective Action If...	You Are in Violation of the Standard If...
<b>Existing Sources</b>			
<ul style="list-style-type: none"> <li>• <b>Recovery furnace</b> Reduce outlet PM emissions to <math>\leq 0.044</math> gr/dscf at 8% <math>O_2</math></li> <li>• <b>SDT</b> Reduce outlet PM emissions to <math>\leq 0.20</math> lb/ton BLS</li> <li>• <b>Lime kiln</b> Reduce outlet PM emissions to <math>\leq 0.064</math> gr/dscf at 10% <math>O_2</math></li> <li>• <b>Chemical recovery system:</b> PM Bubble Compliance Alternative (recovery furnaces, SDTs, and lime kilns)</li> </ul>	<p>When using an ESP, monitor opacity at least once every 10 seconds <b>or</b> When using a wet scrubber, monitor scrubber pressure drop and scrubbing liquid flow rate at least once every 15 minutes</p>	<p>Average of ten consecutive 6-minute opacity readings result in a measurement <math>&gt;20\%</math> <b>or</b> Any 3-hour average scrubber parameter value is outside the range of values established during the initial performance test</p>	<p>Opacity <math>&gt;35\%</math> for recovery furnaces or <math>&gt;20\%</math> for lime kilns <math>\geq 6\%</math> of the operating time within any quarterly period <b>or</b> Six or more 3-hour average scrubber parameter values are outside the range of values established during the initial performance test within any 6-month reporting period<sup>a</sup></p>
<b>New Sources</b>			
<ul style="list-style-type: none"> <li>• <b>Recovery furnace</b> Reduce outlet PM emissions to <math>\leq 0.015</math> gr/dscf at 8% <math>O_2</math></li> <li>• <b>SDT</b> Reduce outlet PM emissions to <math>\leq 0.12</math> lb/ton BLS</li> <li>• <b>Lime kiln</b> Reduce outlet PM emissions to <math>\leq 0.010</math> gr/dscf at 10% <math>O_2</math></li> </ul>	<p>When using an ESP, monitor opacity at least once every 10 seconds <b>or</b> When using a wet scrubber, monitor scrubber pressure drop and scrubbing liquid flow rate at least once every 15 minutes</p>	<p>Average of ten consecutive 6-minute opacity readings result in a measurement <math>&gt;20\%</math> <b>or</b> Any 3-hour average scrubber parameter value is outside the range of values established during the initial performance test</p>	<p>Opacity <math>&gt;20\%</math> for <math>\geq 6\%</math> of the operating time within any quarterly period <b>or</b> Six or more 3-hour average scrubber parameter values are outside the range of values established during the initial performance test within any 6-month reporting period<sup>a</sup></p>



**Table 10. (Continued)**

To Demonstrate Continuous Compliance With this Emission Limit	Then Continuously Monitor these Parameters...	You Must Take Corrective Action If...	You Are In Violation of the Standard If...
<ul style="list-style-type: none"> <li>• <b>Recovery furnace</b> Reduce outlet gaseous organic HAP emissions to <math>\leq 0.025</math> lb/ton BLS (as measured by methanol)</li> </ul>	When using an NDCE furnace with dry ESP system, no monitoring required <b>or</b> When using a non-NDCE furnace or an NDCE furnace with wet ESP system, monitor the applicable parameters subject to prior written approval by the Administrator	Not applicable for NDCE recovery furnace equipped with dry ESP system <b>or</b> For any non-NDCE furnace or any NDCE furnace with wet ESP system, any 3-hour average parameter value is outside the range of values established during the initial performance test	Not applicable for NDCE recovery furnace equipped with dry ESP system <b>or</b> For any non-NDCE furnace or any NDCE furnace with wet ESP system, six or more 3-hour average parameter values are outside the range of values established during the initial performance test within any 6-month reporting period <sup>a</sup>

<sup>a</sup> For the purposes of determining the number of nonopacity (e.g., scrubber) monitoring exceedances, no more than one exceedance will be attributed in any given 24-hour period.

### ***Must a mill comply at all times?***

For kraft and soda combustion sources, the NESHAP establishes an allowable percent of operating time during which exceedances are not considered to be a violation of the standard. Periods of exceedance include when opacity values exceed the specified levels in the NESHAP and when operating parameter values established during the initial performance test cannot be maintained at the appropriate level. The allowance is in addition to excused periods under the startup, shutdown, or malfunction provisions.

The exceedance allowances are:

- For opacity exceedances, anything less than 6 percent of the operating time within any quarterly period.
- For scrubber parameter exceedances, up to five 3-hour average scrubber parameter values within any 6-month reporting period.

For the purposes of determining the number of nonopacity (e.g., scrubber, parameter exceedances, the NESHAP states that no more than one exceedance will be attributed in any given 24-hour period. For example, if a kraft pulp mill had six 3-hour average scrubber parameter values outside the range of values established during the initial performance test within a



particular 6-month reporting period, but two of those values occurred within a 24-hour period, then only one of those two values would count as an exceedance in determining a violation. Consequently, the mill would only have five exceedances within the 6-month reporting period and would be within its exceedance allowance.

Even though periods of exceedance may be exempt under the MACT requirements, these periods of exceedance must still comply with NSPS requirements (40 CFR part 60, subpart BB) and any applicable State requirements.

To calculate the percent of periods of opacity exceedance in a quarterly period, divide the number of hours in the period during which the 6-minute average opacity exceedances occurred by the total number of process unit operating hours in the period and multiply by 100 percent. For example, if there were 223 6-minute average opacity exceedances during a quarterly period, then the number of hours during which the exceedances occurred would be  $223 \times 6/60 = 22.3$  hours. If the total recovery furnace operating time for the quarterly period was 2,100 hours, then to calculate the quarterly exceedance, divide 22.3 hours by 2,100 hours as follows:

$$\frac{\text{Parameter exceedance period}}{\text{total process operating time}} \times 100\%$$

$$\frac{22.3 \text{ hours}}{2,100 \text{ hours}} \times 100\% = 1.06\%$$

***What are the recordkeeping and reporting requirements for the kraft and soda combustion source standards?***

Mills must also comply with recordkeeping and reporting requirements. **Tables 11 and 12** present the recordkeeping and reporting requirements for the kraft and soda combustion source standards.



**Table 11. Kraft and Soda Recordkeeping Requirements**

<b>Keep the Following Records...</b>	<b>Which Contain the Following Information...</b>
Startup, shutdown, and malfunction plan	<ul style="list-style-type: none"> <li>• Procedures for operating and maintaining the source during periods of startup, shutdown, and malfunction (SSM)</li> <li>• A program of corrective action for malfunctioning process and air pollution control equipment used to comply with the standard</li> <li>• Identification of all routine or otherwise predictable continuous monitoring system (CMS) malfunctions.</li> <li>• Procedures for responding to any parameter level inconsistent with the level established during the initial performance test, including the following:               <ul style="list-style-type: none"> <li>• Procedures to determine and record the cause of a parameter exceedance and the time the exceedance began and ended</li> <li>• Corrective actions to take in the event of a parameter exceedance, including procedures for recording the actions taken to correct the exceedance</li> </ul> </li> <li>• A maintenance schedule for each control technique consistent with manufacturer's instructions and recommendations for routine and long-term maintenance</li> <li>• An inspection schedule for each CMS to ensure, at least once in each 24-hour period, that each CMS is properly functioning</li> </ul>
NESHAP General Provisions records	All relevant information listed in §63.10(b) and (c) of the NESHAP General Provisions (40 CFR part 63, subpart A)
Parameter monitoring data	<ul style="list-style-type: none"> <li>• Each successive 6-minute average opacity</li> <li>• Scrubber pressure drop and scrubbing liquid flow rate readings taken at least once every successive 15-minute period</li> <li>• Scrubber pressure drop and scrubbing liquid flow rate 3-hour averages</li> </ul>
Occurrences when corrective action required	<ul style="list-style-type: none"> <li>• Any period when the average of 10 consecutive 6-minute opacity readings result in a measurement <math>&gt; 2.0\%</math></li> <li>• Any 3-hour average scrubber parameter value outside the range of values established during the initial performance test</li> <li>• Brief explanation of the cause of the exceedance</li> <li>• Time the exceedance occurred</li> <li>• Time correction was initiated and completed</li> <li>• Corrective action taken</li> </ul>



Table 11. (Continued)

Keep the Following Records...	Which Contain the Following Information...
Occurrences when violation noted	<ul style="list-style-type: none"> <li>• Opacity &gt;35% for existing recovery furnaces for ≥6% of the operating time within any quarterly period</li> <li>• Opacity &gt;20% for new recovery furnaces or existing or new lime kilns for ≥6% of the operating time within any quarterly period</li> <li>• Six or more 3-hour average scrubber parameter values are outside the range of values established during the initial performance test within any 6-month reporting period<sup>a</sup></li> </ul>
Black liquor solids firing rate records	Black liquor solids firing rates in tons per day for all kraft or soda recovery furnaces and all semichemical combustion units
CaO production rate records	CaO production rates in tons per day for all kraft or soda lime kilns
Monitoring parameter records	Monitoring parameter ranges established during initial performance test
NDCE recovery furnace certification	Certification that an NDCE recovery furnace equipped with a dry ESP system is used to comply with the gaseous organic HAP emission limit for new recovery furnaces

<sup>a</sup> For the purposes of determining the number of nonopacity (e.g., scrubber) monitoring exceedances, no more than one exceedance will be attributed in any given 24-hour period.



See Appendix K for  
example notifications  
and compliance reports.

**Table 12. Kraft and Soda Reporting Requirements**

<b>Submit the Following Reports...</b>	<b>Which Contain the Following Information...</b>
Initial notifications	All relevant information listed in §63.9(b) of the NESHAP General Provisions <sup>a</sup>
Request for extension of compliance	All relevant information listed in §63.9(c) of the NESHAP General Provisions <sup>a</sup>
Notification that source is subject to special compliance requirements	All relevant information listed in §63.9(d) of the NESHAP General Provisions <sup>a</sup>
Notification of performance test	All relevant information listed in §63.9(e) of the NESHAP General Provisions <sup>a</sup>
Additional notifications for sources with CMS	All relevant information listed in §63.9(g) of the NESHAP General Provisions <sup>a</sup>
Notification of compliance status	<ul style="list-style-type: none"> <li>• All relevant information listed in §63.9(h) of the NESHAP General Provisions<sup>a</sup></li> <li>• PM emission limits determined in §63.865(a)(1)(ii) of subpart MM</li> <li>• Calculations and supporting documentation for PM emission limits determined in §63.865(a)(1)(ii) of subpart MM</li> </ul>
Notification of changes (PM bubble compliance alternative)	<ul style="list-style-type: none"> <li>• Modifications to or replacement of air pollution control system</li> <li>• Shutdown of recovery furnace, SDT, or lime kiln or chemical recovery system for more than 60 days</li> <li>• Change in continuous monitoring parameter or the value or range of values for continuous monitoring parameter</li> <li>• Increase in black liquor solids firing rate for any recovery furnace more than 10 percent above the highest measured during the most recent performance test during any 24-hour averaging period</li> </ul>
Quarterly report of excess emissions	<ul style="list-style-type: none"> <li>• All relevant information listed in §63.10(c)(3)(i) of the NESHAP General Provisions<sup>a</sup></li> <li>• Number and duration of occurrences when the source met or exceeded the conditions requiring corrective action</li> <li>• Number and duration of occurrences when the source met or exceeded the conditions indicating a violation</li> </ul>
Semiannual report of no excess emissions	<ul style="list-style-type: none"> <li>• All relevant information listed in §63.10(c)(3)(ii) of the NESHAP General Provisions<sup>a</sup></li> <li>• Statement that no excess emissions occurred during the reporting period</li> </ul>

<sup>a</sup> The NESHAP General Provisions can be found in 40 CFR part 63, subpart A.



*Existing NSPS sources that choose to comply with the PM standards using the PM bubble compliance alternative must continue to comply with the NSPS limits for kraft pulp mills.*

*Compliance with the NESHAP does not always ensure compliance with the NSPS.*

### **How do the requirements for the NSPS and NESHAP compare?**

**Table 13** compares the NSPS for kraft pulp mills and the NESHAP for combustion sources at kraft pulp mills. Note that demonstrating compliance with a NESHAP emission limit does not necessarily mean that NSPS requirements are automatically met.

If sources comply with the surrogate PM emission limits for kraft combustion sources in the NESHAP, which are no less stringent than the PM emission limits in the NSPS (and for lime kilns and new sources are more stringent), then compliance with both the NSPS and NESHAP is assured. Sources subject to the NSPS that use the PM bubble compliance alternative to establish mill-specific PM limits would have to establish PM limits no less stringent than the NSPS limit in order to demonstrate compliance with both the NSPS and NESHAP. (See **Appendix G** for examples of how the PM bubble compliance alternative is applied when the mill has existing combustion sources already subject to the NSPS.)

If sources comply with the gaseous organic HAP emission limit for new recovery furnaces in the NESHAP, there is no guarantee that the sources will also demonstrate compliance with the TRS emission limit in the NSPS. However, reductions in TRS and gaseous organic HAP emissions would occur by the same mechanism (e.g., elimination of stripping from the black liquor in the BLO unit, DCE, wet-bottom ESP, or wet PM return system).

**Table 13. Comparison of NSPS and NESHAP Requirements**

For this Equipment...	The NSPS Requires...	And the NESHAP Requires...	Does NESHAP Compliance Ensure NSPS Compliance?
<b>Existing Sources Subject to NSPS</b>			
Recovery furnace	PM: $\leq 0.044$ gr/dscf at 8% O <sub>2</sub> <b>and</b> Opacity: $\leq 35\%$ for $>94\%$ of operating time within quarterly period	PM: $\leq 0.044$ gr/dscf at 8% O <sub>2</sub> <b>and</b> Opacity: $\leq 35\%$ for $>94\%$ of operating time within quarterly period	Yes
	TRS: $\leq 5$ ppm <sub>dv</sub> at 8% O <sub>2</sub>	No requirement	No
SDT	PM: $\leq 0.20$ lb/ton BLS	PM: $\leq 0.20$ lb/ton BLS	Yes
	TRS: $\leq 0.033$ lb/ton BLS	No requirement	No



Table 13. (Continued)

For this Equipment...	The NSPS Requires...	And the NESHAP Requires...	Does NESHAP Compliance Ensure NSPS Compliance?
Lime kiln	PM: $\leq 0.067$ gr/dscf at 10% O <sub>2</sub> , when natural gas burned or PM: $\leq 0.13$ gr/dscf at 10% O <sub>2</sub> , when fuel oil burned	PM: $\leq 0.064$ gr/dscf at 10% O <sub>2</sub>	Yes
	No opacity requirement	Opacity: $\leq 20\%$ for >94% of operating time within quarterly period (lime kiln with ESP)	Not applicable: NSPS does not have opacity requirement for lime kilns
	TRS: $\leq 8$ ppmdv at 10% O <sub>2</sub>	No requirement	No
Chemical recovery system: PM bubble compliance alternative	PM and TRS emission limits listed above for recovery furnaces, SDTs, and lime kilns and Opacity standard listed above for recovery furnaces	Mill-specific PM limits based on calculated value of sum of individual emission limits for recovery furnaces, SDTs, and lime kilns. and Opacity requirements listed above	Only if mill-specific limits no less stringent than NSPS limits
<b>New Sources</b>			
Recovery furnace	PM: $\leq 0.044$ gr/dscf at 8% O <sub>2</sub> and Opacity: $\leq 35\%$ for >94% of operating time within any quarterly period	PM: $\leq 0.015$ gr/dscf at 8% O <sub>2</sub> and Opacity: $\leq 20\%$ for >94% of operating time within any quarterly period	Yes
	TRS: $\leq 5$ ppmdv at 8% O <sub>2</sub>	Gaseous organic HAP: $\leq 0.025$ lb/ton BLS (as measured by methanol)	Only if reduction in gaseous organic HAP emissions also results in reduction in TRS emissions below NSPS limit
SDT	PM: $\leq 0.20$ lb/ton BLS	PM: $\leq 0.12$ lb/ton BLS	Yes



Table 13. (Continued)

For this Equipment...	The NSPS Requires...	And the NESHAP Requires...	Does NESHAP Compliance Ensure NSPS Compliance?
Lime kiln	PM: $\leq 0.067$ gr/dscf at 10% O <sub>2</sub> , when natural gas burned or PM: $\leq 0.13$ gr/dscf at 10% O <sub>2</sub> , when fuel oil burned	PM: $\leq 0.010$ gr/dscf at 10% O <sub>2</sub>	Yes
	No opacity requirement	Opacity: $\leq 20\%$ for >94% of operating time within quarterly period (lime kiln with ESP)	Not applicable; NSPS does not have opacity requirement for lime kilns
	TRS: $\leq 8$ ppmdv at 10% O <sub>2</sub>	No requirement	No

#### 4.2 What are the standards for sulfite and semichemical combustion sources?

##### *Which sulfite and semichemical combustion sources must be controlled?*

The NESHAP specifies that each of the following sulfite and semichemical affected sources in **Table 14** must be controlled:

**Table 14. Sulfite and Semichemical Affected Sources**

The Following Emission Points Must Be Controlled...
<b>Sulfite Combustion Sources</b>
• Recovery furnace
• Fluidized-bed reactor
<b>Semichemical Combustion Sources</b>
• Fluidized-bed reactor
• Recovery furnace
• Smelter
• Rotary liquor kiln
• Black liquor gasifier

*Recovery furnaces (and their associated SDTs) that combust spent liquor from both kraft and semichemical pulping processes are subject to the NESHAP requirements for kraft and soda mills (See Section 3.1.)*



**What are the emission limits for sulfite and semichemical combustion sources?**

The emissions from the sulfite and semichemical combustion sources must meet the emission limits shown in **Table 15** below.

**Table 15. Sulfite and Semichemical Emission Limits**

<b>These Emission Points...</b>	<b>Must Meet these Requirements...</b>
<b>Sulfite Combustion Sources</b>	
• Existing sources	Reduce outlet PM emissions to $\leq 0.040$ gr/dscf at 8% O <sub>2</sub>
• New sources	Reduce outlet PM emissions to $\leq 0.020$ gr/dscf at 8% O <sub>2</sub>
<b>Semichemical Combustion Sources</b>	
• Existing and new sources	Reduce outlet gaseous organic HAP emissions to $\leq 2.97$ lb/ton BLS (as measured by THC [as carbon]) or Reduce outlet gaseous organic HAP emissions by 90%

**When must mills comply with the sulfite and semichemical combustion source standards?**

Existing combustion sources at sulfite and semichemical pulp mills must comply with the NESHAP by March 13, 2004. New combustion sources at sulfite and semichemical pulp mills that have a startup date after March 13, 2001 must comply with the NESHAP immediately upon startup. New combustion sources at sulfite and semichemical pulp mills that have a startup date after April 15, 1998 but before March 13, 2001 must comply with the NESHAP by March 13, 2001.

**How does a mill demonstrate initial compliance with the sulfite and semichemical combustion source standards?**

A mill must demonstrate compliance through an initial performance test for each sulfite or semichemical combustion source. The initial performance test has two objectives:

1. **To demonstrate that the sulfite or semichemical combustion source complies with the emission limit.** Refer to **Table 16**.
2. **To establish the operating parameter values that must be monitored to demonstrate continuous compliance.** For example, for sulfite combustion sources equipped with wet scrubbers, the test would establish the minimum scrubber pressure drop and scrubbing liquid flow rate that indicates compliance with the applicable PM standard.

*For testing purposes, PM is used as a surrogate for HAP metals, and THC is used as a surrogate for gaseous organic HAP.*



EPA Methods 1-4, 5, 17, 29, and 25A are included in Appendix A to 40 CFR part 60.

**Table 16. Sulfite and Semichemical Initial Compliance Requirements**

To Demonstrate Initial Compliance with this Emission Limit...	Conduct an Initial Performance Test Following this Method...	To Measure these Parameters...
<b>Sulfite Combustion Sources</b>		
<ul style="list-style-type: none"> <li><b>Existing sources</b> Reduce outlet PM emissions to <math>\leq 0.040</math> gr/dscf at 8% O<sub>2</sub></li> <li><b>New sources</b> Reduce outlet PM emissions to <math>\leq 0.020</math> gr/dscf at 8% O<sub>2</sub></li> </ul>	Method 5, 29, or 17 <sup>a</sup> <b>and</b> Methods 1 through 4	Particulate matter concentration at the control device outlet corrected to 8% O <sub>2</sub>
<b>Semichemical Combustion Sources</b>		
<ul style="list-style-type: none"> <li><b>Existing and new sources</b> Reduce outlet gaseous organic HAP emissions to <math>\leq 2.97</math> lb/ton BLS (as measured by THC [as carbon]) <b>or</b> Reduce outlet gaseous organic HAP emissions by 90%</li> </ul>	Method 25A <b>and</b> Methods 1 through 4 <b>and</b> Method of measuring BLS production	THC mass emission rate at the control device outlet <b>or</b> THC mass emission rate at both the inlet and outlet of the control device

<sup>a</sup> If Method 17 is used, you must add a constant value of 0.004 gr/dscf to the results, and the stack temperature must be no greater than 400°F.

**How does a mill demonstrate continuous compliance with the sulfite and semichemical combustion source standards?**

Mills must install a continuous monitoring system to measure control device operating parameters. Mills must also establish a range of values for each operating parameter to be monitored based upon the values recorded during the initial performance test or during previous qualifying tests. If previous test data are used, the mill must certify that the control devices and processes have not be modified subsequent to the date of testing. The mill may conduct multiple performance tests to establish ranges of operating parameter values. The mills also may expand or replace the operating parameter levels through subsequent performance tests. **Table 17** presents the monitoring requirements for each emission limit.

Mills can monitor parameters other than those listed in Table 17 only if they receive written approval from the Administrator. Also, mills that comply with the NESHAP through operational changes or with control devices not described in the NESHAP must submit a monitoring plan that proposes which parameters will be monitored, the range of these parameters, and the frequency with which these parameters will be monitored, subject to approval by the Administrator.



**Table 17. Sulfite and Semichemical Continuous Compliance Requirements**

<b>To Demonstrate Continuous Compliance with this Emission Limit...</b>	<b>Then Continuously Monitor these Parameters...</b>	<b>You Must Take Corrective Action If...</b>	<b>You Are in Violation of the Standard If...</b>
<b>Sulfite Combustion Sources</b>			
<ul style="list-style-type: none"> <li><b>Existing sources</b> Reduce outlet PM emissions to <math>\leq 0.040</math> gr/dscf at 8% O<sub>2</sub></li> <li><b>New sources</b> Reduce outlet PM emissions to <math>\leq 0.020</math> gr/dscf at 8% O<sub>2</sub></li> </ul>	Monitor scrubber pressure drop and scrubbing liquid flow rate at least once every 15 minutes	Any 3-hour average scrubber parameter value is outside the range of values established during the initial performance test	Six or more 3-hour average scrubber parameter values are outside the range of values established during the initial performance test within any 6-month reporting period <sup>a</sup>
<b>Semichemical Combustion Sources</b>			
<ul style="list-style-type: none"> <li><b>Existing and new sources</b> Reduce outlet gaseous organic HAP emissions to <math>\leq 2.97</math> lb/ton BLS <b>or</b> Reduce outlet gaseous organic HAP emissions by 90%</li> </ul>	When using an RTO, monitor RTO operating temperature at least once every 15 minutes	Any 1-hour average temperature value falls below the value established during the initial performance test	Any 3-hour average temperature value falls below the value established during the initial performance test within any 6-month reporting period <sup>a</sup>

<sup>a</sup> For the purposes of determining the number of nonopacity (e.g., scrubber or RTO) monitoring exceedances, no more than one exceedance will be attributed in any given 24-hour period.

***Must a mill comply at all times?***

For sulfite and semichemical sources, the NESHAP establishes an allowable percent of operating time during which exceedances are not considered to be a violation of the standard. Periods of exceedance include when operating parameter values established during the initial performance test cannot be maintained at the appropriate level. The allowance is in addition to excused periods under the startup, shutdown, or malfunction provisions.

The exceedance allowances are:

- For existing and new sulfite combustion sources, up to five 3-hour average scrubber parameter values that are outside the range of values established during the initial performance test within any 6-month reporting period



For the purposes of determining the number of nonopacity (e.g., scrubber) parameter exceedances, the NESHAP states that no more than one exceedance will be attributed in any given 24-hour period. For example, if a sulfite pulp mill had six 3-hour average scrubber parameter values outside the range of values established during the initial performance test within a particular 6-month reporting period, but two of those values occurred within a 24-hour period, then only one of those two values would count as an exceedance in determining a violation. Consequently, the mill would only have five exceedances within the 6-month reporting period and would be within its exceedance allowance.

Even though periods of exceedance may be exempt under the MACT requirements, these periods of exceedance must still comply with any applicable State requirements. (Sulfite pulp mills are not subject to the NSPS requirements in 40 CFR part 60, subpart BB.)

***What are the recordkeeping and reporting requirements for the sulfite and semichemical combustion source standards?***

Sulfite and stand-alone semichemical mills must also comply with recordkeeping and reporting requirements. The **recordkeeping requirements** for sulfite and semichemical combustion sources are the same as those presented in **Table 11** for kraft and soda combustion sources, with the following exceptions. Records of black liquor solids firing rates for kraft and soda recovery furnaces and CaO production rates for kraft and soda lime kilns would not be applicable. Additional records would include black liquor solids firing rates for semichemical combustion sources, RTO operating temperature readings, 1-hour and 3-hour averages of RTO operating temperature, RTO operating temperature limit established during the initial performance test, and occurrences when corrective action is required or a violation is noted for an RTO.

The **reporting requirements** for sulfite and semichemical combustion sources are the same as those presented in **Table 12** for kraft and soda combustion sources, except that the following reports would not be applicable: reports of kraft and soda PM emission limits established under the PM bubble compliance alternative, calculations and supporting documentation for these PM emission limits, and reports of any changes after these PM emission limits have been approved by the Administrator.



## ***Chapter 5 – Other Federal Regulations Affecting Pulp and Paper Mills***

The pulp and paper combustion sources NESHAP does not represent all of the pollution regulation of the pulp and paper industry. Pulp and paper mills are subject to additional air requirements under the CAA, water requirements under the Clean Water Act (CWA), and other Federal, State and local laws not associated in any way with the pulp and paper combustion sources NESHAP. This chapter discusses the other Federal regulations, current and future, that also affect the pulp and paper industry.

Other Federal regulations currently affecting the pulp and paper industry include the following:

- Pulp and Paper Production NESHAP (40 CFR part 63, subpart S)
- National Ambient Air Quality Standards (NAAQS)
- Kraft Mill NSPS (40 CFR part 60, subparts B and BB)
- Industrial Boilers NSPS (40 CFR part 60, subparts D, Db, and Dc)
- Gas-Fired Turbines NSPS (40 CFR part 60, subpart GG)
- Volatile Organic Liquid Storage Vessels NSPS (40 CFR part 60, subpart Kb)
- Prevention of Significant Deterioration (PSD)/New Source Review (NSR)
- Pulp and Paper Effluent Limitations Guidelines and Standards, Pretreatment Standards, and NSPS (40 CFR part 430, subparts A-L)
- National Pollutant Discharge Elimination System (NPDES) Related Statutes and Regulations
- Spill Prevention Control and Countermeasure (SPCC) Plans (40 CFR part 112)
- Notice of Discharge of Reportable Quantities of Hazardous Substances (40 CFR parts 116 and 117)
- Resource Conservation and Recovery Act (RCRA)
- Emergency Planning and Community Right-to-Know Act (EPCRA)/Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)



<b>If You Need the Following Information...</b>	<b>Then Read...</b>
Other Federal air regulations affecting the pulp and paper industry	Section 5.1
Federal water regulations affecting the pulp and paper industry	Section 5.2
Federal hazardous waste regulations affecting the pulp and paper industry	Section 5.3
Upcoming regulations that will affect pulp and paper mills and companies	Section 5.4

### 5.1 What other Federal air regulations currently affect pulp and paper mills?

Other Federal air regulations currently affecting the pulp and paper industry are shown in **Table 18** below:

**Table 18. Other Federal Air Regulations**

<b>The Following Air Regulation...</b>	<b>Affects...</b>	<b>By...</b>
NESHAP 40 CFR part 63, subpart S	Pulping and bleaching systems at pulp and paper mills	Controlling HAP
NAAQS	Energy generation at pulp and paper mills	Controlling PM, CO, and SO <sub>2</sub> and ozone precursors (VOC and NO <sub>x</sub> ) as part of the state implementation plans
NSPS		
1. 40 CFR part 60, subpart BL	Kraft pulp mills	Controlling PM and TRS at existing sources under State regulation. State regulations are based on EPA guidelines.
2. 40 CFR part 60, subpart BB	Kraft pulp mills	Controlling PM and TRS
3. 40 CFR part 60, subparts D, Db, and Dc	Industrial boilers	Controlling PM, NO <sub>x</sub> , and SO <sub>2</sub>
4. 40 CFR part 60, subpart GG	Gas-fired turbines	Controlling NO <sub>x</sub> and SO



Table 18. (Continued)

The Following Air Regulation...	Affects...	By...
5. 40 CFR part 60, subpart Kb	Volatile organic liquid storage vessels	Controlling VOC
PSD/NSR	Pulp and paper mills installing new or modified equipment	Requiring a preconstruction permit that imposes emission limitations based on best available control technology (BACT) or lowest achievable emission rate (LAER) for criteria pollutants for which there is a significant increase

*The Pulp and Paper Production NESHAP (40 CFR part 63, subpart S) regulates emissions from non-combustion sources at pulp and paper mills*

***Pulp and Paper Production NESHAP (40 CFR part 63, subpart S).***

The pulp and paper production NESHAP specifies emission standards for pulping and bleaching systems at all chemical pulping mills and bleaching systems at mechanical pulping, non-wood fiber, and secondary fiber mills which employ chlorine or chlorine dioxide for bleaching. The NESHAP requires mills to reduce HAP emissions by collecting and incinerating pulping process vent emissions, collecting and controlling bleaching process vent emissions with a caustic scrubber, eliminating the use of certain bleaching chemicals, and collecting and treating process condensate streams to remove HAPs through biological treatment or stripping (kraft mills only). Another option in the NESHAP for treatment of HAPs in kraft mill condensate systems is to recycle the condensates to an enclosed process unit. The NESHAP is written to encourage pollution prevention techniques.

**NAAQS** have been established for six criteria pollutants. Pulp and paper mills are potential sources of PM, CO, SO<sub>2</sub>, and ozone precursors (VOC and NO<sub>x</sub>). Each State must develop a State Implementation Plan (SIP) to identify sources of air pollution and to determine what actions are necessary to achieve attainment with the NAAQS for all criteria pollutants. The SIP contains emission regulations that may affect the pulp and paper industry, including emission limitations and standards and preconstruction permitting requirements (e.g., NSR, PSD).

**Kraft Mill NSPS (40 CFR part 60, subpart BB).** All kraft mills in operation are currently regulated under the kraft mill NSPS (40 CFR Subpart BB) or State regulations for existing sources promulgated under Section 111(d) of the Act (40 CFR 60, Subpart B). The kraft mill NSPS sets emission limits for PM and TRS for recovery furnaces, SDTs, and lime kilns and sets emission limits for TRS only for digester systems, brown stock washer systems, multiple effect evaporators, black liquor oxidation systems, and



condensate stripper systems. See **Chapter 4** for a more detailed discussion of the kraft mill NSPS, as this regulation applies to kraft mills only.

**Industrial Boilers NSPS (40 CFR part 60, subparts D, Db, and Dc) and Gas-Fired Turbines NSPS (40 CFR part 60, subpart GG).** Almost all pulp and paper mills have boilers and turbines for generating electricity and steam. Newer combustion units may be subject to regulation under one of these rules which set emissions limits for PM, NO<sub>x</sub>, and SO<sub>2</sub>. (Note that subpart Dc does not regulate NO<sub>x</sub>, and subpart GG does not regulate PM.)

**Volatile Organic Liquid Storage Vessels NSPS (40 CFR part 60, subpart Kb).** Pulp and paper mills with storage vessels containing a volatile organic liquid which emits VOCs into the atmosphere would be subject to regulation under the Volatile Organic Liquid Storage Vessels NSPS (40 CFR part 60, subpart Kb).

## 5.2 What Federal water regulations currently affect pulp and paper mills?

Federal water regulations currently affecting the pulp and paper industry are shown in **Table 19** below:

**Table 19. Federal Water Regulations**

The Following Water Regulation...	Affects...	By...
Effluent limitations Pretreatment standards NSPS 40 CFR part 430, subparts A-L	Indirect-discharging of pollutants to publicly-owned treatment works (POTWs) and direct-discharging into navigable waters via the NPDES program	Setting effluent limitations and pollutant discharge limits to POTWs; also includes Best Management Practices (BMP) regulations and the Voluntary Advanced Technology Incentive program
Section 402 of CWA NPDES: Technology and water quality-based limitations	Direct-discharging of pollutants into navigable waters	Setting effluent limitation on pollutant based on available technology and intended use of receiving waterbody; also sets monitoring and reporting requirements
Pretreatment program	Indirect-discharging of pollutants to POTWs	Setting pollutant discharge limits to POTW



**Table 19. (Continued)**

<b>The Following Water Regulation...</b>	<b>Affects...</b>	<b>By...</b>
Storm water permit application	Any facility	Establishing pollution prevention plans and BMP
Section 110 of CWA 40 CFR part 110	Any facility	Prohibiting oil discharges
SPCC 40 CFR part 112	Oil storing/ consuming facilities	Requiring a spill prevention and control plan, reporting, plan updates, and training obligations
Notice of Discharge of Reportable Quantities of Hazardous Substances 40 CFR parts 116 and 117	Any facility	Requiring reporting of designated hazardous substance discharges to U.S. government following the Department of Transportation regulations

Stay informed about new or revised requirements by visiting the EPA Office of Water's Pulp and Paper website:  
<http://www.epa.gov/ost/pulppaper/>

***Pulp and Paper Effluent Limitations Guidelines and Standards, Pretreatment Standards, and NSPS (40 CFR part 430, subparts A-L).***

These regulations control discharge of pollutants in wastewaters generated at pulp and paper mills. The pretreatment standards apply to mills that discharge wastewater to a municipal wastewater treatment facility (i.e., POTWs). The effluent limitations guidelines and standards are applied to the mills that directly discharge into receiving water via the NPDES program. In addition, the effluent limitations guidelines and standards include best management practices (BMP) regulations designed to prevent or contain leaks and spills of pulping liquor, soap, and turpentine, and to control any intentional diversions of these substances. They also include the Voluntary Advanced Technology Incentives Program, which is designed to encourage direct discharging bleached papergrade kraft mills to install more pollution prevention technology than required by the regulations.

***NPDES Program (CWA section 402).*** The NPDES program controls direct discharges into navigable waters. The scope of this program is quite broad, and most point source discharges associated with a pulp and paper mill will be subject to NPDES permitting requirements.

***SPCC Plans (40 CFR part 112).*** This regulation applies to all facilities that store or use oil or oil products, and which because of their location, could reasonably be expected to discharge oil into navigable waters of the United States. Such facilities are required to prepare a SPCC plan.

***Notice of Discharge of Reportable Quantities of Hazardous Substances (40 CFR parts 116 and 117).*** This regulation defines the discharges into



navigable waters of the United States that must be reported to appropriate agencies of the U.S. Government. This requirement does NOT apply to discharges covered by a facility's NPDES permit.

### 5.3 What Federal hazardous waste regulations currently affect pulp and paper mills?

Federal hazardous wastes and emergency planning regulations currently affecting the pulp and paper industry are shown in Table 20 below:

**Table 20. Federal Hazardous Waste and Emergency Planning Regulations**

The Following Hazardous Waste Regulation...	Affects...	By...
RCRA	Black liquor at pulp mills	Requiring reclamation and reuse of black liquor
EPCRA/CERCLA	Pulp mills	Requiring that air and water discharges from the mill be accounted for by filing TRI Form R reports for certain pollutants
		Requiring mills to provide information on chemicals used in the bleach plant
		Requiring mills to report emergency spills or off-site releases (air, water, or solid wastes)

**RCRA.** Most RCRA requirements are not industry specific but apply to any company that transports, treats, stores, or disposes of hazardous wastes. The pulping process generally does not generate significant RCRA-related hazardous waste streams. However, handling of black liquor can create RCRA-related concerns. Black liquor is exempt from regulation as a solid waste under 40 CFR part 261.2(e) and Table 1, §261.4(a)(6), but only if the black liquor is reclaimed in a recovery furnace and reused in the pulping process. Therefore, potential liquor spills that are not reused in the process, such as leaks from surface impoundments used to store black liquor prior to recovery will be an issue for RCRA compliance assessment.

**EPCRA/CERCLA.** EPCRA section 313 requires manufacturing facilities to submit an annual toxic chemical release report. This requirement applies to facilities in SIC codes 20 through 39, that have ten or more employees, and that manufacture, process, or use specified chemicals in amounts greater than threshold quantities. This report, referred to as the Form R, covers releases and transfer of toxic chemicals to various facilities and environmental media,



and allows EPA to compile the national Toxics Release Inventory (TRI) data base.

Air emissions and water effluents of certain pollutants from pulping processes must be accounted for in the annual TRI Form R report. Solid waste discharges from the pulping area are not generally a significant issue for Form R reporting purposes because these releases generally remain on-site. Pulp and paper mills must also report emergency "spills" or certain off-site releases that might occur as the result of process upsets or other malfunctions. These releases could include abnormal air emissions, and in some situations, water or solid waste discharges directly from the pulping area.

#### **5.4 What upcoming regulations will affect pulp and paper mills and companies?**

Pending regulations that will affect the pulp and paper industry include the following:

**Effluent Limitations Guidelines and Standards.** EPA plans to publish revised effluent limitations guidelines and standards for additional subcategories in the near future, such as dissolving kraft, dissolving sulfite, and secondary fiber deink. Pending water regulations consist of EPA proposing effluent limitations guidelines and standards for the pulp and paper industry subparts that have not already been promulgated. EPA is also considering whether pulp mill wastewater treatment system sludges are to be considered a hazardous waste and subject to RCRA Subtitle C. Since the effluent guidelines address concerns about chlorine-containing compounds, it is expected that there will be no change in the exemption of pulp mill sludges from being classified as a hazardous waste.

**NESHAP.** EPA plans to publish NESHAP in the near future for plywood and composite wood products facilities, surface coating operations at flatwood panel facilities, paper and other web coating operations at paper products facilities, industrial boilers, and gas turbines.

*Check the ATW for the latest information on other NESHAP affecting pulp and paper mills and companies*



## Chapter 6 – Other Requirements and Information

This chapter includes information about who regulates you, your permitting requirements, and how the NESHAP General Provisions apply to mills subject to the pulp and paper combustion sources NESHAP.

If You Need the Following Information...	Then Read...
Who administers this regulation?	Section 6.1
Do I need a Title V permit?	Section 6.2
How do I change my permit to include this rule?	Section 6.3
What parts of the NESHAP General Provisions apply?	Section 6.4

### 6.1 Who administers this regulation?

Your State or local agency for air pollution control, or your EPA Regional Office, will regulate you. If your plant is in Indian country, then your Tribe or your EPA Regional Office will regulate you. You will be regulated by more than one agency if a state, local or tribal agency has been granted delegation of this rule.

Not all States have been granted delegation, or, if they have been granted delegation, they may not have been delegated all portions of the rule. EPA Regional Offices may also have retained certain rights even after delegation (for example, you may continue to have dual reporting requirements). You should check with your EPA Regional Office or State for the latest information.

### 6.2 Do I need a Title V permit?

You will need a Title V permit if you are subject to the pulp and paper combustion sources NESHAP.

### 6.3 How do I change my permit to include this rule?

Your options are outlined in **Table 21** as follows:

See **Appendix C** for a list of EPA Regional contacts.



**Table 21. Title V Permitting Requirements**

<b>As of March 13, 2001, If You Have... Then You Must...</b>	
Not been issued a final Title V permit	Update your permit application or draft permit.
Less than three years left on your Title V permit	Update your Title V permit during renewal.
Three or more years left on your Title V permit	Your permitting authority will reopen your permit within 18 months after the publication date of the final rule or final amendments.

Title V permitting rules may change after the publication of this document. Keep abreast of any changes by checking the Federal Register or visit the Title V websites at <http://www.epa.gov/ttn/oarpg/t5main.html> and <http://www.epa.gov/oar/oaqps/permits>.

#### **6.4 What parts of the NESHAP General Provisions apply?**

The NESHAP General Provisions were published in the Federal Register on March 16, 1994 (59 FR 12408) and apply to all NESHAP, including the pulp and paper combustion sources NESHAP. This means that when you became subject to this rule, you also became subject to the NESHAP General Provisions. Some sections in this rule override the NESHAP General Provisions. You will find that Table 1 of the final rule shows you which sections of the NESHAP General Provisions apply to this rule and which do not. Requirements of the NESHAP General Provisions, except for notification, recordkeeping, and reporting requirements, are not addressed in this document. The NESHAP General Provisions can be found in 40 CFR part 63, subpart A.

*See Table 1 of the final rule (located in **Appendix A** of this document) to see which NESHAP General Provisions requirements apply to you.*



## **Appendix A**

### **Final NESHAP and Technical Corrections**



**Final NESHAP**  
**(January 12, 2001)**





# Federal Register

---

Friday,  
January 12, 2001

---

## Part IV

### Environmental Protection Agency

---

40 CFR Part 63

National Emission Standards for  
Hazardous Air Pollutants for Chemical  
Recovery Combustion Sources at Kraft,  
Soda, Sulfite, and Stand-Alone  
Semichemical Pulp Mills; Final Rule



**ENVIRONMENTAL PROTECTION AGENCY****40 CFR Part 63**

[FRL-6919-9]

RIN 2060-A134

**National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills**

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

**SUMMARY:** This action promulgates national emission standards for hazardous air pollutants (NESHAP) for new and existing sources used in chemical recovery processes at kraft, soda, sulfite, and stand-alone semichemical pulp mills. Hazardous air pollutants (HAP) that are regulated by this final rule include gaseous organic HAP and HAP metals. The adverse health effects of exposure to these HAP can include cancer, reproductive and developmental effects, gastrointestinal effects, damage to the nervous system, and irritation to the eyes, skin, and respiratory system. Emissions of other pollutants from these sources include particulate matter (PM), volatile organic compounds (VOC), carbon monoxide

(CO), sulfur dioxide (SO<sub>2</sub>), and nitrogen oxides (NO<sub>x</sub>).

This final rule implements section 112(d) of the Clean Air Act (CAA) and is based on the Administrator's determination that chemical recovery combustion sources at kraft, soda, sulfite, and stand-alone semichemical pulp mills are major sources of HAP emissions. The final rule is intended to protect public health by requiring chemical recovery combustion sources to meet standards reflecting the application of the maximum achievable control technology (MACT) to control HAP emissions from these sources. Implementation of this rule will reduce emissions of HAP by approximately 2,500 megagrams per year (Mg/yr) (2,700 tons per year (tpy)) and emissions of other pollutants by approximately 107,900 Mg/yr (118,900 tpy).

EFFECTIVE DATE: March 13, 2001.

**ADDRESSES:** Docket No. A-94-67, containing information considered by EPA in developing the promulgated standards, is available for public inspection between 8:00 a.m. and 5:30 p.m., Monday through Friday, excluding Federal holidays, at the following address: U.S. EPA, Air and Radiation Docket and Information Center (6102), 401 M Street SW, Washington, DC 20460, telephone (202) 260-7548. The docket is located at the above address in

room M-1500, Waterside Mall (ground floor). A reasonable fee may be charged for copying docket materials.

**FOR FURTHER INFORMATION CONTACT:** For further information concerning applicability and rule determinations, contact the appropriate State or local agency representative. If no State or local representative is available, contact the EPA Regional Office staff listed in the SUPPLEMENTARY INFORMATION section of this preamble. For information concerning the analyses performed in developing this rule, contact Mr. Jeff Telander, Minerals and Inorganic Chemicals Group, Emission Standards Division (MD-13), Office of Air Quality Planning and Standards, U.S. EPA, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5427, facsimile number (919) 541-5600, electronic mail address telander.jeff@epa.gov.

**SUPPLEMENTARY INFORMATION:***Regulated Entities*

Categories and entities potentially regulated by this action are those kraft, soda, sulfite, and stand-alone semichemical pulp mills with chemical recovery processes that involve the combustion of spent pulping liquor. Categories and entities potentially regulated by this action include:

Category	SIC code	NAICS code	Examples of regulated entities
Industry .....	2611, 2621, 2631 .....	32211, 32212, 32213 .....	Kraft, soda, sulfite, and stand-alone semichemical pulp mills.

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. To determine whether your facility is regulated by this action, you should examine the applicability criteria in § 63.660 of the final rule. If you have questions regarding the applicability of this action to a particular entity, consult the appropriate EPA Regional Office representative listed below.

U.S. EPA Region I—Director, Air Compliance Program, 1 Congress Street, Suite 1100 (SEA), Boston, MA 02114-2023, Phone (617) 918-1650; Fax: (617) 918-1505

U.S. EPA Region II—Air Compliance Branch, 290 Broadway, New York, NY 10007; Phone: (212) 637-4080; Fax: (212) 637-3998

U.S. EPA Region III—Chief, Air Enforcement Branch (3AP12) 1650 Arch Street, Philadelphia, PA 19103-2029, Phone (215) 814-3438; Fax: (215) 814-2134, Region III Office Website: <http://www.epa.gov/reg3airtd/hazpollut/hazairpol.htm>.

U.S. EPA Region IV—Air and Radiation Technology Branch, Atlanta Federal Center,

61 Forsyth Street, Atlanta, Georgia 30303-3104; Phone: (404) 562-9105, Fax: (404) 562-9095

U.S. EPA Region V—Air Enforcement and Compliance Assurance Branch (AE-17J), 77 West Jackson Boulevard, Chicago, IL 60604-3590; Phone: (312) 353-2088; Fax: (312) 353-8289

U.S. EPA Region VI—Chief, Toxics Enforcement Section (6EN-AT), 1445 Ross Avenue, Dallas, TX 75202-2733; Phone: (214) 665-7224, Fax: (214) 665-7446; Region VI Office Website: [www.epa.gov/region6](http://www.epa.gov/region6)

U.S. EPA Region VII—901 N. 5th Street, Kansas City, KS 66101; Phone: (913) 551-7020; Fax: (913) 551-7844; <http://www.epa.gov/region07/programs/artd/air/toxics/airtox1.htm>

U.S. EPA Region VIII—Air Enforcement Program (8ENF-T), 999 18th Street Suite 500, Denver, CO 80202; Phone: (303) 312-6312; Fax: (303) 312-6409.

U.S. EPA Region IX—Air Division; 75 Hawthorne Street, San Francisco, CA 94105; Phone: (415) 744-1219, Fax: (415) 744-1076.

U.S. EPA Region X—Office of Air Quality (OQAQ-107); 1200 Sixth Avenue, Seattle, WA 98101; Phone: (206) 553-4273, Fax: (206) 553-0110.

*Judicial Review*

The NESHAP for chemical recovery combustion sources at kraft, soda, sulfite, and semichemical pulp mills was proposed on April 15, 1995 (60 FR 18783). Today's action announces EPA's final decisions on the rule. Under section 307(b)(1) of the CAA, judicial review of the final rule is available by filing a petition for review in the U.S. Court of Appeals for the District of Columbia Circuit by March 13, 2001. Only those objections to this rule which were raised with reasonable specificity during the period for public comment may be raised during judicial review. Under section 307(b)(2) of the CAA, the requirements that are the subject of today's final rule may not be challenged later in civil or criminal proceedings brought by EPA to enforce these requirements.



**World Wide Web (WWW)**

In addition to being available in the docket, an electronic copy of today's final rule will also be available on the WWW through the Technology Transfer Network (TTN). Following the Administrator's signature, a copy of the rule will be posted on the TTN's policy and guidance page for newly proposed or final rules at <http://www.epa.gov/ttn/oarpg/t3pfpr.html>. The TTN provides information and technology exchange in various areas of air pollution control. If more information regarding the TTN is needed, call the TTN HELP line at (919) 541-5384.

**Outline**

The following outline is provided to aid in reading this preamble to the final rule.

- I. Background and Public Participation
- II. Summary of Final Rule
  - A. Applicability
  - B. Standards
  - C. Performance Test Requirements
  - D. Monitoring Requirements
  - E. Recordkeeping and Reporting Requirements
- III. Summary of Changes Since Proposal
  - A. Applicability
  - B. Definitions
  - C. Standards
  - D. Performance Test Requirements
  - E. Monitoring Requirements
  - F. Reporting Requirements
  - G. Delegation of Authority
- IV. Summary of Responses to Major Comments
- V. Summary of Impacts
  - A. Air Quality Impacts
  - B. Cost Impacts
  - C. Economic Impacts
  - D. Benefits Analysis
  - E. Non-Air Environmental Impacts
  - F. Energy Impacts
- VI. Administrative Requirements
  - A. Executive Order 12866: Regulatory Planning and Review
  - B. Executive Order 13132: Federalism
  - C. Executive Order 13064: Consultation and Coordination with Indian Tribal Governments
  - D. Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks
  - E. Unfunded Mandates Reform Act of 1995
  - F. Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 et seq
  - G. Paperwork Reduction Act
  - H. National Technology Transfer and Advancement Act of 1995
  - I. Congressional Review Act

**I. Background and Public Participation**

Section 112 of the CAA requires EPA to list categories and subcategories of major sources and area sources of HAP and to establish NESHAP for the listed source categories and subcategories.

Major sources of HAP are those that have the potential to emit greater than 9.07 Mg/yr (10 tpy) of any one HAP or 22.68 Mg/yr (25 tpy) of any combination of HAP.

Section 112 of the CAA requires that we establish NESHAP for the control of HAP from both new and existing major sources. The CAA requires the NESHAP to reflect the maximum degree of reduction in emissions of HAP that is achievable. This level of control is commonly referred to as MACT.

The MACT floor is the minimum control level allowed for NESHAP and is defined under section 112(d)(3) of the CAA. In essence, the MACT floor ensures that the standard is set at a level that assures that all major sources achieve the level of control at least as stringent as that already achieved by the better-controlled and lower-emitting sources in each source category or subcategory. For new sources, the MACT floor cannot be less stringent than the emission control that is achieved in practice by the best-controlled similar source. The MACT standards for existing sources can be less stringent than standards for new sources, but they cannot be less stringent than the average emission limitation achieved by the best-performing 12 percent of existing sources in the category or subcategory (or the best-performing 5 sources for categories or subcategories with fewer than 30 sources) (CAA section 112(d)(3)).

In developing MACT, we also consider control options that are more stringent than the floor. We may establish standards more stringent than the floor based on the consideration of the cost of achieving the emissions reductions, any non-air quality health and environmental impacts, and energy requirements (CAA section 112(d)(2)).

On July 16, 1992 (57 FR 31576), we published a list of source categories slated for regulation under section 112(c). That list included the pulp and paper production source category regulated by the standards being promulgated today. We proposed standards for chemical recovery combustion sources at kraft, soda, sulfite, and stand-alone semichemical pulp mills covered by this rule on April 15, 1998 (63 FR 18783).

As in the proposal, the final standards give existing sources 3 years from the date of promulgation to comply. Sources that begin construction or reconstruction after April 15, 1998 must comply with the standards for new sources by March 13, 2001 or upon startup, whichever is later. We believe these standards to be achievable by

affected sources within the time provided.

Emissions limits, as well as monitoring, performance testing, recordkeeping, and reporting requirements are included in the final rule. All of these components are necessary to ensure that sources comply with the standards both initially and over time. However, we have made every effort to simplify the requirements in the rule.

The preamble for the proposed standards described the rationale for the proposed standards. Public comments were solicited at the time of proposal. The public comment period lasted from April 15, 1998 to June 15, 1998. Industry representatives, regulatory agencies, environmental groups, and the general public were given the opportunity to comment on the proposed rule and to provide additional information during and after the public comment period. Although we offered a proposal the opportunity for oral presentation of data, views, or arguments concerning the proposed rule, no one requested a hearing, and a hearing was not held.

We received a total of 35 letters containing comments on the proposed rule during and after the public comment period. Commenters included individual pulp and paper companies, an industry trade association, an environmental group, a local regulatory agency, an association of State and local regulatory agencies, and an association of air pollution control vendors. Today's final rule reflects our full consideration of all of the comments received. Major public comments on the proposed rule, along with our responses to those comments, are summarized in this preamble. See the Summary of Public Comments and Responses memorandum for a more detailed discussion of public comments and our responses (docket No. A-94-67).

**II. Summary of Final Rule****A. Applicability**

The final rule applies to all existing and new kraft, soda, sulfite, and stand-alone semichemical pulp mills with chemical recovery processes that involve the combustion of spent pulping liquor. Specifically, the affected sources that are regulated by today's final rule are each new nondirect contact evaporator (NDCE) recovery furnace and associated smelt dissolving tank (SDT) located at a kraft or soda pulp mill, each new direct contact evaporator (DCE) recovery furnace system and associated SDT located at a kraft or soda pulp mill, each new lime kiln located at a kraft or



soda pulp mill, each new or existing sulfite combustion unit located at a sulfite pulp mill, each new or existing semichemical combustion unit located at a stand-alone semichemical pulp mill, and each existing chemical recovery system located at a kraft or soda pulp mill. The chemical recovery system is defined as all existing DCE and NDCE recovery furnaces, SDT, and lime kilns at a kraft or soda pulp mill.

All existing kraft and soda pulp mills have chemical recovery processes that

involve the combustion of spent pulping liquor. However, several existing sulfite and stand-alone semichemical pulp mills do not recover pulping chemicals by combusting spent liquor. Three of the 11 sulfite mills use a calcium-based sulfite process and do not have chemical recovery combustion units and, thus, are not impacted by this final rule. One of the 13 stand-alone semichemical pulp mills burns spent liquor in a power boiler and does not have chemical recovery; therefore, that

mill also is not impacted by this final rule.

#### **B. Standards**

Today's final rule regulates HAP metals emissions and/or gaseous organic HAP emissions for chemical recovery combustion sources in the pulp and paper production source category. The promulgated standards are summarized in Table 1.

BILLING CODE 6560-60-P



TABLE 1. SUMMARY OF PROMULGATED STANDARDS<sup>a</sup>

Subcategory	Emission point	HAP metals standard		Alternate HAP metals standard ("bubble")		Gaseous organic HAP standard	
		Existing	New	Existing	New	Existing	New
Kraft and soda	Recovery furnaces (NDCE and DCE)	PM $\leq$ 0.10 g/dscm (0.044 gr/dscf) at 8% oxygen	PM $\leq$ 0.034 g/dscm (0.015 gr/dscf) at 8% oxygen	Mill-specific PM emission limit (kg/Mg (lb/ton) BLS) based on calculated value of the sum of the individual emissions limits for recovery furnaces, SDT, and lime kilns. See equation 1 in §63.865(a)(1) of the final rule.	No "bubble" alternate standard for new sources	No standard	Gaseous organic HAP $\leq$ 0.012 kg/Mg (0.025 lb/ton) BLS (as measured by methanol)
	SDT	PM $\leq$ 0.10 kg/Mg (0.20 lb/ton) BLS	PM $\leq$ 0.06 kg/Mg (0.12 lb/ton) BLS			No standard <sup>b</sup>	No standard <sup>b</sup>
	Lime kilns	PM $\leq$ 0.15 g/dscm (0.064 gr/dscf) at 10% oxygen	PM $\leq$ 0.023 g/dscm (0.01 gr/dscf) at 10% oxygen			No standard <sup>b</sup>	No standard <sup>b</sup>
Sulfite	Sulfite combustion units	PM $\leq$ 0.092 g/dscm (0.040 gr/dscf) at 8% oxygen	PM $\leq$ 0.046 g/dscm (0.020 gr/dscf) at 8% oxygen	Not applicable	Not applicable	No standard <sup>b</sup>	No standard <sup>b</sup>
Stand-alone semi-chemical	Semichemical combustion units	No standard	No standard	Not applicable	Not applicable	Gaseous organic HAP $\leq$ 1.49 kg/Mg (2.97 lb/ton) BLS (as measured by THC) OR 90% reduction	Gaseous organic HAP $\leq$ 1.49 kg/Mg (2.97 lb/ton) BLS (as measured by THC) OR 90% reduction

<sup>a</sup> g/dscm = grams per dry standard cubic meter, gr/dscf = grains per dry standard cubic foot, kg/Mg = kilograms per megagram, lb/ton = pounds per ton, BLS = black liquor solids, and THC = total hydrocarbons.

<sup>b</sup> Emissions of gaseous organic HAP from these sources are regulated as part of the NESHAP for noncombustion sources at pulp and paper mills.



The standards for each subcategory are discussed in the following sections by the pollutant regulated.

#### 1. HAP Metals Standards for Kraft and Soda Pulp Mills

Today's rule promulgates PM emissions limits as a surrogate for HAP metals for new and existing recovery furnaces, SDT, and lime kilns at kraft and soda pulp mills. The PM emissions limits are established at the MACT floor level. For existing kraft and soda recovery furnaces and SDT, the MACT floor level corresponds (coincidentally) to the promulgated PM emissions limits in the new source performance standards (NSPS) for kraft pulp mills (43 FR 7568, February 23, 1978). We believe this level best represents the level of performance achievable by the average of the best-performing 12 percent of sources, considering normal process and operating variability. For existing kraft and soda lime kilns, the MACT floor level is more stringent than the NSPS because data indicate that the average of the best-performing 12 percent of sources can achieve a more stringent level.

The final rule also allows the use of a "bubble compliance alternative" for determining compliance with the HAP metals standards for existing process units (i.e., recovery furnaces, SDT, and lime kilns) in the chemical recovery system at kraft and soda pulp mills. The bubble compliance alternative allows mills to set PM emissions limits for each existing process unit in the chemical recovery system at the mill such that, if these limits are met, the total emissions from all existing process units are less than or equal to a mill-specific bubble limit. This mill-specific bubble limit is calculated based on the promulgated emissions standards (referred to in the rule as reference concentrations or reference emissions rates) for each process unit and mill-specific gas flow rates and process rates. Equation 1 in § 63.865(a)(1) of the final rule will be used to calculate the bubble limit based on PM emissions.

As in the proposed rule, the bubble compliance alternative is not applicable to new affected sources under this rulemaking. Thus, all new affected sources at kraft and soda pulp mills are required to meet the individual emissions limitations set for those sources. Also, owners or operators of existing process units subject to the NSPS for kraft pulp mills are required to continue to meet the PM emissions standards of that rule, regardless of which option they choose for complying with today's HAP metals standards (because that standard is a separate

regulatory requirement which remains in place).

Owners or operators that choose to comply with the HAP metals standards using the bubble compliance alternative are required to submit PM emissions limits to the Administrator for approval for each existing kraft or soda recovery furnace, SDT, and lime kiln at the mill. Before the PM emissions limits are approved, the owner or operator must submit documentation demonstrating that if the PM emissions limits for each emission source are met, the entire group of process units in the chemical recovery system are in compliance with the millwide allowable PM emission level. The allowable PM emission level is determined from the applicable bubble equation using the reference PM concentrations and reference PM emissions rates for each process unit and source-specific factors for exhaust gas flow rates and process rates. Once approved by the Administrator, the PM emissions limits are incorporated in the operating permit for the mill. Thereafter, the owner or operator of the kraft or soda pulp mill demonstrates compliance with the standards by demonstrating that each recovery furnace, SDT, and lime kiln emits less than or equal to the approved PM emission limit for that process unit. In addition, the PM emissions limits for any existing recovery furnace, SDT, or lime kiln subject to the 1978 NSPS for kraft pulp mills must be at least as stringent as the PM emissions limits established in the NSPS. An example of how the bubble compliance alternative can be used to establish PM emissions limits for process units in a chemical recovery system at an example mill is provided in the administrative record (Docket No. A-94-67).

With one exception, owners or operators that choose to comply with the HAP metals standards using the bubble compliance alternative must include all existing process units in a chemical recovery system in the bubble. Any existing process unit that can be classified as a stand-by unit (i.e., a process unit that operates for less than 6,300 hours during any calendar year) cannot be included as part of a bubble. Owners or operators of stand-by units must accept the promulgated PM emissions limits shown in Table 1 for those units.

#### 2. Gaseous Organic HAP Standards for Kraft and Soda Pulp Mills

Today's rule promulgates a gaseous organic HAP standard for new recovery furnaces using methanol as a surrogate for gaseous organic HAP. All new recovery furnaces at kraft and soda pulp

mills must meet a gaseous organic HAP limit, as measured by methanol, of 0.012 kilogram per megagram (kg/Mg) (0.025 pound per ton (lb/ton)) of black liquor solids (BLS) fired. There are no gaseous organic HAP standards under today's rule for existing NDCE recovery furnaces or DCE recovery furnace systems.

#### 3. HAP Metals Standards for Sulfite Pulp Mills

Today's rule promulgates PM emissions limits as a surrogate for HAP metals for new and existing sulfite combustion units. Existing sulfite combustion units must meet a PM emission limit of 0.092 gram per dry standard cubic meter (g/dscm) (0.040 grain per dry standard cubic foot (gr/dscf)) corrected to 8 percent oxygen. New sulfite combustion units must meet a PM emission limit of 0.046 g/dscm (0.020 gr/dscf) corrected to 8 percent oxygen.

#### 4. Gaseous Organic HAP Standards for Stand-Alone Semichemical Pulp Mills

Today's rule promulgates gaseous organic HAP standards for existing and new semichemical combustion units using total hydrocarbon (THC) as a surrogate for gaseous organic HAP. All stand-alone semichemical pulp mills with existing or new chemical recovery combustion units must reduce gaseous organic HAP emissions (as measured by THC reported as carbon) from these units by 90 percent, or meet a gaseous organic HAP emission limit (as measured by THC reported as carbon) of 1.49 kg/Mg (2.97 lb/ton) of BLS fired.

#### C. Performance Test Requirements

The following discussion identifies the test methods to be used for compliance determinations.

Test Method 5, "Determination of Particulate Emissions from Stationary Sources" (40 CFR part 60, appendix A)—in conjunction with a measurement of oxygen concentration in the stack using either Test Method 3A, "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrument Analyzer Procedure)" (40 CFR part 60, appendix A) or Test Method 3D, "Gas Analysis for the Determination of Emission Rate Correction Factor or Excess Air" (40 CFR part 60, appendix A)—is the test method for determining compliance with the PM emissions limits for new and existing kraft and soda recovery furnaces, SDT, and lime kilns and for new and existing sulfite combustion units. Test Method 29, "Determination of Metals Emissions from Stationary Sources" (40 CFR part



60, appendix A) may be used as an alternative to Test Method 5 for measuring PM emissions. Test Method 17, "Determination of Particulate Emissions from Stationary Sources (In-Stack Filtration Method)" (40 CFR part 60, appendix A) may also be used as an alternative to Test Method 5 if a constant value of 0.009 g/dscm (0.004 gr/dscf) is added to the results of Test Method 17, and the stack temperature is no greater than 205 degrees Centigrade (°C) (400 degrees Fahrenheit (°F)).

Test Method 308, "Procedure for Determination of Methanol Emissions from Stationary Sources" (40 CFR part 63, appendix A) is the test method for determining compliance with the gaseous organic HAP emission limit for new kraft and soda NDCE recovery furnaces that are not equipped with dry electrostatic precipitator (ESP) systems and for DCE recovery furnace systems.

Test Method 25A, "Determination of Total Gaseous Organic Concentration using a Flame Ionization Analyzer" (40 CFR part 60, appendix A) is the test method for determining compliance with the gaseous organic HAP emission limit for new and existing combustion units at stand-alone semichemical pulp mills.

#### D. Monitoring Requirements

Each owner or operator of an affected source or process unit must install, operate, calibrate, and maintain a continuous monitoring system for each affected source or process unit. The owner or operator also must establish a range of values for each operating parameter (associated with a process operation or with an emission control device) to be monitored based upon values recorded during the initial performance test or during qualifying previous performance tests using the required test methods. If values from previous performance tests are used to establish the operating parameter range, the owner or operator must certify that the control devices and processes had not been modified subsequent to the testing upon which the data used to establish the operating ranges were obtained. The owner or operator may conduct multiple performance tests to establish ranges of operating parameters. The owner or operator also may establish expanded or replacement ranges during subsequent performance tests. An exceedance of the operating parameters occurs when the measured operating parameter levels, averaged over a specified time period, are outside the established range for a predetermined duration. However, with the exception of opacity exceedances, no more than one exceedance would be

attributed to an affected source or process unit during any given 24-hour period. The following paragraphs describe the operating parameters to be monitored, the averaging periods and frequency with which these parameters should be monitored, when corrective action is required to return operating parameters to levels that are within the established range, and when operating parameter exceedances constitute a violation of the emissions standards.

Owners or operators of existing kraft or soda recovery furnaces that are equipped with an ESP for PM control must install, calibrate, maintain, and operate continuous opacity monitoring systems (COMS). The COMS must perform at least one cycle of sampling and analysis for each successive 10-second period and one cycle of data recording for each successive 6-minute period. If the average of ten consecutive 6-minute average values of opacity exceeds 20 percent, the owner or operator must initiate the corrective actions contained in the mill's startup, shutdown, and malfunction (SSM) plan. A violation of the applicable emissions standards would occur when opacity is greater than 35 percent for 6 percent or more of the operating time during any quarterly period.

Owners or operators of new kraft or soda recovery furnaces and new or existing kraft or soda lime kilns that are equipped with ESP for PM control must also install, calibrate, maintain, and operate COMS. The COMS must perform at least one cycle of sampling and analysis for each successive 10-second period and one cycle of data recording for each successive 6-minute period. If the average of ten consecutive 6-minute average values of opacity exceeds 20 percent, the owner or operator must initiate the corrective actions contained in the facility's SSM plan. A violation of the applicable emissions standards would occur when opacity is greater than 20 percent for 6 percent or more of the operating time during any quarterly period.

Owners or operators using wet scrubbers to meet the PM emissions limits for any kraft or soda recovery furnace, SDT, or lime kiln or any sulfite combustion unit must install, calibrate, maintain, and operate a continuous monitoring system capable of determining and recording the pressure drop and scrubbing liquid flow rate at least once for each successive 15-minute period. If any 3-hour average of the pressure drop or scrubbing liquid flow rate falls outside the established range, the owner or operator must initiate the corrective actions included in the facility's SSM plan. A violation of the

applicable emissions standards occurs when six or more 3-hour average values of either parameter are outside the established range during any 6-month reporting period.

Owners or operators using regenerative thermal oxidizers (RTO) to comply with the gaseous organic HAP emission standard for chemical recovery combustion units at stand-alone semichemical mills must establish a minimum RTO operating temperature that indicates at least a 90 percent reduction in HAP emissions (as measured by THC reported as carbon), or outlet HAP emissions (as measured by THC reported as carbon) of less than or equal to 1.49 kg/Mg (2.97 lb/ton) of BLS fired. To ensure ongoing compliance, the owner or operator must install, calibrate, maintain, and operate a monitoring system to measure and record the RTO operating temperature for each successive 15-minute period. If any 1-hour average of the operating temperature falls below the minimum established temperature, the owner or operator must initiate the corrective actions contained in the facility's SSM plan. A violation of the applicable emissions standards occurs when any 3-hour average of the RTO operating temperature falls below the minimum established temperature.

The owner or operator of an affected source or process unit that uses a wet scrubber, ESP, or RTO to comply with today's standards may monitor alternative operating parameters subject to prior written approval by the Administrator, as specified in § 63.8(f).

The owner or operator of an affected source or process unit that is complying with today's standards through operational changes or by a control device other than those described above must submit a plan proposing parameters to be monitored, parameter ranges, and monitoring frequencies to be used to determine ongoing compliance, subject to approval by the Administrator. If any 3-hour average value of a monitored parameter falls outside the established range, the owner or operator must initiate the corrective actions included in the facility's SSM plan. A violation of the emissions standards occurs when six or more 3-hour average values of a monitored parameter are outside the established range during any 6-month reporting period.

Owners or operators complying with the gaseous organic HAP standard for new kraft and soda recovery furnaces through the use of an NDCE recovery furnace equipped with a dry ESP system are not required to perform any continuous parameter monitoring for



gaseous organic HAP. However, each owner or operator must maintain onsite a certification statement signed by a responsible mill official that an NDCE recovery furnace equipped with a dry ESP system is in use.

#### *E. Recordkeeping and Reporting Requirements*

In addition to all of the recordkeeping and reporting requirements outlined in § 63.10, owners or operators of kraft, soda, sulfite, and stand-alone semichemical pulp mills must maintain the following records for each affected source or process unit: Records of the BLS firing rates for all recovery furnaces at kraft and soda pulp mills and spent liquor solids firing rates for all chemical recovery combustion units at sulfite and stand-alone semichemical pulp mills, records of the lime production rates (calculated as calcium oxide) for all kraft and soda lime kilns, records of all parameter monitoring data, records and documentation of supporting calculations for compliance determinations, records of the established monitoring parameter ranges for each affected source or process unit, and records of all certifications made in order to determine compliance with the gaseous organic HAP standards. Consistent with requirements in the NESHAP General Provisions in subpart A of 40 CFR part 63 and the operating permit program in 40 CFR part 70, all records must be maintained for a minimum of 5 years.

### **III. Summary of Changes Since Proposal**

#### *A. Applicability*

At proposal, we defined affected source as each kraft and soda NDCE recovery furnace and associated SDT, each kraft and soda DCE recovery furnace and associated SDT, each kraft and soda lime kiln, each sulfite combustion unit, and each semichemical combustion unit. However, this definition would have prevented mills from averaging emissions of HAP metals or the PM surrogate for HAP metals across their existing recovery furnaces, SDT, and lime kilns (a bubble compliance alternative which we proposed). To allow averaging across these existing emission points, we have revised the definition of affected source to include existing NDCE recovery furnaces, DCE recovery furnaces, SDT, and lime kilns as process units within a chemical recovery system affected source.

As in the proposed rule, new sources are not eligible for the bubble compliance alternative under this

rulemaking, given that state-of-the-art equipment design and add-on controls can be integrated and installed most cost-effectively during construction of new sources. New sources can be designed and constructed with maximized compliance in mind. Also, sources classified as new by virtue of being reconstructed can be reconstructed with maximized compliance in mind. Therefore, we have not revised the definition of affected source for new sources. Each new kraft and soda recovery furnace and associated SDT, and each new kraft and soda lime kiln will continue to be defined as an affected source by itself.

#### *B. Definitions*

Because of the changes in definition of affected source in the final rule, we have added definitions for "chemical recovery system" and "process unit" to § 63.861 in the final rule. Chemical recovery system is defined as all existing DCE and NDCE recovery furnaces, SDT, and lime kilns at a kraft or soda pulp mill. Process unit is defined as an existing DCE or NDCE recovery furnace, SDT, or lime kiln in a chemical recovery system at a kraft or soda pulp mill.

To take into account the development of gasification technology as a replacement for conventional recovery furnace systems, we have added a definition for "black liquor gasification" to § 63.861 in the final rule. Black liquor gasification is defined as the thermochemical conversion of black liquor into a combustible gaseous product. For the same reason, we also have revised the definitions for "recovery furnace," "kraft recovery furnace," "semichemical combustion unit," and "soda recovery furnace" to include black liquor gasification.

In order to eliminate any confusion with the term "PM," we have replaced the term "PM HAP" with "HAP metals" throughout the final rule. Therefore, the definition for "HAP metals" in § 63.861 of today's rule replaces the definition for "PM HAP."

#### *C. Standards*

In the proposed rule, we included a standard whereby existing kraft and soda lime kilns must ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.15 g/dscm (0.067 gr/dscf) corrected to 10 percent oxygen. We have decided not to promulgate this PM standard because this proposed standard does not reflect the performance of MACT (*i.e.*, the surrogate PM emissions levels achievable by the best-performing lime

kilns, which are controlled by ESP). We have revised the PM standard for existing lime kilns in the final rule to be equivalent to the revised HAP metals MACT floor PM level of 0.15 g/dscm (0.064 gr/dscf) corrected to 10 percent oxygen. (There is also a bubble compliance alternative, whereby, as explained earlier, PM emissions from the recovery furnace, SDT, and lime kiln could in essence be summed so long as the summed emissions are no greater than the sum of the otherwise-applicable MACT emission standard for each unit.)

The proposed rule included a compliance option whereby existing kraft and soda recovery furnaces, SDT, and lime kilns could meet a standard for individual HAP metals, rather than for the PM surrogate for HAP metals (63 FR 18758, 18765, and 18769, April 15, 1998; proposed § 63.862). We have decided not to promulgate this alternative HAP metals standard because this proposed standard does not reflect the performance of MACT (*i.e.*, the HAP metals emissions levels achievable by the best-performing sources) and also because it would have other significant technical deficiencies. (See docket No. A-94-67.) (Necessarily, we also are not promulgating the bubble compliance alternative associated with this HAP metals option.)

#### *D. Performance Test Requirements*

To correct an oversight in the proposed rule, we have added an oxygen correction equation for volumetric gas flow rates to the final rule under new § 63.865(b)(4). The equation will be used to correct gas streams to the same oxygen content as the associated emission limit (*e.g.*, 8 percent oxygen for recovery furnaces, 10 percent oxygen for lime kilns). For the same reason, we also revised the PM emission limit equations for the bubble compliance alternative in paragraphs (a)(1), (2)(i), and (2)(iii) of § 63.865 for the final rule to reflect the oxygen correction for volumetric gas flow rates. Because SDT exhaust conditions already approximate ambient air conditions, we have removed the oxygen correction in the PM emission limit equation for SDT in § 63.865(a)(2)(ii) from the final rule. We have also clarified the oxygen correction equation in § 63.865(b)(2), which is used to correct PM concentrations, for the final rule.

#### *E. Monitoring Requirements*

In order to account for any recovery furnaces that might use a wet scrubber, we have revised the wet scrubber monitoring provisions in § 63.864(a)(2), (c)(1)(ii), and (c)(2)(ii) for the final rule.



to include kraft or soda recovery furnaces. We have clarified the opacity corrective action provisions in § 63.864(c)(1)(i) of the final rule to state that affected sources or process units are required to implement corrective action when the average of ten consecutive 6-minute averages results in a measurement greater than 20 percent opacity. We also have revised the opacity violation provisions in § 63.864(c)(2)(i) and (ii) to clarify in the final rule that a violation of the applicable emission standard would occur when the opacity is greater than the specified level for 6 percent or more of the operating time in any quarterly period.

#### F. Reporting Requirements

We have revised the excess emissions reporting provisions of § 63.867(c) for the final rule to clarify that reporting excess emissions below the violation thresholds of § 63.864(c) does not constitute a violation of the applicable standard.

#### G. Delegation of Authority

We have revised the delegation of authority provisions in § 63.868 for the final rule to include the following authorities which will be retained by the Administrator and not transferred to a State: Approval of alternatives to standards in § 63.862 under § 63.6(g), approval of major alternatives to test methods under § 63.7(e)(2)(ii) and (f) and as defined in § 63.90, approval of major alternatives to monitoring under § 63.8(f) and as defined in § 63.90, and approval of major alternatives to recordkeeping and reporting under § 63.10(f) and as defined in § 63.90. These authorities are retained because any requests by sources for alternative standards must be considered by EPA and acted upon in a notice and comment rulemaking. We cannot delegate authorities that may alter the stringency of the standard that require Federal oversight for national consistency, or that may require Federal rulemaking. Requests to revise standards for the source category (or portions thereof) must be addressed through the subpart E rulemaking process for alternative standards.

#### IV. Summary of Responses to Major Comments

This section summarizes the major comments we received on the proposed rule and our responses to those comments. A more comprehensive summary of comments and responses can be found in docket No. A-94-67.

*Comment:* Commenters questioned the proposed MACT floor of "no

control" for gaseous organic HAP emissions from existing NDCE recovery furnaces and stated that the performance of dry ESP systems should be the basis of the MACT floor for gaseous organic HAP emissions from existing NDCE recovery furnaces. One commenter provided a list of 13 NDCE recovery furnaces equipped with dry ESP systems, which is a sufficient number of recovery furnaces to define the MACT floor. A commenter also noted that wet to dry ESP system conversion is a cost-effective control option.

*Response:* We are not basing the MACT floor for existing NDCE recovery furnaces on this technology for the following reasons. We have concluded that existing NDCE recovery furnaces do not represent the "best" or "maximum achievable" technology. It is possible that black liquor gasification is a means of reducing gaseous organic HAP emissions from chemical recovery operations that provides environmental benefits (notably energy savings) which are superior to those provided by NDCE recovery furnaces (whether equipped with wet or dry ESP systems). Compared with NDCE recovery furnace performance, development of the proposed gasification technology promises reduced consumption of fossil fuel, increased efficiency in energy conversion and chemical recovery, elimination of the smelt-water explosion hazard (inherent to the operation of conventional recovery furnaces), reduced maintenance costs, and significantly lower environmental emissions of criteria pollutants (PM, SO<sub>2</sub>, NO<sub>x</sub>, VOC precursors to ozone, and CO) and greenhouse gases (63 FR 26607, May 8, 2000, Proposed Final Project Agreement for Georgia-Pacific XL Project).

Because gasification systems do not require the use of an ESP, the costs that would be incurred by converting a wet ESP system to a dry ESP system are not recoverable if the NDCE recovery furnace is replaced with a gasification system. Therefore, if we require existing NDCE recovery furnaces with wet ESP systems by virtue of a MACT floor to retrofit to dry ESP systems, we would tend to eliminate the incentive for the industry to replace the NDCE recovery furnaces with gasification systems before the end of the useful life of the dry ESP systems. Thus, it is our view that a MACT floor requirement which results in retrofitting to dry ESP systems would create disincentives that would discourage possible conversion to the even more promising gasification technology, so that such a requirement need not be considered to be "MACT."

See *Portland Cement Ass'n v. EPA*, 486 F.2d 375, 385 (D.C. Cir. 1973); *Essex Chemical Corp. v. Ruckelshaus*, 486 F.2d 427, 439 (D.C. Cir. 1973) (in establishing technology-based standards, EPA must consider counter-productive effects of a control technology in determining whether it is a "best" technology).

In a related matter, there is a further question as to whether existing DCE recovery furnaces should be subject to MACT floor or beyond-the-floor standards for gaseous organic HAP. We considered whether to require conversion of DCE recovery furnace systems to NDCE recovery furnaces with dry ESP systems as a beyond-the-floor standard. The capital costs of this retrofitting would be in the billions of dollars and would not be justified by the amount of HAP removed. Moreover, we do not view NDCE recovery furnaces with dry ESP systems as MACT for existing DCE recovery furnaces because it would create the same disincentives for conversion to gasification just discussed, including potentially foregoing significant energy-saving opportunities. (See CAA section 112(d)(2), which includes energy impacts as a relevant consideration in beyond-the-floor determinations.) Consequently, we are not adopting a beyond-the-floor standard for DCE recovery furnaces.

It would also be highly anomalous to adopt a MACT floor based on the performance of NDCE recovery furnaces with dry ESP systems, for the following reason. As explained above, we are not adopting a beyond-the-floor standard for existing DCE recovery furnaces, and the MACT floor for existing DCE recovery furnaces is "no control." This would yield the result that a MACT floor determination would apply only to NDCE recovery furnaces—the better-performing furnace type. Hence the anomaly—the only type of existing recovery furnace to incur regulatory costs would be the better-performing NDCE recovery furnaces. Although, as also explained above, we currently do not view gaseous organic HAP control of existing NDCE or DCE recovery furnaces as MACT in order to preserve incentives for conversion of the furnaces to gasification systems, in determining that there should be no further control of these units under CAA section 112(d) at the present time, we are also swayed by avoiding the anomaly of controlling only NDCE recovery furnaces.

We also note that the new source standard for recovery furnaces reflects the performance of NDCE recovery furnaces equipped with dry ESP systems. We could not base the standard



on the performance of gasification at this time because accurate data documenting performance on pulp and paper combustion sources do not yet exist. Obtaining accurate performance data on gasification systems is one of the purposes of the proposed Final Project Agreement for the Georgia-Pacific XL Project (63 FR 26607, May 8, 2000). In any case, we also do not believe that this standard poses the same potential to discourage use of gasification. First, we expect that sources using gasification technology will be able to meet the standard. Second, we are prepared to exercise flexibility as to compliance dates for any new source basing its compliance on use of gasification technology, consistent with the statute (63 FR 26607, May 8, 2000).

**Comment:** Several commenters objected to the proposed beyond-the-floor MACT standard for gaseous organic HAP emissions from existing semichemical combustion units that are not fluidized-bed reactors. Commenters also claimed that the proposed emission limit is not supportable for some types of chemical recovery combustion units, such as recovery furnaces.

**Response:** We disagree with the commenters. Based on available emissions data and our RTO cost estimates, RTO represent a cost-effective control strategy for meeting the proposed gaseous organic HAP emissions limits. (See docket No. A-94-67.)

**Comment:** A commenter provided data for kraft and soda recovery furnaces, SDT, and lime kilns which the commenter believes show a lack of correlation between outlet emissions of PM and outlet emissions of HAP metals. According to the commenter, variations in raw materials and processes have a greater effect on uncontrolled HAP metals emissions, and, therefore, controlled emissions, than the type of control device used. According to the commenter, there is not a straight correlation between reducing PM and reducing HAP metals.

**Response:** Regarding the commenter's suggestion that there is a lack of statistical correlation between HAP metals emissions and PM emissions, we agree that the ratio of the mass of HAP metals to the total mass of PM emitted varies from source to source. Additionally, the amount of HAP metals in PM at each source varies. We do not agree with the commenters' assertion that PM is an inappropriate surrogate for particulate HAP metals emissions. Hazardous air pollutant metals are a component of PM, and control devices designed for PM removal also remove

particulate HAP metals at a similar rate. Therefore, emission control efficiencies, determined by measuring emissions at both the inlet and the outlet of the control device, are similar for both PM and particulate HAP metals. Outlet PM emissions are a good indicator of the performance of the control device, and there is no doubt that PM is an appropriate surrogate for particulate HAP metals.

Also, after reviewing available HAP metals emissions data, we conclude that there are insufficient data to establish numerical HAP metals emissions limits that reflect MACT. Consequently, we have chosen not to promulgate the proposed numerical HAP metals emissions limits and the associated HAP metals bubble compliance alternative.

**Comment:** A number of commenters objected to the proposed emissions limits for PM (as a surrogate for HAP metals) for existing sources.

Commenters suggested that the PM emissions limits be recalculated using additional PM emissions data because they believe that many units operate well below the emissions levels selected for the proposed MACT floors.

Commenters also took issue with our using the PM standards in the NSPS for Kraft Pulp Mills as the basis for the HAP metals MACT floors for existing kraft and soda combustion sources and noted that we failed to account for the fact that the technology reflected in the NSPS for Kraft Pulp Mills is an old technology and that numerous sources are achieving emissions reductions well beyond the NSPS.

**Response:** We disagree with the commenters regarding their objections to the proposed PM emissions limits for existing kraft and soda recovery furnaces and SDT. We believe that the MACT floor PM emissions limits for recovery furnaces and SDT are justified due to the variability in PM emissions from these sources and the uncertainties about why the same types of control equipment perform at different levels under comparable circumstances. Therefore, we believe that the standards in the final rule reasonably reflect the level of performance achievable in practice by the average of the best-performing 12 percent of sources.

For existing lime kilns, the control devices that we thought were representative of the HAP metals MACT floor were ESP, high-efficiency venturi scrubbers, and ESP and scrubbers in combination. However, lime kilns equipped with ESP consistently show lower PM emissions than lime kilns equipped with scrubbers, and it is apparent that there are a sufficient number of lime kilns equipped with

ESP to be representative of the HAP metals MACT floor. (That is, sufficient numbers of sources are equipped with ESP such that the level of performance of a lime kiln equipped with an ESP represents the level of performance achievable by the average of the best-performing 12 percent of existing kraft and soda lime kilns.) Therefore, today's action corrects that error and recalculates the PM emission limitation achievable by the technology that represents the MACT floor for existing lime kilns based on the performance of a lime kiln equipped with a properly designed and operated ESP.

Based on available data from monthly and annual compliance tests, lime kilns equipped with ESP can achieve PM emissions as low as 0.0023 g/dscm (0.001 gr/dscf) and as high as 0.15 g/dscm (0.064 gr/dscf) at 10 percent oxygen. To account for this variability in PM emissions from lime kiln ESP, we are setting the HAP metals MACT floor for existing lime kilns at 0.15 g/dscm (0.064 gr/dscf) at 10 percent oxygen, which is slightly less than the proposed HAP metals MACT floor of 0.15 g/dscm (0.067 gr/dscf) at 10 percent oxygen.

The best-performing lime kiln ESP (which represents MACT for HAP metals for new lime kilns) is more than twice the size (i.e., has twice the specific collecting area) of typical lime kiln ESP, and its performance remains the basis for the new source MACT standard. Therefore, today's action does not differ from the proposed standard for HAP metals for new lime kilns.

## V. Summary of Impacts

### A. Air Quality Impacts

At the current level of control, emissions of HAP (HAP metals and gaseous organic HAP) are approximately 20,400 Mg/yr (22,500 tpy), and emissions of other pollutants (PM, VOC, CO, SO<sub>2</sub>, NO<sub>x</sub>) are approximately 507,100 Mg/yr (559,000 tpy). Implementation of today's final rule is expected to reduce emissions of HAP, PM, VOC, CO, and SO<sub>2</sub>, and slightly increase emissions of NO<sub>x</sub>. The EPA estimates that emissions of HAP will be reduced by approximately 2,500 Mg/yr (2,700 tpy) and emissions of other pollutants by approximately 107,900 Mg/yr (118,900 tpy).

### B. Cost Impacts

The estimated capital cost of control for today's final rule is \$241 million (1997\$) and includes the cost to purchase and install both the control equipment and monitoring equipment. Most (89 percent) of the capital cost can be attributed to the PM controls for



kraft, soda, and sulfite combustion units

The estimated annual cost of the rule is \$32.2 million/yr (1997\$) and accounts for the year-to-year operating expenses associated with the control equipment and the monitoring equipment, in addition to the capital recovery expense associated with the equipment purchases. Most (79 percent) of the annual cost can be attributed to the PM controls for kraft, soda, and sulfite combustion units.

The total average costs for annual recordkeeping and reporting activities required by the final rule are estimated to be \$962,600/yr (1997\$) through the third year after the effective date and \$5.4 million/yr (1997\$) through the third year after the compliance date.

These capital and annualized cost estimates are intended to represent the maximum expected costs of the NESHAP and do not account for the potential cost savings achieved by mills that will successfully use the bubble compliance alternative.

#### C. Economic Impacts

This section presents a summary of EPA's evaluation of the economic impacts of today's final rule. A more detailed analysis of the economic impacts of this rule, as well as the recently promulgated NESHAP for noncombustion pulp and paper sources (i.e., MACT I and MACT II) and promulgated effluent limitation guidelines, is discussed in the Economic Analysis for the National Emission Standards for Hazardous Air Pollutants for Source Category: Pulp and Paper Production: Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards Pulp, Paper, and Paperboard Category—Phase 1 (DCN 14649, hereafter, the Economic Analysis, or EA). The EPA estimates that the pulp and paper industry will incur total capital costs of \$240 million (1997\$) under the final rule. Overall, EPA projects total annualized compliance expenditures of \$30 million (1997\$).

Price increases of less than 0.5 percent are anticipated for bleached papergrade kraft and soda, dissolving kraft, dissolving sulfite, papergrade sulfite, and semichemical pulps and products. A price increase of 1.4 percent is expected for unbleached kraft pulps. Based on our economic modeling of the impacts of such changes, we do not anticipate any facility closures nor firm failures as a result of compliance with this final rule. In addition, we expect that production decreases, employment changes, and impacts on international trade will be minimal.

#### D. Benefits Analysis

Implementation of today's final rule is expected to reduce emissions of HAP, PM, VOC, CO, and SO<sub>2</sub>, while it is expected to slightly increase emissions of NO<sub>x</sub>. Such pollutants can potentially cause adverse health effects and can have welfare effects, such as impaired visibility and reduced crop yields. In the benefits analysis, we have not conducted detailed air quality modeling to evaluate the magnitude and extent of the potential impacts from individual pulp and paper facilities. Nevertheless, to the extent that emissions from these facilities cause adverse effects, this final rule would mitigate such impacts.

##### 1. Qualitative Description of Pollutant Effects

This final rule is designed to reduce the emissions of HAP, as defined in section 112 of the CAA. Several of these HAP are classified as known, probable, or possible human carcinogens. They have also been shown to cause other adverse health effects, such as damage to the eye, central nervous system, liver, kidney, and respiratory system depending upon the exposures to these emissions. The types of studies in which these various effects have been reported include: (1) Epidemiological studies of health effects occurring in human populations (e.g., the general population, or workers exposed in the workplace), (2) case reports that document human exposure incidents (e.g., accidental releases or poisonings), (3) carefully controlled laboratory exposures of volunteer human subjects, and (4) laboratory studies on animals.

Emissions of VOC and NO<sub>x</sub> interact in the presence of sunlight to create ground-level ozone. Recent scientific evidence shows an association between elevated ozone concentrations and increases in hospital admissions for a variety of respiratory illnesses and indicates that ground-level ozone not only affects people with impaired respiratory systems (such as asthmatics), but healthy adults and children as well. Adverse welfare effects of ozone exposure include damage to crops, tree seedlings, ornamentals (shrubs, grass, etc.), and forested ecosystems.

The reactions between VOC and NO<sub>x</sub> to form ozone depend on the balance in concentrations of each pollutant found in the ambient air. For example, when the concentration of NO<sub>x</sub> is high relative to the concentration of VOC, VOC reductions are effective in limiting ozone formation, while NO<sub>x</sub> reductions in that situation are ineffective. This rule is expected to increase NO<sub>x</sub> emissions slightly, but also decrease

VOC emissions. The increase in NO<sub>x</sub> under this rule is not expected to cause significant adverse health or welfare impacts because the magnitude of the NO<sub>x</sub> increase (less than 500 Mg/yr) is very small relative to the total NO<sub>x</sub> inventory.

The VOC emission reductions from this rule occur primarily in rural attainment areas. These areas tend to be NO<sub>x</sub> limited; therefore, VOC reductions are not expected to affect ozone concentrations. The low-end estimate of VOC benefits relates to emissions reductions (3,400 Mg/yr) occurring in ozone nonattainment areas. Since ozone nonattainment areas are typically urban areas that are VOC limited, these emissions reductions are likely to be effective in limiting ozone formation. The high-end of the range of VOC benefits includes all VOC emissions reductions (31,000 Mg/yr) expected to occur for this rule. This estimate is included to account for the uncertainty as to whether specific rural areas are NO<sub>x</sub> limited.

Exposure to PM has been associated with the following adverse human health effects: Premature mortality, aggravation of respiratory and cardiovascular disease, changes in lung function and increased respiratory symptoms, alterations in lung tissue and structure, and altered respiratory tract defense mechanisms. In general, exposed populations at greater risk from these effects are the following: individuals with respiratory disease and cardiovascular disease, individuals with infectious disease, elderly individuals, asthmatic individuals, and children. Reduced welfare is associated with elevated concentrations of fine particles, which reduce visibility, damage materials, and cause soiling. The reductions in PM emissions under this rule (approximately 21,000 Mg/yr) are intended to decrease the adverse effects of PM, to the extent that populations or scenic destinations are located within pollutant transport distance of pulp and paper facilities.

Carbon monoxide is a colorless, odorless gas that is toxic to mammals. When inhaled, it combines with hemoglobin, which reduces the oxygen-carrying capacity of blood and results in less oxygen being transported to vital organs of the body. This can have detrimental effects on the cardiovascular and central nervous systems. There are numerous studies that support the association between ambient CO levels and adverse health effects which have been cited in the Air Quality Criteria Document for Carbon Monoxide (EPA Document No. 600/P-99/001F, June 2000). The reduction of



CO emissions under this rule is intended to diminish these potential effects.

Sulfur dioxide oxidizes in water to form both sulfurous and sulfuric acids. When SO<sub>2</sub> dissolves in the atmosphere in rain, fog, or snow, the acidity of the deposition can corrode various materials and cause damage to both aquatic and terrestrial ecosystems. Sulfur dioxide can also transform into PM<sub>2.5</sub>, (*i.e.*, particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers). Emissions of SO<sub>2</sub> are reduced slightly (20 Mg/yr) under this rule.

## 2. Monetized Air Quality Benefits

We used a benefit transfer method to value a subset of the emissions reductions for the MACT II rule. Monetized benefit values are estimated for only VOC, SO<sub>2</sub>, and PM emissions reductions expected to result from this rule. This method relies on a benefits analysis conducted for the Ozone and PM national ambient air quality standards (NAAQS). The benefits analysis conducted for the NAAQS involves the same pollutants that are impacted by this pulp and paper rulemaking, and we assume the values from the NAAQS analysis are applicable to this final rule. The NAAQS analysis valued the national-level benefits achieved from a single, "representative" year under a new set of standards. The benefits (in dollars) per ton of reduction of each pollutant were then applied to the projected reductions of the same pollutants under this final rule.

We assume that the relationship of emission changes with the health and welfare effects associated with the NAAQS-estimated ozone and PM concentrations correspond to the projected changes in emissions from pulp and paper mills. No air quality modeling was conducted to evaluate potential changes in human exposure under the rule, so the actual magnitude and timing of human health benefits are unknown.

In some cases, we did consider the location of mills when applying the NAAQS benefits per ton figures. For VOC monetized benefits, a low-end estimate included emissions only in ozone nonattainment areas, which was compared to a high-end estimate that used all VOC emissions. For SO<sub>2</sub>, the benefit transfer values differed between mills located in the eastern and western portions of the United States. Some benefit categories were not monetized at all, due to a lack of sufficient data. Nevertheless, the largest monetized benefits are derived from PM reductions, for which we used

nationalwide emission estimates and assume that the distributions of exposed populations from the ozone and PM studies are similar to those exposed to pulp and paper mill emissions.

The EPA estimates that the rule would reduce HAP emissions by approximately 2,500 Mg/yr; VOC emissions by approximately 31,000 Mg/yr (3,400 Mg/yr in ozone nonattainment areas); CO emissions by 56,000 Mg/yr; PM emissions by approximately 21,000 Mg/yr; and SO<sub>2</sub> emissions by 20 Mg/yr; and increase NO<sub>x</sub> emissions by approximately 500 Mg/yr. Based upon the previously discussed emissions reductions, we estimate that the monetary benefits of the rule range between \$280 million and \$370 million (1997\$) for a representative year.

This rule is expected to result in reductions in PM emissions for particles of varying sizes. We expect most PM reductions to be in the size range of PM<sub>10</sub> and below. This assumption is based upon the fact that existing chemical recovery process sources typically have PM controls in place which have removed most of the large particles associated with uncontrolled emissions. However, it is likely that a small fraction of emissions reductions will be for particles above PM<sub>10</sub>. Reductions in emissions of particle sizes greater than 10 micrometers may not result in the same benefits as particles of sizes less than 10 micrometers. As such, PM-related benefits reported for this rule represent an upper-bound estimate on the applicable PM emissions reductions.

These figures suggest that the benefits of today's final rule may be significantly greater than the projected costs. Chapter 4 of the EA presents a detailed description of the methodology used to monetize the benefits of the rule.

## E. Non-Air Environmental Impacts

The quantity of PM collected will increase when recovery furnace PM control devices are upgraded or replaced to comply with today's final HAP metals standards. However, no increases in solid waste disposal are expected because existing mills have sufficient capacity within the chemical recovery process to recycle the additional PM collected.

If owners or operators choose to replace wet scrubbers with ESP to comply with the HAP metals standard for lime kilns, the generation of wastewater will be reduced. The significance of the reduction in wastewater will depend on whether the scrubber discharge had previously been recycled and reused. If wet scrubbers are replaced by ESP (and there was no

prior recycle or reuse of scrubber discharge), EPA estimates that wastewater discharge will decrease nationwide by about 35 billion liters per year (9.3 billion gallons per year) following implementation of the rule.

## F. Energy Impacts

The overall energy demand (*i.e.*, electricity plus natural gas) is expected to decrease by about 13,700 megawatt-hours per year (MWh/yr) nationwide under today's final rule. Electricity requirements are expected to decrease by about 17,800 MWh/yr under the final rule. This net decrease in electricity requirements includes an expected increase of about 39,600 MWh/yr when PM control devices on kraft and soda recovery furnaces and SDT and sulfite combustion units are upgraded or replaced, an expected increase of 18,400 MWh/yr when gaseous organic HAP controls (*i.e.*, RTO) are added to semichemical combustion units, and an expected decrease of about 75,900 MWh/yr if wet scrubbers are replaced by ESP to provide increased control of PM emissions from kraft and soda lime kilns. Natural gas requirements are expected to increase by about 4,100 MWh/yr when gaseous organic HAP controls are added to semichemical combustion units. This estimate is based on an increase of 0.4 million cubic meters per year (14 million cubic feet per year) of natural gas, assuming 1,024 British thermal units per cubic foot of natural gas.

## VI. Administrative Requirements

### A. Executive Order 12866, Regulatory Planning and Review

Under Executive Order 12866 (58 FR 51736, October 4, 1993), EPA must determine whether the regulatory action is "significant" and, therefore, subject to review by the Office of Management and Budget (OMB) and the requirements of the Executive Order. The Executive Order defines "significant regulatory action" as one that is likely to result in a rule that may:

- (1) Have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
- (2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- (3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or



(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, OMB has notified EPA that this action is a "significant regulatory action" because it will have an annual effect on the economy of \$100 million or more. Consequently, this action was submitted to OMB for review under Executive Order 12866. Any written comments from OMB and written EPA responses are available in the docket (see ADDRESSES section of this preamble).

#### B. Executive Order 13132, Federalism

Executive Order 13132, entitled "Federalism" (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure "meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications." "Policies that have federalism implications" is defined in the Executive Order to include regulations that have "substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government." Under Executive Order 13132, EPA may not issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that is not required by statute, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by State and local governments, or EPA consults with State and local officials early in the process of developing the regulation. The EPA also may not issue a regulation that has federalism implications and that preempts State law unless EPA consults with State and local officials early in the process of developing the regulation.

This final rule does not have federalism implications. It will not have substantial direct effects on the States on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. Thus, the requirements of section 6 of the Executive Order do not apply to this rule.

#### C. Executive Order 13084, Consultation and Coordination With Indian Tribal Governments

Under Executive Order 13084, EPA may not issue a regulation that is not

required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments, or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to OMB, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments to "provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities." Today's final rule does not significantly or uniquely affect the communities of Indian tribal governments. No tribal governments own or operate kraft, soda, sulfite, or stand-alone semichemical pulp mills. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

#### D. Executive Order 13045, Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045 (62 FR 19885, April 23, 1997) applies to any rule that: (1) Is determined to be "economically significant" as defined under Executive Order 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, EPA must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned rule is preferable to other potentially effective and reasonably feasible alternatives that EPA considered.

The EPA interprets Executive Order 13045 as applying only to those regulatory actions that are based on health or safety risks, such that the analysis required under section 5-501 of the Executive Order has the potential to influence the rule. This final rule is not subject to Executive Order 13045 because it is based on technology performance and not on health or safety risks.

#### E. Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Pub. L. 104-4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures by State, local, and tribal governments, in the aggregate, or by the private sector, of \$100 million or more in any 1 year. Before promulgating an EPA rule for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost effective, or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost effective, or least burdensome alternative if the Administrator publishes with the final rule an explanation why that alternative was not adopted. Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed under section 203 of the UMRA a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

The EPA has determined that this rule (in conjunction with the MACT I and MACT III rules and the effluent guidelines recently promulgated for the pulp and paper industry) contains a Federal mandate that may result in estimated costs of \$100 million or more to either State, local, or tribal governments, in the aggregate, or to the private sector in any 1 year. Accordingly, EPA has prepared under section 202 of the UMRA a written statement, which is summarized below.

##### 1. Statutory Authority

The statutory authority for this rulemaking is section 112 of the CAA.



Title III of the CAA Amendments was enacted to reduce the amount of nationwide air toxic emissions. Section 112(b) lists the 189 chemicals, compounds, or groups of chemicals deemed by Congress to be HAP. These toxic air pollutants are to be regulated by NESHAP. Hazardous air pollutant emissions from the pulp and paper production source category are being regulated under section 112(d) of the CAA. The NESHAP requires existing and new major sources to control emissions of HAP using MACT.

The pulp and paper production source category includes all mills that produce pulp and/or paper. The NESHAP for the source category are being developed in phases. This final NESHAP, referred to as MACT II, regulates chemical recovery combustion sources at kraft, soda, sulfite, and stand-alone semichemical pulp mills. The final NESHAP for noncombustion sources (i.e., MACT I and MACT III) regulates noncombustion processes at mills that (1) chemically pulp wood fiber (using kraft, sulfite, soda, and semi-chemical methods) (MACT I), and (2) mechanically pulp wood fiber (e.g., groundwood, thermomechanical, pressurized), pulp secondary fibers (deinked and nondeinked), and pulp nonwood (MACT III).

Regarding EPA's compliance with section 205(a), EPA did identify and consider a reasonable number of alternatives. A summary of these alternatives and their costs and environmental impacts is provided in the preamble to the proposed rule (63 FR 18773, April 15, 1998). Additional information on the costs and environmental impacts of the regulatory alternatives is presented in the Revised Nationwide Costs, Environmental Impacts, and Cost Effectiveness of Regulatory Alternatives for Kraft, Soda, Sulfite, and Semichemical Combustion Sources Memo (docket No. A-94-67).

The chosen alternative represents the MACT floor for chemical recovery combustion sources at kraft, soda, and sulfite pulp mills and is the least costly and least burdensome alternative for those sources. The chosen alternative also includes an option more stringent than the MACT floor for chemical recovery combustion sources at stand-alone semichemical pulp mills. However, EPA considers the cost effectiveness of the more stringent option for semichemical chemical recovery combustion sources (less than \$2,900/Mg of HAP reduced) acceptable, especially when measured against the environmental benefits of reducing emissions of both HAP and non-HAP. Therefore, EPA concludes that the

chosen alternative is the least costly and least burdensome alternative that achieves the objectives of section 112, as called for in section 205(a).

## 2. Social Costs and Benefits

The regulatory impact analysis prepared for MACT I, including the EPA's assessment of costs and environmental benefits, is detailed in the "Regulatory Impacts Assessment of Proposed Effluent Guidelines and NESHAP for the Pulp, Paper, and Paperboard Industry," (EPA-821/R-93-020). The regulatory impacts assessment document was updated for the final rule for MACT I and III and the proposed rule for MACT II and is referred to as the Economic Analysis Document (docket No. A-94-67).

## 3. Future and Disproportionate Costs

The EPA does not believe that there will be any disproportionate budgetary effects of the rule on any particular areas of the country, particular governments or types of communities (e.g., urban, rural), or particular industry segments.

## 4. Effects on the National Economy

The estimated direct cost to the pulp and paper industry of compliance with this rule is approximately \$30 million (1997\$) annually. Indirect costs of the rule to industries other than the pulp and paper industry, governments, tribes, and other affected entities are expected to be minor. The estimated annual cost of this rule is minimal when compared to the nominal gross domestic product of \$8,318.4 billion reported for the Nation in 1997. This rule is expected to have little impact on domestic productivity, economic growth, full employment, creation of productive jobs, and on the international competitiveness of the U.S. goods and services.

## 5. Consultation With Government Officials

Although this rule does not affect any State, local, or tribal governments, EPA has consulted with State and local air pollution control officials. The EPA also has held numerous meetings on the proposed integrated rules with many of the stakeholders from the pulp and paper industry, including the AF&PA, the National Council of the Paper Industry for Air and Stream Improvement, numerous individual companies, vendors, and other interested parties. The EPA has added materials to the docket to document these meetings.

*F. Regulatory Flexibility Act (RFA), as Amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 U.S.C. 601 et seq.*

The RFA generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

For purposes of assessing the impacts of today's rule on small entities, small entity is defined as: (1) A small business that has fewer than 750 employees for NAICS codes 32211, 32212, and 32213 (pulp, paper, and paperboard mills), (2) a small governmental jurisdiction that is a government of a city, county, town, school district or special district with a population of less than 50,000, and (3) a small organization that is any not-for-profit enterprise which is independently owned and operated and is not dominant in its field.

After considering the economic impacts of today's final rule on small entities, it has been determined that this action will not have a significant economic impact on a substantial number of small entities. The EPA has determined that three companies met the definition of small entity at the time of proposal. These three companies own only three of the 136 mills subject to today's final rule. The small business analysis reported in the EA shows that the affected mills have costs as a percentage of sales ratios of less than 1 percent, that these mills are not expected to close, nor are the owning companies expected to encounter financial distress as a result of this rule. An analysis of mergers and acquisitions subsequent to the baseline year of the analysis indicates that these three companies no longer meet the definition of small business.

## G. Paperwork Reduction Act

The information collection requirements in this final rule will be submitted for approval to OMB under the Paperwork Reduction Act, 44 U.S.C. 3501 et seq. The EPA has prepared an Information Collection Request (ICR) document (ICR No. 1805.01), and a copy may be obtained from Sandy Farmer by mail at Office of Environmental Information, Collection Strategies Division (2822), U.S. EPA, 1200 Pennsylvania Avenue NW, Washington, DC 20460, by electronic mail at



farmer.sandy@epa.gov, or by calling (202) 260-2740. A copy may also be downloaded off the Internet at <http://www.epa.gov/icr>. The information requirements are not effective until OMB approves them.

The information requirements in the final rule include mandatory notifications, records, and reports required by the NESHAP General Provisions. These information requirements are needed to confirm the compliance status of major sources, to identify any non-major sources not subject to the standard and any new or reconstructed sources subject to the standards, to confirm that emission control devices are being properly operated and maintained, and to ensure that the standards are being achieved. Based on the recorded and reported information, EPA can decide which facilities, records, or processes should be inspected. These recordkeeping and reporting requirements are specifically authorized under section 114 of the CAA. All information submitted to EPA for which a claim of confidentiality is made is safeguarded according to EPA's policies in 40 CFR part 2, subpart B.

The annual public recordkeeping and reporting burden for this collection of information (averaged over the first 3 years after the effective date of this rule) is estimated to total 21,500 labor hours per year, at a total annual cost of \$958,300 (1997\$). This estimate includes initial notifications, one-time performance test and report (with repeat tests where needed), one-time purchase and installation of monitoring system, one-time preparation of a startup, shutdown, and malfunction plan with immediate reports for any event when the procedures in the plan were not followed, compliance reports and recordkeeping. Total capital costs associated with these requirements over the 3-year period of the ICR are estimated at \$14,700, with annualized capital costs of \$1,600 (1997\$). Total operation and maintenance costs associated with these requirements are estimated at \$2,700 (1997\$).

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions, develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing ways to comply with any previously applicable instructions and requirements; train personnel to be able

to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR part 9 and 48 CFR chapter 15.

#### H. National Technology Transfer and Advancement Act of 1995

Section 12(d) of the National Technology Transfer and Advancement Act (NTTAA) of 1995 (Pub. L. 104-113; 15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory and procurement activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, business practices) developed or adopted by one or more voluntary consensus bodies. The NTTAA directs EPA to provide Congress, through annual reports to OMB, with explanations when an agency does not use available and applicable voluntary consensus standards.

This rulemaking involves the following technical standards: EPA Methods 1, 2, 3, 3A, 3B, 4, 5, 17, 25A, 29, and 308 (40 CFR part 60, appendix A; 40 CFR part 61, appendix B; 40 CFR part 63, appendix A). Consistent with the NTTAA, EPA conducted searches to identify voluntary consensus standards in addition to these EPA methods. For EPA Methods 3B and 308, no applicable voluntary consensus standards have been found at this time. The search and review results have been documented and are placed in the docket for this rule (Docket No. A-94-67).

The search for emissions testing procedures identified 19 voluntary consensus standards. The EPA determined that 15 of these 19 standards identified for measuring emissions of the HAP or surrogates subject to emissions limits in the rule would not be practical due to lack of equivalency, detail, and/or quality assurance/quality control requirements. Therefore, we did not use these voluntary consensus standards in this rulemaking. Four of the 19 consensus standards identified are under development or under EPA review. Therefore, we did not use these voluntary consensus standards in this rulemaking.

Section 63.865 of the rule lists the EPA test methods included in the rule.

Most of these methods have been used by States and industry for more than 10 years. Nevertheless, under § 63.7(e)(2)(ii) and (f), the rule also allows any State or source to apply to EPA for permission to use an alternative method in place of any of the EPA test methods listed in § 63.865.

#### I. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. The EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the Federal Register. A major rule cannot take effect until 60 days after it is published in the Federal Register. This action is a "major rule" as defined by 5 U.S.C. 804(2). This rule will be effective March 13, 2001.

#### List of Subjects in 40 CFR Part 63

Environmental protection, Administrative practice and procedure, Air pollution control, Hazardous substances, Intergovernmental relations, Pulp and paper mills, Reporting and recordkeeping requirements.

Dated: December 15, 2000.

Carol M. Browner,  
Administrator

For the reasons set out in the preamble, title 40, chapter I, part 63 of the Code of Federal Regulations is amended as follows

#### PART 63—[AMENDED]

1. The authority citation for part 63 continues to read as follows:

Authority: 42 U.S.C. 7401 *et seq.*

2. Part 63 is amended by adding subpart MM to read as follows:

#### Subpart MM—National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills

Sec.

- 63.860 Applicability and designation of affected source.
- 63.861 Definitions.
- 63.862 Standards.
- 63.863 Compliance dates.
- 63.864 Monitoring requirements.



- 63.865 Performance test requirements and test methods.  
 63.866 Recordkeeping requirements.  
 63.867 Reporting requirements.  
 63.868 Delegation of authority.  
 Table 1 to Subpart MM—General Provisions  
 Applicability to Subpart MM

**§ 63.860 Applicability and designation of affected source.**

(a) The requirements of this subpart apply to the owner or operator of each kraft, soda, sulfite, or stand-alone semichemical pulp mill that is a major source of hazardous air pollutants (HAP) emissions as defined in § 63.2.

(b) *Affected sources.* The requirements of this subpart apply to each new or existing affected source listed in paragraphs (b)(1) through (6) of this section:

- (1) Each existing chemical recovery system (as defined in § 63.861) located at a kraft or soda pulp mill.
  - (2) Each new nondirect contact evaporator (NDCE) recovery furnace and associated smelt dissolving tank(s) located at a kraft or soda pulp mill.
  - (3) Each new direct contact evaporator (DCE) recovery furnace system (as defined in § 63.861) and associated smelt dissolving tank(s) located at a kraft or soda pulp mill.
  - (4) Each new lime kiln located at a kraft or soda pulp mill.
  - (5) Each new or existing sulfite combustion unit located at a sulfite pulp mill.
  - (6) Each new or existing semichemical combustion unit located at a stand-alone semichemical pulp mill.
- (c) The requirements of the General Provisions in subpart A of this part that apply to the owner or operator subject to the requirements of this subpart are identified in Table 1 to this subpart.

**§ 63.861 Definitions.**

All terms used in this subpart are defined in the Clean Air Act in subpart A of this part, or in this section. For the purposes of this subpart, if the same term is defined in subpart A or any other subpart of this part and in this section, it must have the meaning given in this section.

*Black liquor* means spent cooking liquor that has been separated from the pulp produced by the kraft, soda, or semichemical pulping process.

*Black liquor gasification* means the thermochemical conversion of black liquor into a combustible gaseous product.

*Black liquor oxidation (BLO) system* means the vessels used to oxidize the black liquor, with air or oxygen, and the associated storage tank(s).

*Black liquor solids (BLS)* means the dry weight of the solids in the black

liquor that enters the recovery furnace or semichemical combustion unit.

*Black liquor solids firing rate* means the rate at which black liquor solids are fed to the recovery furnace or the semichemical combustion unit.

*Chemical recovery combustion source* means any source in the chemical recovery area of a kraft, soda, sulfite or stand-alone semichemical pulp mill that is an NDCE recovery furnace, a DCE recovery furnace system, a smelt dissolving tank, a lime kiln, a sulfite combustion unit, or a semichemical combustion unit.

*Chemical recovery system* means all existing DCE and NDCE recovery furnaces, smelt dissolving tanks, and lime kilns at a kraft or soda pulp mill. Each existing recovery furnace, smelt dissolving tank, or lime kiln is considered a process unit within a chemical recovery system.

*Direct contact evaporator (DCE) recovery furnace* means a kraft or soda recovery furnace equipped with a direct contact evaporator that concentrates strong black liquor by direct contact between the hot recovery furnace exhaust gases and the strong black liquor.

*Direct contact evaporator (DCE) recovery furnace system* means a direct contact evaporator recovery furnace and any black liquor oxidation system, if present, at the pulp mill.

*Dry electrostatic precipitator (ESP) system* means an electrostatic precipitator with a dry bottom (i.e., no black liquor, water, or other fluid is used in the ESP bottom) and a dry particulate matter return system (i.e., no black liquor, water, or other fluid is used to transport the collected PM to the mix tank).

*Hazardous air pollutants (HAP) metals* means the sum of all emissions of antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, and selenium as measured by EPA Method 29 (40 CFR part 60, appendix A) and with all nondetect data treated as one-half of the method detection limit.

*Kraft pulp mill* means any stationary source that produces pulp from wood by cooking (digesting) wood chips in a solution of sodium hydroxide and sodium sulfide. The recovery process used to regenerate cooking chemicals is also considered part of the kraft pulp mill.

*Kraft recovery furnace* means a recovery furnace that is used to burn black liquor produced by the kraft pulping process, as well as any recovery furnace that burns black liquor produced from both the kraft and semichemical pulping processes, and

includes the direct contact evaporator, if applicable. Includes black liquor gasification.

*Lime kiln* means the combustion unit (e.g., rotary lime kiln or fluidized-bed calciner) used at a kraft or soda pulp mill to calcine lime mud, which consists primarily of calcium carbonate, into quicklime, which is calcium oxide (CaO).

*Lime production rate* means the rate at which dry lime, measured as CaO, is produced in the lime kiln.

*Method detection limit* means the minimum concentration of an analyte that can be determined with 99 percent confidence that the true value is greater than zero.

*Modification* means, for the purposes of § 63.862(a)(1)(ii)(E)(1), any physical change (excluding any routine part replacement or maintenance) or operational change (excluding any operational change that occurs during a start-up, shutdown, or malfunction) that is made to the air pollution control device that could result in an increase in PM emissions.

*Nondetect data* means, for the purposes of this subpart, any value that is below the method detection limit.

*Nondirect contact evaporator (NDCE) recovery furnace* means a kraft or soda recovery furnace that burns black liquor that has been concentrated by indirect contact with steam.

*Particulate matter (PM)* means total particulate matter as measured by EPA Method 5, EPA Method 17 (§ 63.865(b)(1)), or EPA Method 29 (40 CFR part 60, appendix A).

*Process unit* means an existing DCE or NDCE recovery furnace, smelt dissolving tank, or lime kiln in a chemical recovery system at a kraft or soda mill.

*Recovery furnace* means an enclosed combustion device where concentrated black liquor produced by the kraft or soda pulping process is burned to recover pulping chemicals and produce steam. Includes black liquor gasification.

*Regenerative thermal oxidizer (RTO)* means a thermal oxidizer that transfers heat from the exhaust gas stream to the inlet gas stream by passing the exhaust stream through a bed of ceramic stoneware or other heat-absorbing medium before releasing it to the atmosphere, then reversing the gas flow so the inlet gas stream passes through the heated bed, raising the temperature of the inlet stream close to or at its ignition temperature.

*Semichemical combustion unit* means any equipment used to combust or pyrolyze black liquor at stand-alone semichemical pulp mills for the purpose



of chemical recovery. Includes black liquor gasification.

**Similar process units** means all existing DCE and NDCE recovery furnaces, smelt dissolving tanks, or lime kilns at a kraft or soda pulp mill.

**Smelt dissolving tanks (SDT)** means vessels used for dissolving the smelt collected from a kraft or soda recovery furnace.

**Soda pulp mill** means any stationary source that produces pulp from wood by cooking (digesting) wood chips in a sodium hydroxide solution. The recovery process used to regenerate cooking chemicals is also considered part of the soda pulp mill.

**Soda recovery furnace** means a recovery furnace used to burn black liquor produced by the soda pulping process and includes the direct contact evaporator, if applicable. Includes black liquor gasification.

**Stand-alone semichemical pulp mill** means any stationary source that produces pulp from wood by partially digesting wood chips in a chemical solution followed by mechanical defibrating (grinding), and has an onsite chemical recovery process that is not integrated with a kraft pulp mill.

**Sulfite combustion unit** means a combustion device, such as a recovery furnace or fluidized-bed reactor, where spent liquor from the sulfite pulping process (i.e., red liquor) is burned to recover pulping chemicals.

**Sulfite pulp mill** means any stationary source that produces pulp from wood by cooking (digesting) wood chips in a solution of sulfurous acid and bisulfite ions. The recovery process used to regenerate cooking chemicals is also considered part of the sulfite pulp mill.

**Total hydrocarbons (THC)** means the sum of organic compounds measured as carbon using EPA Method 25A (40 CFR part 60, appendix A).

#### § 63.862 Standards.

(a) **Standards for HAP metals existing sources.** (1) Each owner or operator of an existing kraft or soda pulp mill must comply with the requirements of either paragraph (a)(1)(i) or (ii) of this section.

(i) Each owner or operator of a kraft or soda pulp mill must comply with the PM emissions limits in paragraphs (a)(1)(i)(A) through (C) of this section.

(A) The owner or operator of each existing kraft or soda recovery furnace must ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.10 gram per dry standard cubic meter (g/dscm) (0.044 grain per dry standard cubic foot (gr/dscf)) corrected to 8 percent oxygen.

(B) The owner or operator of each existing kraft or soda smelt dissolving tank must ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.10 kg/Mg (0.20 lb/ton) of black liquor solids fired.

(C) The owner or operator of each existing kraft or soda lime kiln must ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.15 g/dscm (0.064 gr/dscf) corrected to 10 percent oxygen.

(ii) As an alternative to meeting the requirements of § 63.862(a)(1)(i), each owner or operator of a kraft or soda pulp mill may establish PM emissions limits for each existing kraft or soda recovery furnace, smelt dissolving tank, and lime kiln that operates 6,300 hours per year or more by:

(A) Establishing an overall PM emission limit for each existing process unit in the chemical recovery system at the kraft or soda pulp mill using the methods in § 63.865(a)(1) and (2).

(B) The emissions limits for each kraft recovery furnace, smelt dissolving tank, and lime kiln that are used to establish the overall PM limit in paragraph (a)(1)(ii)(A) of this section must not be less stringent than the emissions limitations required by § 60.282 of part 60 of this chapter for any kraft recovery furnace, smelt dissolving tank, or lime kiln that is subject to the requirements of § 60.282.

(C) Each owner or operator of an existing kraft or soda recovery furnace, smelt dissolving tank, or lime kiln must ensure that the PM emissions discharged to the atmosphere from each of these sources are less than or equal to the applicable PM emissions limits, established using the methods in § 63.865(a)(1), that are used to establish the overall PM emissions limits in paragraph (a)(1)(ii)(A) of this section.

(D) Each owner or operator of an existing kraft or soda recovery furnace, smelt dissolving tank, or lime kiln must reestablish the emissions limits determined in paragraph (a)(1)(ii)(A) of this section if either of the actions in paragraphs (a)(1)(ii)(D)(1) and (2) of this section are taken:

(1) The air pollution control system for any existing kraft or soda recovery furnace, smelt dissolving tank, or lime kiln for which an emission limit was established in paragraph (a)(1)(ii)(A) of this section is modified (as defined in § 63.861) or replaced; or

(2) Any kraft or soda recovery furnace, smelt dissolving tank, or lime kiln for which an emission limit was established in paragraph (a)(1)(ii)(A) of this section

is shut down for more than 60 consecutive days.

(iii) Each owner or operator of an existing kraft or soda recovery furnace, smelt dissolving tank, or lime kiln that operates less than 6,300 hours per year must comply with the applicable PM emissions limits for that process unit provided in paragraph (a)(1)(i) of this section.

(2) The owner or operator of each existing sulfite combustion unit must ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.092 g/dscm (0.040 gr/dscf) corrected to 8 percent oxygen.

(b) **Standards for HAP metals: new sources.** (1) The owner or operator of any new kraft or soda recovery furnace must ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.034 g/dscm (gr/dscf) corrected to 8 percent oxygen.

(2) The owner or operator of any new kraft or soda smelt dissolving tank must ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.06 kg/Mg (0.12 lb/ton) of black liquor solids fired.

(3) The owner or operator of any new kraft or soda lime kiln must ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.023 g/dscm (0.010 gr/dscf) corrected to 10 percent oxygen.

(4) The owner or operator of any new sulfite combustion unit must ensure that the concentration of PM in the exhaust gases discharged to the atmosphere is less than or equal to 0.046 g/dscm (0.020 gr/dscf) corrected to 8 percent oxygen.

(c) **Standards for gaseous organic HAP.** (1) The owner or operator of any new recovery furnace at a kraft or soda pulp mill must ensure that the concentration of gaseous organic HAP, as measured by methanol, discharged to the atmosphere is no greater than 0.012 kg/Mg (0.025 lb/ton) of black liquor solids fired.

(2) The owner or operator of each existing or new semichemical combustion unit must ensure that:

(i) The concentration of gaseous organic HAP, as measured by total hydrocarbons reported as carbon, discharged to the atmosphere is less than or equal to 1.49 kg/Mg (2.97 lb/ton) of black liquor solids fired; or

(ii) The gaseous organic HAP emissions, as measured by total hydrocarbons reported as carbon, are reduced by at least 90 percent prior to



discharge of the gases to the atmosphere.

**§ 63.863 Compliance dates.**

(a) The owner or operator of an existing affected source or process unit must comply with the requirements in this subpart no later than January 12, 2004.

(b) The owner or operator of a new affected source that has an initial startup date after January 12, 2001, must comply with the requirements in this subpart immediately upon startup of the affected source, except as specified in § 63.6(b).

**§ 63.864 Monitoring requirements.**

(a) *General.* (1) The owner or operator of each affected kraft or soda recovery furnace or lime kiln equipped with an ESP must install, calibrate, maintain, and operate a continuous opacity monitoring system that can be used to determine opacity at least once every successive 10-second period and calculate and record each successive 6-minute average opacity using the procedures in §§ 63.6(h) and 63.8.

(2) The owner or operator of each affected kraft or soda recovery furnace, kraft or soda lime kiln, sulfite combustion unit, or kraft or soda smelt dissolving tank equipped with a wet scrubber must install, calibrate, maintain, and operate a continuous monitoring system that can be used to determine and record the pressure drop across the scrubber and the scrubbing liquid flow rate at least once every successive 15-minute period using the procedures in § 63.8(c), as well as the procedures in paragraphs (a)(2)(i) and (ii) of this section:

(i) The monitoring device used for the continuous measurement of the pressure drop of the gas stream across the scrubber must be certified by the manufacturer to be accurate to within a gage pressure of  $\pm 500$  pascals ( $\pm 2$  inches of water gage pressure), and

(ii) The monitoring device used for continuous measurement of the scrubbing liquid flow rate must be certified by the manufacturer to be accurate within  $\pm 5$  percent of the design scrubbing liquid flow rate.

(3) The owner or operator of each affected semichemical combustion unit equipped with an RTO must install, calibrate, maintain, and operate a continuous monitoring system that can be used to determine and record the operating temperature of the RTO at least once every successive 15-minute period using the procedures in § 63.8(c). The monitor must compute and record the operating temperature at the point of incineration of effluent gases that are

emitted using a temperature monitor accurate to within  $\pm 1$  percent of the temperature being measured.

(4) The owner or operator of each affected source or process unit that uses a control device listed in paragraphs (a)(1) through (3) of this section may monitor alternative control device operating parameters subject to prior written approval by the Administrator.

(5) The owner or operator of each affected source or process unit that uses an air pollution control system other than those listed in paragraphs (a)(1) through (3) of this section must monitor the parameters as approved by the Administrator using the methods and procedures in § 63.865(f).

(6) The owner or operator of each affected source or process unit complying with the gaseous organic HAP emissions limitations of § 63.862(c)(1) through the use of an NDCE recovery furnace equipped with a dry ESP system is not required to conduct any performance testing or any continuous monitoring to demonstrate compliance with the gaseous organic HAP emission limitation.

*(b) Initial compliance determination.*

(1) The owner or operator of each affected source or process unit subject to the requirements of this subpart is required to conduct an initial performance test using the test methods and procedures listed in §§ 63.7 and 63.865, except as provided in paragraph (b)(3) of this section.

*(2) Determination of operating ranges.*

(i) During the initial performance test required in paragraph (b)(1) of this section, the owner or operator of any affected source or process unit must establish operating ranges for the monitoring parameters in paragraphs (a)(2) through (5) of this section, as appropriate; or

(ii) The owner or operator may base operating ranges on values recorded during previous performance tests or conduct additional performance tests for the specific purpose of establishing operating ranges, provided that test data used to establish the operating ranges are or have been obtained using the test methods required in this subpart. The owner or operator of the affected source or process unit must certify that all control techniques and processes have not been modified subsequent to the testing upon which the data used to establish the operating parameter ranges were obtained.

(iii) The owner or operator of an affected source or process unit may establish expanded or replacement operating ranges for the monitoring parameter values listed in paragraphs (a)(2) through (5) of this section and

established in paragraph (b)(2)(i) or (ii) of this section during subsequent performance tests using the test methods in § 63.865.

(3) An initial performance test is not required to be conducted in order to determine compliance with the emissions limitations of § 63.862(c)(1) if the affected source or process unit includes an NDCE recovery furnace equipped with a dry ESP system.

(4) After the Administrator has approved the PM emissions limits for each kraft or soda recovery furnace, smelt dissolving tank, and lime kiln, the owner or operator complying with an overall PM emission limit established in § 63.862(a)(1)(ii) must demonstrate compliance with the HAP metals standard by demonstrating compliance with the approved PM emissions limits for each affected kraft or soda recovery furnace, smelt dissolving tank, and lime kiln, using the test methods and procedures in § 63.865(b).

*(c) On-going compliance provisions.*

(1) Following the compliance date, owners or operators of all affected sources or process units are required to implement corrective action, as specified in the startup, shutdown, and malfunction plan prepared under § 63.866(a) if the monitoring exceedances in paragraphs (c)(1)(i) through (v) of this section occur:

(i) For a new or existing kraft or soda recovery furnace or lime kiln equipped with an ESP, when the average of ten consecutive 6-minute averages result in a measurement greater than 20 percent opacity;

(ii) For a new or existing kraft or soda recovery furnace, kraft or soda smelt dissolving tank, kraft or soda lime kiln, or sulfite combustion unit equipped with a wet scrubber, when any 3-hour average parameter value is outside the range of values established in paragraph (b)(2) of this section

(iii) For a new or existing semichemical combustion unit equipped with an RTO, when any 1-hour average temperature falls below the temperature established in paragraph (b)(2) of this section;

(iv) For an affected source or process unit equipped with an alternative emission control system approved by the Administrator, when any 3-hour average value is outside the range of parameter values established in paragraph (b)(2) of this section; and

(v) For an affected source or process unit that is monitoring alternative operating parameters established in paragraph (a)(4) of this section, when any 3-hour average value is outside the range of parameter values established in paragraph (b)(2) of this section.



(2) Following the compliance date, owners or operators of all affected sources or process units are in violation of the standards of § 63.862 if the monitoring exceedances in paragraphs (c)(2)(i) through (vi) of this section occur:

(i) For an existing kraft or soda recovery furnace equipped with an ESP, when opacity is greater than 35 percent for 6 percent or more of the operating time within any quarterly period;

(ii) For a new kraft or soda recovery furnace or a new or existing lime kiln equipped with an ESP, when opacity is greater than 20 percent for 6 percent or more of the operating time within any quarterly period;

(iii) For a new or existing kraft or soda recovery furnace, kraft or soda smelt dissolving tank, kraft or soda lime kiln, or sulfite combustion unit equipped with a wet scrubber, when six or more

3-hour average parameter values within any 6-month reporting period are outside the range of values established in paragraph (b)(2) of this section;

(iv) For a new or existing semichemical combustion unit equipped with an RTO, when any 3-hour average temperature falls below the temperature established in paragraph (b)(2) of this section;

(v) For an affected source or process unit equipped with an alternative air pollution control system approved by the Administrator, when six or more 3-hour average values within any 6-month reporting period are outside the range of parameter values established in paragraph (b)(2) of this section; and

(vi) For an affected source or process unit that is monitoring alternative operating parameters established in paragraph (a)(4) of this section, when six or more 3-hour average values

within any 6-month reporting period are outside the range of parameter values established in paragraph (b)(2) of this section.

(3) For purposes of determining the number of nonopacity monitoring exceedances, no more than one exceedance will be attributed in any given 24-hour period.

#### § 63.865 Performance test requirements and test methods.

(a) The owner or operator of a process unit seeking to comply with a PM emission limit under § 63.862(a)(1)(ii)(A) must use the procedures in paragraphs (a)(1) through (4) of this section:

(1) Determine the overall PM emission limit for the chemical recovery system at the mill using Equation 1 of this section as follows:

$$EL_{PM} = [(C_{ref, RF})(Q_{RF_{tot}}) + (C_{ref, LK})(Q_{LK_{tot}})](F1)/(BLS_{tot}) + ER1_{ref, SDT} \quad (\text{Eq. 1})$$

Where:

$EL_{PM}$ =overall PM emission limit for all existing process units in the chemical recovery system at the kraft or soda pulp mill, kg/Mg (lb/ton) of black liquor solids fired

$C_{ref, RF}$ =reference concentration of 0.10 g/dscm (0.044 gr/dscf) corrected to 8 percent oxygen for existing kraft or soda recovery furnaces

$Q_{RF_{tot}}$ =sum of the average volumetric gas flow rates measured during the performance test and corrected to 8 percent oxygen for all existing recovery furnaces in the chemical recovery system at the kraft or soda pulp mill, dscm/min (dry standard cubic feet per minute [dscf/min]);

$C_{ref, LK}$ =reference concentration of 0.10 g/dscm (0.064 gr/dscf) corrected to 10

percent oxygen for existing kraft or soda lime kilns.

$Q_{LK_{tot}}$ =sum of the average volumetric gas flow rates measured during the performance test and corrected to 10 percent oxygen for all existing lime kilns in the chemical recovery system at the kraft or soda pulp mill, dscm/min (dscf/min).

$F1$ =conversion factor, 1.44 minutes•kilogram/day•gram (min•kg/d•g) (0.206 minutes•pound/day•gram [min•lb/d•gr]);

$BLS_{tot}$ =sum of the average black liquor solids firing rates of all existing recovery furnaces in the chemical recovery system at the kraft or soda pulp mill measured during the performance test, megagrams per day (Mg/d) (tons per day [tons/d]) of black liquor solids fired

$ER1_{ref, SDT}$ =reference emission rate of 0.10 kg/Mg (0.20 lb/ton) of black liquor solids

fired for existing kraft or soda smelt dissolving tanks.

(2) Establish an emission limit for each kraft or soda recovery furnace, smelt dissolving tank, and lime kiln, and, using these emissions limits, determine the overall PM emission rate for the chemical recovery system at the mill using the procedures in paragraphs (a)(2)(i) through (v) of this section, such that the overall PM emission rate calculated in paragraph (a)(2)(v) of this section is less than or equal to the overall PM emission limit determined in paragraph (a)(1) of this section, as appropriate.

(i) The PM emission rate from each affected recovery furnace must be determined using Equation 2 of this section as follows:

$$ER_{RF} = (F1)(C_{EL, RF})(Q_{RF})/(BLS) \quad (\text{Eq. 2})$$

Where:

$ER_{RF}$ =emission rate from each recovery furnace, kg/Mg (lb/ton) of black liquor solids

$F1$ =conversion factor, 1.44 min•kg/d•g (0.206 min•lb/d•gr)

$C_{EL, RF}$ =PM emission limit proposed by owner or operator for the recovery

furnace, g/dscm (gr/dscf) corrected to 8 percent oxygen

$Q_{RF}$ =average volumetric gas flow rate from the recovery furnace measured during the performance test and corrected to 8 percent oxygen, dscm/min (dscf/min)

$BLS$ =average black liquor solids firing rate of the recovery furnace measured during

the performance test, Mg/d (ton/d) of black liquor solids

(ii) The PM emission rate from each affected smelt dissolving tank must be determined using Equation 3 of this section as follows:

$$ER_{SDT} = (F1)(C_{EL, SDT})(Q_{SDT})/(BLS) \quad (\text{Eq. 3})$$



## Where:

$ER_{SDT}$ =emission rate from each SDT, kg/Mg (lb/ton) of black liquor solids fired.

$F1$ =conversion factor, 1.44 min•kg/d•g (0.206 min•lb/d•gr).

$C_{EL, SDT}$ =PM emission limit proposed by owner or operator for the smelt dissolving tank, g/dscm (gr/dscf).

$Q_{SDT}$ =average volumetric gas flow rate from the smelt dissolving tank measured during the performance test, dscm/min (dscf/min).

$BLS$ =average black liquor solids firing rate of the associated recovery furnace measured during the performance test, Mg/d (ton/d) of black liquorsolids fired. If more than one SDT is used to dissolve

the smelt from a given recovery furnace, then the black liquor solids firing rate of the furnace must be proportioned according to the size of the SDT.

(iii) The PM emission rate from each affected lime kiln must be determined using Equation 4 of this section as follows:

$$ER_{LK} = (F1)(C_{EL, LK})(Q_{LK})(CaO_{tox}/BLS_{tox})/(CaO_{LK}) \quad (Eq. 4)$$

## Where:

$ER_{LK}$ =emission rate from each lime kiln, kg/Mg (lb/ton) of black liquor solids.

$F1$ =conversion factor, 1.44 min•kg/d•g (0.206 min•lb/d•gr).

$C_{EL, LK}$ =PM emission limit proposed by owner or operator for the lime kiln, g/dscm (gr/dscf) corrected to 10 percent oxygen

$Q_{LK}$ =average volumetric gas flow rate from the lime kiln measured during the performance test and corrected to 10 percent oxygen, dscm/min (dscf/min)

$CaO_{LK}$ =lime production rate of the lime kiln, measured as CaO during the performance test, Mg/d (ton/d) of CaO.

$CaO_{tox}$ =sum of the average lime production rates for all existing lime kilns in the chemical recovery system at the mill measured as CaO during the performance test, Mg/d (ton/d)

$BLS_{tox}$ =sum of the average black liquor solids firing rates of all recovery furnaces in the chemical recovery system at the mill measured during the performance test, Mg/d (ton/d) of black liquor solids.

(iv) If more than one similar process unit is operated in the chemical recovery system at the kraft or soda pulp mill, Equation 5 of this section must be used to calculate the overall PM emission rate from all similar process units in the chemical recovery system at the mill and must be used in determining the overall PM emission rate for the chemical recovery system at the mill:

$$ER_{PU_{tox}} = ER_{PU1}(PR_{PU1}/PR_{tox}) + \dots + (ER_{PUn})(PR_{PUn}/PR_{tox}) \quad (Eq. 5)$$

## Where:

$ER_{PU_{tox}}$ =overall PM emission rate from all similar process units, kg/Mg (lb/ton) of black liquor solids fired.

$ER_{PU1}$ =PM emission rate from process unit No. 1, kg/Mg (lb/ton) of black liquor solids fired, calculated using Equation 2, 3, or 4 in paragraphs (a)(2)(i) through (iii) of this section.

$PR_{PU1}$ =black liquor solids firing rate in Mg/d (ton/d) for process unit No. 1, if process unit is a recovery furnace or SDT. The CaO production rate in Mg/d

(ton/d) for process unit No. 1, if process unit is a lime kiln.

$PR_{tox}$ =total black liquor solids firing rate in Mg/d (ton/d) for all recovery furnaces in the chemical recovery system at the kraft or soda pulp mill if the similar process units are recovery furnaces or SDT, or the total CaO production rate in Mg/d (ton/d) for all lime kilns in the chemical recovery system at the mill if the similar process units are lime kilns

$ER_{PUn}$ =PM emission rate from process unit No. i, kg/Mg (lb/ton) of black liquor solids fired

$PR_{PUn}$ =black liquor solids firing rate in Mg/d (ton/d) for process unit No. i, if process unit is a recovery furnace or SDT. The CaO production rate in Mg/d (ton/d) for process unit No. i, if process unit is a lime kiln.

$i$ =number of similar process units located in the chemical recovery system at the kraft or soda pulp mill.

(v) The overall PM emission rate for the chemical recovery system at the mill must be determined using Equation 6 of this section as follows:

$$ER_{tox} = ER_{RF_{tox}} + ER_{SDT_{tox}} + ER_{LK_{tox}} \quad (Eq. 6)$$

## Where:

$ER_{tox}$ =overall PM emission rate for the chemical recovery system at the mill, kg/Mg (lb/ton) of black liquor solids fired

$ER_{RF_{tox}}$ =PM emission rate from all kraft or soda recovery furnaces, calculated using Equation 2 or 5 in paragraphs (a)(2)(i) and (iv) of this section, where applicable, kg/Mg (lb/ton) of black liquor solids fired

$ER_{SDT_{tox}}$ =PM emission rate from all smelt dissolving tanks, calculated using Equation 3 or 5 in paragraphs (a)(2)(ii) and (iv) of this section, where applicable, kg/Mg (lb/ton) of black liquor solids fired

$ER_{LK_{tox}}$ =PM emission rate from all lime kilns, calculated using Equation 4 or 5 in paragraphs (a)(2)(iii) and (iv) of this section, where applicable, kg/Mg (lb/ton) of black liquor solids fired.

(3) For purposes of determining the volumetric gas flow rate used in this section for each kraft or soda recovery furnace, smelt dissolving tank, and lime kiln, Methods 1 through 4 in appendix A of 40 CFR part 60 must be used.

(4) Process data measured during the performance test must be used to determine the black liquor solids firing rate on a dry basis and the CaO production rate.

(b) The owner or operator seeking to determine compliance with § 63.862(a) must use the procedures in paragraphs (b)(1) through (4) of this section

(1) For purposes of determining the concentration of PM emitted from each kraft or soda recovery furnace, sulfite combustion unit, smelt dissolving tank or lime kiln, Method 5 or 29 in appendix A of 40 CFR part 60 must be

used, except that Method 17 in appendix A of 40 CFR part 60 may be used in lieu of Method 5 or Method 29, if a constant value of 0.009 g/dscm (0.004 gr/dscf) is added to the results of Method 17, and the stack temperature is no greater than 205°C (400°F). The sampling time and sample volume for each run must be at least 60 minutes and 0.90 dscm (31.8 dscf). Water must be used as the cleanup solvent instead of acetone in the sample recovery procedure.

(2) For sources complying with paragraph (a)(1) or (2) of § 63.862, the PM concentration must be corrected to the appropriate oxygen concentration using Equation 7 of this section as follows:



$$C_{\text{corr}} = C_{\text{meas}} \times (21 - X)/(21 - Y) \quad (\text{Eq. 7})$$

Where:

$C_{\text{corr}}$  = the measured concentration corrected for oxygen, g/dscm (gr/dscf).

$C_{\text{meas}}$  = the measured concentration,

uncorrected for oxygen, g/dscm (gr/dscf).

X = the corrected volumetric oxygen concentration (8 percent for kraft or soda recovery furnaces and sulfite combustion

units and 10 percent for kraft or soda lime kilns).

Y = the measured average volumetric oxygen concentration.

(3) Method 3A or 3B in appendix A of 40 CFR part 60 must be used to determine the oxygen concentration. The gas sample must be taken at the

same time and at the same traverse points as the particulate sample.

(4) For purposes of complying with paragraph (a)(1) or (2) of § 63.862, the volumetric gas flow rate must be corrected to the appropriate oxygen concentration using Equation 8 of this section as follows:

$$Q_{\text{corr}} = Q_{\text{meas}} \times (21 - X)/(21 - Y) \quad (\text{Eq. 8})$$

Where:

$Q_{\text{corr}}$  = the measured volumetric gas flow rate corrected for oxygen, dscm/min (dscf/min).

$Q_{\text{meas}}$  = the measured volumetric gas flow rate uncorrected for oxygen, dscm/min (dscf/min).

X = the corrected volumetric oxygen concentration (8 percent for kraft or soda recovery furnaces and sulfite combustion

units and 10 percent for kraft or soda lime kilns).

Y = the measured average volumetric oxygen concentration.

(c) The owner or operator seeking to determine compliance with the gaseous organic HAP standard in § 63.862(c)(1) without using an NDCE recovery furnace equipped with a dry ESP system

must use Method 308 in appendix A of this part. The sampling time and sample volume for each run must be at least 60 minutes and 0.014 dscm (0.50 dscf), respectively.

(1) The emission rate from any new NDCE recovery furnace must be determined using Equation 9 of this section as follows:

$$ER_{\text{NDCE}} = (MR_{\text{meas}})/(BLS) \quad (\text{Eq. 9})$$

Where

$ER_{\text{NDCE}}$  = methanol emission rate from the NDCE recovery furnace, kg/Mg (lb/ton) of black liquor solids fired

$MR_{\text{meas}}$  = measured methanol mass emission rate from the NDCE recovery furnace, kg/hr (lb/hr).

BLS = average black liquor solids firing rate of the NDCE recovery furnace, Mg/hr

(ton/hr); determined using process data measured during the performance test.

(2) The emission rate from any new DCE recovery furnace system must be determined using Equation 10 of this section as follows:

$$ER_{\text{DCE}} = [(MR_{\text{meas, RF}})/BLS_{\text{RF}}] + [(MR_{\text{meas, BLO}})/BLS_{\text{BLO}}] \quad (\text{Eq. 10})$$

Where

$ER_{\text{DCE}}$  = methanol emission rate from each DCE recovery furnace system, kg/Mg (lb/ton) of black liquor solids fired

$MR_{\text{meas, RF}}$  = average measured methanol mass emission rate from each DCE recovery furnace, kg/hr (lb/hr).

$MR_{\text{meas, BLO}}$  = average measured methanol mass emission rate from the black liquor oxidation system, kg/hr (lb/hr).

$BLS_{\text{RF}}$  = average black liquor solids firing rate for each DCE recovery furnace, Mg/hr (ton/hr), determined using process data measured during the performance test

$BLS_{\text{BLO}}$  = the average mass rate of black liquor solids treated in the black liquor oxidation system, Mg/hr (ton/hr), determined using process data measured during the performance test

(d) The owner or operator seeking to determine compliance with the gaseous

organic HAP standards in § 63.862(c)(2) for semichemical combustion units must use Method 25A in appendix A of 40 CFR part 60. The sampling time must be at least 60 minutes

(1) The emission rate from any new or existing semichemical combustion unit must be determined using Equation 11 of this section as follows.

$$ER_{\text{SCCU}} = (THC_{\text{meas}})/(BLS) \quad (\text{Eq. 11})$$

Where

$ER_{\text{SCCU}}$  = THC emission rate from each semichemical combustion unit, kg/Mg (lb/ton) of black liquor solids fired

$THC_{\text{meas}}$  = measured THC mass emission rate, kg/hr (lb/hr)

BLS = average black liquor solids firing rate, Mg/hr (ton/hr); determined using process data measured during the performance test.

(2) If the owner or operator of the semichemical combustion unit has selected the percentage reduction

standards for THC, under § 63.862(c)(2)(ii), the percentage reduction in THC emissions is computed using Equation 12 of this section as follows, provided that  $E_i$  and  $E_o$  are measured simultaneously:



$$(\%R_{\text{THC}}) = \left( \frac{E_i - E_o}{E_i} \right) \times 100 \quad (\text{Eq. 12})$$

Where:

$\%R_{\text{THC}}$  = percentage reduction of total hydrocarbons emissions achieved.

$E_i$  = measured THC mass emission rate at the THC control device inlet, kg/hr (lb/hr).

$E_o$  = measured THC mass emission rate at the THC control device outlet, kg/hr (lb/hr).

(e) The owner or operator seeking to comply with the continuous parameter monitoring requirements of § 63.864(b)(2) must continuously monitor each parameter and determine the arithmetic average value of each parameter during each 3-run performance test. Multiple 3-run performance tests may be conducted to establish a range of parameter values.

(f) The owner or operator of an affected source or process unit seeking to demonstrate compliance with the standards in § 63.862 using a control technique other than those listed in § 63.864(a)(1) through (3) must provide to the Administrator a monitoring plan that includes a description of the control device, test results verifying the performance of the control device, the appropriate operating parameters that will be monitored, and the frequency of measuring and recording to establish continuous compliance with the standards. The monitoring plan is subject to the Administrator's approval. The owner or operator of the affected source or process unit must install, calibrate, operate, and maintain the monitor(s) in accordance with the monitoring plan approved by the Administrator. The owner or operator must include in the information submitted to the Administrator proposed performance specifications and quality assurance procedures for the monitors. The Administrator may request further information and will approve acceptable test methods and procedures.

#### § 63.866 Recordkeeping requirements.

(a) *Startup, shutdown, and malfunction plan.* The owner or operator must develop and implement a written plan as described in § 63.6(e)(3) that contains specific procedures to be followed for operating the source and maintaining the source during periods of startup, shutdown, and malfunction, and a program of corrective action for malfunctioning process and control systems used to comply with the standards. In addition to the information required in § 63.6(e), the plan must include the requirements in paragraphs (a)(1) and (2) of this section.

(1) Procedures for responding to any process parameter level that is inconsistent with the level(s) established under § 63.864(b)(2), including the procedures in paragraphs (a)(1)(i) and (ii) of this section:

(i) Procedures to determine and record the cause of an operating parameter exceedance and the time the exceedance began and ended; and

(ii) Corrective actions to be taken in the event of an operating parameter exceedance, including procedures for recording the actions taken to correct the exceedance.

(2) The startup, shutdown, and malfunction plan also must include the schedules listed in paragraphs (a)(2)(i) and (ii) of this section:

(i) A maintenance schedule for each control technique that is consistent with, but not limited to, the manufacturer's instructions and recommendations for routine and long-term maintenance; and

(ii) An inspection schedule for each continuous monitoring system required under § 63.864 to ensure, at least once in each 24-hour period, that each continuous monitoring system is properly functioning.

(b) The owner or operator of an affected source or process unit must maintain records of any occurrence when corrective action is required under § 63.864(c)(1), and when a violation is noted under § 63.864(c)(2).

(c) In addition to the general records required by § 63.10(b)(2), the owner or operator must maintain records of the information in paragraphs (c)(1) through (6) of this section:

(1) Records of black liquor solids firing rates in units of megagrams/day or tons/day for all recovery furnaces and semichemical combustion units.

(2) Records of CaO production rates in units of megagrams/day or tons/day for all lime kilns;

(3) Records of parameter monitoring data required under § 63.864, including any period when the operating parameter levels were inconsistent with the levels established during the initial performance test, with a brief explanation of the cause of the deviation, the time the deviation occurred, the time corrective action was initiated and completed, and the corrective action taken;

(4) Records and documentation of supporting calculations for compliance determinations made under §§ 63.865(a) through (e);

(5) Records of monitoring parameter ranges established for each affected source or process unit;

(6) Records certifying that an NDCE recovery furnace equipped with a dry ESP system is used to comply with the gaseous organic HAP standard in § 63.862(c)(1).

#### § 63.867 Reporting requirements.

(a) *Notifications.* The owner or operator of any affected source or process unit must submit the applicable notifications from subpart A of this part, as specified in Table 1 of this subpart.

(b) *Additional reporting requirements for HAP metals standards.* (1) Any owner or operator of a group of process units in a chemical recovery system at a mill complying with the PM emissions limits in § 63.862(a)(1)(ii) must submit the PM emissions limits determined in § 63.865(a) for each affected kraft or soda recovery furnace, smelt dissolving tank, and lime kiln to the Administrator for approval. The emissions limits must be submitted as part of the notification of compliance status required under subpart A of this part.

(2) Any owner or operator of a group of process units in a chemical recovery system at a mill complying with the PM emissions limits in § 63.862(a)(1)(ii) must submit the calculations and supporting documentation used in § 63.865(a)(1) and (2) to the Administrator as part of the notification of compliance status required under subpart A of this part.

(3) After the Administrator has approved the emissions limits for any process unit, the owner or operator of a process unit must notify the Administrator before any of the actions in paragraphs (b)(3)(i) through (iv) of this section are taken:

(i) The air pollution control system for any process unit is modified or replaced;

(ii) Any kraft or soda recovery furnace, smelt dissolving tank, or lime kiln in a chemical recovery system at a kraft or soda pulp mill complying with the PM emissions limits in § 63.862(a)(1)(ii) is shut down for more than 60 consecutive days;

(iii) A continuous monitoring parameter or the value or range of values of a continuous monitoring parameter for any process unit is changed; or

(iv) The black liquor solids firing rate for any kraft or soda recovery furnace during any 24-hour averaging period is



increased by more than 10 percent above the level measured during the most recent performance test.

(4) An owner or operator of a group of process units in a chemical recovery system at a mill complying with the PM emissions limits in § 63.862(a)(1)(ii) and seeking to perform the actions in paragraph (b)(3)(i) or (ii) of this section must recalculate the overall PM emissions limit for the group of process units and resubmit the documentation required in paragraph (b)(2) of this section to the Administrator. All modified PM emissions limits are subject to approval by the Administrator.

(c) *Excess emissions report.* The owner or operator must report quarterly if measured parameters meet any of the conditions specified in paragraph (c)(1) or (2) of § 63.864. This report must contain the information specified in

§ 63.10(c) of this part as well as the number and duration of occurrences when the source met or exceeded the conditions in § 63.864(c)(1), and the number and duration of occurrences when the source met or exceeded the conditions in § 63.864(c)(2). Reporting excess emissions below the violation thresholds of § 63.864(c) does not constitute a violation of the applicable standard.

(1) When no exceedances of parameters have occurred, the owner or operator must submit a semiannual report stating that no excess emissions occurred during the reporting period.

(2) The owner or operator of an affected source or process unit subject to the requirements of this subpart and subpart S of this part may combine excess emissions and/or summary reports for the mill.

#### § 63.868 Delegation of authority.

(a) In delegating implementation and enforcement authority to a State under section 112(d) of the Clean Air Act, the authorities contained in paragraph (b) of this section must be retained by the Administrator and not transferred to a State.

(b) The authorities which will not be delegated to States are listed in paragraphs (b)(1) through (4) of this section:

(1) Approval of alternatives to standards in § 63.862 under § 63.6(g).

(2) Approval of major alternatives to test methods under § 63.7(e)(2)(ii) and (f) and as defined in § 63.90.

(3) Approval of major alternatives to monitoring under § 63.8(f) and as defined in § 63.90.

(4) Approval of major alternatives to recordkeeping and reporting under § 63.10(f) and as defined in § 63.90.

TABLE 1 TO SUBPART MM—GENERAL PROVISIONS APPLICABILITY TO SUBPART MM

General provisions reference	Summary of requirements	Applies to subpart MM	Explanation
63.1(a)(1) ....	General applicability of the General Provisions	Yes .....	Additional terms defined in § 63.861; when overlap between subparts A and MM of this part, subpart MM takes precedence
63.1(a)(2)–(14) . . .	General applicability of the General Provisions	Yes.	
63.1(b)(1) ....	Initial applicability determination .....	No .....	Subpart MM specifies the applicability in § 63.860.
63.1(b)(2) ..	Title V operating permit—see 40 CFR part 70	Yes .....	All major affected sources are required to obtain a title V permit.
63.1(b)(3) .	Record of the applicability determination .....	No .....	All affected sources are subject to subpart MM according to the applicability definition of subpart MM.
63.1(c)(1) ..	Applicability of subpart A of this part after a relevant standard has been set.	Yes .....	Subpart MM clarifies the applicability of each paragraph of subpart A of this part to sources subject to subpart MM.
63.1(c)(2) .	Title V permit requirement .....	Yes .....	All major affected sources are required to obtain a title V permit. There are no area sources in the pulp and paper mill source category.
63.1(c)(3)	[Reserved]	NA	
63.1(c)(4)	Requirements for existing source that obtains an extension of compliance	Yes	
63.1(c)(5)	Notification requirements for an area source that increases HAP emissions to major source levels	Yes	
63.1(d) .	[Reserved]	NA	
63.1(e) .	Applicability of permit program before a relevant standard has been set	Yes	
63.2 ..	Definitions .....	Yes .....	Additional terms defined in § 63.861; when overlap between subparts A and MM of this part occurs, subpart MM takes precedence
63.3 .....	Units and abbreviations .....	Yes	
63.4 .....	Prohibited activities and circumvention .....	Yes.	
63.5(a) .....	Construction and reconstruction—applicability	Yes	
63.5(b)(1) .....	Upon construction, relevant standards for new sources	Yes	
63.5(b)(2) .....	[Reserved]	NA.	
63.5(b)(3) .....	New construction/reconstruction .....	Yes	
63.5(b)(4) .....	Construction/reconstruction notification .....	Yes.	
63.5(b)(5) .....	Construction/reconstruction compliance .....	Yes.	
63.5(b)(6) .....	Equipment addition or process change .....	Yes.	
63.5(c) ..	[Reserved]	NA	
63.5(d) .....	Application for approval of construction/reconstruction.	Yes.	
63.5(e) .....	Construction/reconstruction approval .....	Yes.	



TABLE 1 TO SUBPART MM—GENERAL PROVISIONS APPLICABILITY TO SUBPART MM—Continued

General provisions reference	Summary of requirements	Applies to subpart MM	Explanation
63.5(f) .....	Construction/reconstruction approval based on prior State preconstruction review.	Yes.	
63.6(a)(1) .....	Compliance with standards and maintenance requirements—applicability.	Yes.	
63.6(a)(2) .....	Requirements for area source that increases emissions to become major.	Yes.	
63.6(b) .....	Compliance dates for new and reconstructed sources.	Yes.	
63.6(c) .....	Compliance dates for existing sources .....	Yes .....	Subpart MM specifically stipulates the compliance schedule for existing sources
63.6(d) .....	[Reserved] .....	NA.	
63.6(e) .....	Operation and maintenance requirements .....	Yes.	
63.6(f) .....	Compliance with nonopacity emissions standards.	Yes.	
63.6(g) .....	Compliance with alternative nonopacity emissions standards.	Yes.	
63.6(h) .....	Compliance with opacity and visible emissions (VE) standards.	Yes .....	Subpart MM does not contain any opacity or VE standards; however, § 63.864 specifies opacity monitoring requirements
63.6(i) .....	Extension of compliance with emissions standards.	Yes.	
63.6(j) .....	Exemption from compliance with emissions standards	Yes.	
63.7(a)(1) .....	Performance testing requirements—applicability	Yes .....	§ 63.864(a)(6) specifies the only exemption from performance testing allowed under subpart MM.
63.7(a)(2) .....	Performance test dates .....	Yes	
63.7(a)(3) .....	Performance test requests by Administrator under CAA section 114.	Yes.	
63.7(b)(1) .....	Notification of performance test .....	Yes	
63.7(b)(2) .....	Notification of delay in conducting a scheduled performance test.	Yes	
63.7(c) .....	Quality assurance program .....	Yes	
63.7(d) .....	Performance testing facilities .....	Yes	
63.7(e) .....	Conduct of performance tests .....	Yes	
63.7(f) .....	Use of an alternative test method .....	Yes	
63.7(g) .....	Data analysis, recordkeeping, and reporting ..	Yes	
63.7(h) .....	Waiver of performance tests .....	Yes .....	§ 63.864(a)(6) specifies the only exemption from performance testing allowed under subpart MM.
63.8(a) .....	Monitoring requirements—applicability .....	Yes .....	
63.8(b) .....	Conduct of monitoring .....	Yes .....	
63.8(c) .....	Operation and maintenance of CMS .....	Yes .....	
63.8(d) .....	Quality control program .....	Yes .....	See § 63.864.
63.8(e)(1) .....	Performance evaluation of CMS .....	Yes	See § 63.864.
63.8(e)(2) .....	Notification of performance evaluation .....	Yes.	See § 63.864.
63.8(e)(3) .....	Submission of site-specific performance evaluation test plan	Yes	See § 63.864.
63.8(e)(4) .....	Conduct of performance evaluation and performance evaluation dates.	Yes.	
63.8(e)(5) .....	Reporting performance evaluation results .....	Yes	
63.8(f) .....	Use of an alternative monitoring method .....	Yes	
63.8(g) .....	Reduction of monitoring data .....	Yes.	
63.9(a) .....	Notification requirements—applicability and general information.	Yes	
63.9(b) .....	Initial notifications .....	Yes	
63.9(c) .....	Request for extension of compliance .....	Yes.	
63.9(d) .....	Notification that source subject to special compliance requirements.	Yes	
63.9(e) .....	Notification of performance test .....	Yes.	
63.9(f) .....	Notification of opacity and VE observations .....	Yes .....	Subpart MM does not contain any opacity or VE standards; however, § 63.864 specifies opacity monitoring requirements.
63.9(g)(1) .....	Additional notification requirements for sources with CMS.	Yes.	
63.9(g)(2) .....	Notification of compliance with opacity emissions standard.	Yes .....	Subpart MM does not contain any opacity or VE emissions standards; however, § 63.864 specifies opacity monitoring requirements
63.9(g)(3) .....	Notification that criterion to continue use of alternative to relative accuracy testing has been exceeded	Yes.	



TABLE 1 TO SUBPART MM—GENERAL PROVISIONS APPLICABILITY TO SUBPART MM—Continued

General provisions reference	Summary of requirements	Applies to subpart MM	Explanation
63.9(h) .....	Notification of compliance status .....	Yes.	See § 63.866.
63.9(i) .....	Adjustment to time periods or postmark deadlines for submittal and review of required communications.	Yes.	
63.9(j) .....	Change in information already provided .....	Yes.	
63.10(a) .....	Recordkeeping requirements—applicability and general information.	Yes .....	
63.10(b)(1) .....	Records retention .....	Yes	Applicability requirements are given in § 63.860.
63.10(b)(2) .....	Information and documentation to support notifications and demonstrate compliance.	Yes	
63.10(b)(3) .....	Records retention for sources not subject to relevant standard.	Yes .....	
63.10(c) .....	Additional recordkeeping requirements for sources with CMS	Yes.	
63.10(d)(1) .....	General reporting requirements .....	Yes.	Subpart MM does not include any opacity or VE standards; however, § 63.864 specifies opacity monitoring requirements.
63.10(d)(2) .....	Reporting results of performance tests .....	Yes.	
63.10(d)(3) .....	Reporting results of opacity or VE observations	Yes .....	
63.10(d)(4) .....	Progress reports .....	Yes.	
63.10(d)(5) .....	Periodic and immediate startup, shutdown, and malfunction reports	Yes	The use of flares to meet the standards in subpart MM is not anticipated.
63.10(e) .....	Additional reporting requirements for sources with CMS	Yes	
63.10(f) .....	Waiver of recordkeeping and reporting requirements	Yes	
63.11 .....	Control device requirements for flares .....	No .....	
63.12 .....	State authority and delegations .....	Yes	
63.13 .....	Addresses of State air pollution control agencies and EPA Regional Offices.	Yes	
63.14 .....	Incorporations by reference .....	Yes	
63.15 .....	Availability of information and confidentiality .....	Yes.	

[FR Doc. 01-65 Filed 1-11-01; 8:45 am.]

BILLING CODE 6560-50-F



**Technical Corrections to Final NESHAP**  
**(July 19, 2001)**







requirements, Sulfur oxides, Volatile organic compounds.

Authority: 42 U.S.C. 7401 *et seq.*

Dated: May 25, 2001

Laura Yoshii,

Acting Regional Administrator, Region IX.

Part 52, chapter I, title 40 of the Code of Federal Regulations is amended as follows.

#### PART 52—[AMENDED]

1. The authority citation for part 52 continues to read as follows:

Authority: 42 U.S.C. 7401 *et seq.*

#### Subpart F—California

2. Section 52.220 is amended by adding paragraphs (c)(260)(i)(B) and (c)(266)(i)(B)(3) to read as follows

##### § 52.220 Identification of plan.

(c) \* \* \*  
(260) \* \* \*  
(i) \* \* \*

(B) San Joaquin Valley Unified Air Pollution Control District

(1) Rule 2020 adopted on September 17, 1998.

(266) \* \* \*  
(i) \* \* \*  
(B) \* \* \*

(3) Rule 2201 adopted on August 20, 1998

[FR Doc 01-17038 Filed 7-18-01; 8:45 am]

BILLING CODE 8360-50-F

#### ENVIRONMENTAL PROTECTION AGENCY

#### 40 CFR Part 63

[AD-FRL-6997-8]

RIN 2060-AJ34

#### National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule; technical corrections.

**SUMMARY:** Under the Clean Air Act (CAA), EPA promulgated the national emission standards for hazardous air pollutants (NESHAP) for chemical recovery combustion sources at kraft, soda, sulfite, and stand-alone semichemical pulp mills on January 12, 2001. The promulgated rule requires new and existing major sources to control emissions of hazardous air pollutants (HAP) to the level reflecting application of the maximum achievable control technology. The technical corrections in this action will not change the standards established by the rule or the level of health protection it provides.

Section 553 of the Administrative Procedure Act, 5 U.S.C. 553(b)(B), provides that, when an agency for good cause finds that notice and public procedure are impracticable, unnecessary, or contrary to the public interest, the agency may issue a rule without providing notice and an opportunity for public comment. We have determined that there is good cause for making today's rule final without prior proposal and opportunity for comment because the changes to the rule are minor technical corrections consisting largely of correcting typographical errors and other misprints and correcting minor errors in the rule's effective dates, are noncontroversial, and do not substantively change the requirements of the rule. In addition, there has already been full opportunity

to comment on all of the provisions in this Notice. Thus, notice and public procedure are unnecessary. We find that this constitutes good cause under 5 U.S.C. 553(b)(B) (see also the final sentence of section 307(d)(1) of the Clean Air Act, 42 U.S.C. section 7607(d)(1), indicating that the good cause provisions of the Administrative Procedure Act continue to apply to this type of rulemaking under the Clean Air Act).

Section 553(d)(3) allows an agency, upon a finding of good cause, to make a rule effective immediately. Because today's changes do not substantively change the requirements of the rule, we find good cause to make these technical corrections effective immediately.

**EFFECTIVE DATE:** July 19, 2001.

**ADDRESSES:** Docket No. A-94-67 contains the supporting information for the original NESHAP for chemical recovery combustion sources at kraft, soda, sulfite, and stand-alone semichemical mills and this action. The docket is located at the U.S. EPA in room M-1500, Waterside Mall (ground floor), 401 M Street SW., Washington, DC 20460, and may be inspected from 8 a.m. to 5:30 p.m., Monday through Friday, excluding legal holidays. A reasonable fee may be charged for copying.

**FOR FURTHER INFORMATION CONTACT:** Mr. Jeff Telander, Minerals and Inorganic Chemicals Group, Emission Standards Division (MD-13), Office of Air Quality Planning and Standards, U.S. EPA, Research Triangle Park, North Carolina 27711, telephone number (919) 541-5427, facsimile number (919) 541-5600, electronic mail address telander.jeff@epa.gov.

#### SUPPLEMENTARY INFORMATION:

**Regulated Entities.** Categories and entities potentially regulated by this action are those kraft, soda, sulfite, and stand-alone semichemical pulp mills with chemical recovery processes that involve the combustion of spent pulping liquor. Categories and entities potentially regulated by this action include:

Category	SIC code	NAICS code	Examples of regulated entities
Industry	2611, 2621, 2631	32211, 32212, 32213	Kraft, soda, sulfite, and stand-alone semichemical pulp mills

This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by this action. This table lists the types of entities that EPA is now aware could potentially be regulated by this action.

To determine whether your facility is regulated by this action, you should carefully examine the applicability criteria in § 63.860 of the final rule. If you have questions regarding the applicability of this action to a particular entity, consult the person

listed in the preceding **FOR FURTHER INFORMATION CONTACT** section of this document.

**World Wide Web (WWW).** In addition to being available in the docket, an electronic copy of today's document will also be available on the WWW



through the Technology Transfer Network (TTN). Following the signature, a copy of this action will be posted on the TTN's policy and guidance page for newly proposed or final rules at <http://www.epa.gov/ttn/oarpg/t3pfpr.html>. The TTN provides information and technology exchange in various areas of air pollution control. If

more information regarding the TTN is needed, call the TTN HELP line at (919) 541-5384.

#### I. Background

The EPA, under 40 CFR part 63, subpart MM, promulgated the NESHAP for chemical recovery combustion sources at kraft, soda, sulfite, and stand-alone semichemical pulp mills on

January 12, 2001 (66 FR 3180). The final rule includes emissions limits, as well as monitoring, performance testing, recordkeeping, and reporting requirements.

#### II. Summary of Corrections

Today's changes are described below for the convenience of the reader.

Citation	Change
§ 63.863(a)	Change the compliance date for existing affected sources to March 13, 2004.
§ 63.863(b)	Change the startup date, after which new affected sources must comply immediately upon startup, to March 13, 2001.
§ 63.865(a)	Reduce the number of referenced paragraphs from "(a)(1) through (4)" to "(a)(1) and (2)" to reflect the elimination of paragraphs (a)(3) and (4).
§ 63.865(a)(3), (a)(4), (b)(5), and (b)(6)	Remove paragraphs (a)(3) and (4) from § 63.865(a) and revise and redesignate them as new paragraphs § 63.865(b)(5) and (6) so that these requirements will no longer be limited under § 63.865(a) to existing sources using the PM bubble compliance alternative.
§ 63.865(b)	Change the reference from "§ 63.862(a)" to "§ 63.862(a) or (b)" so as to include the new source standards under § 63.862(b). Also, increase the number of referenced paragraphs from "(b)(1) through (4)" to "(b)(1) through (6)" to reflect the addition of paragraphs (b)(5) and (6).
§ 63.865(b)(2)	Change the reference from "paragraph (a)(1) or (2) of § 63.862" to "paragraph (a) or (b) of § 63.862" so as to include the new source standards under § 63.862(b).
§ 63.865(b)(4)	Revise Equation 8 so that the numerator and denominator of the oxygen correction factor are reversed to yield: $Q_{corr} = Q_{meas} \times (21 - Y)/(21 \times X)$ . Also, reorder the definition of terms for Equation 8 to place "Y" before "X."
§ 63.865(c)	Add a reference to Methods 1 through 4 to the reference to Method 308 because those four test methods are also needed. Because Methods 1 through 4 are also being referenced, clarify that the sampling time and sample volume apply to each Method 308 run.
§ 63.865(d)	Add a reference to Methods 1 through 4 to the reference to Method 25A because those four test methods are also needed. Because Methods 1 through 4 are also being referenced, clarify that the sampling time and sample volume apply to each Method 25A run.

#### III. Administrative Requirements

Under Executive Order 12866 (58 FR 51736, October 4, 1993), this action is not a "significant regulatory action" and is, therefore, not subject to review by the Office of Management and Budget (OMB). Because EPA has made a "good cause" finding that this action is not subject to notice and comment requirements under the Administrative Procedure Act or any other statute, it is not subject to the regulatory flexibility provisions of the Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*), or to sections 202 and 205 of the Unfunded Mandates Reform Act of 1995 (UMRA) (Public Law 104-4). In addition, this action does not significantly or uniquely affect small governments or impose a significant intergovernmental mandate, as described in sections 203 and 204 of the UMRA. This action also does not significantly or uniquely affect the communities of tribal governments, as specified by Executive Order 13175 (63 FR 67249, November 6, 2000). This action does not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as

specified in Executive Order 13132 (64 FR 43255, August 10, 1999). This action also is not subject to Executive Order 13045 (62 FR 19885, April 23, 1997) because it is not economically significant.

Section 12(d) of the National Technology Transfer and Advancement Act (NTTAA) of 1995 (Pub. L. 104-113; 15 U.S.C. 272 note) directs EPA to use voluntary consensus standards in its regulatory and procurement activities unless to do so would be inconsistent with applicable law or otherwise impractical. The EPA is not proposing/adopting any voluntary consensus standards in this action.

This technical correction action does not involve special consideration of environmental justice related issues as required by Executive Order 12898 (59 FR 7629, February 16, 1994). In issuing these technical corrections, EPA has taken the necessary steps to eliminate drafting errors and ambiguity, minimize potential litigation, and provide a clear legal standard for affected conduct, as required by section 3 of Executive Order 12988 (61 FR 4729, February 7, 1996). The EPA has complied with Executive Order 12630 (53 FR 8859, March 15, 1988) by examining the takings implications of these technical

corrections in accordance with the "Attorney General's Supplemental Guidelines for the Evaluation of Risk and Avoidance of Unanticipated Takings" issued under the Executive Order. These technical corrections do not impose an information collection burden under the provisions of the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 *et seq.*). The EPA's compliance with these statutes and Executive Orders for the underlying rule is discussed in the NESHAP for chemical recovery combustion source at kraft, soda, sulfite, and stand-alone semichemical pulp mills.

The Congressional Review Act (5 U.S.C. 801 *et seq.*), as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that, before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. Section 808 allows the issuing agency to make a rule effective sooner than otherwise provided by the Congressional Review Act if the agency makes a good cause finding that notice and public procedure is impracticable, unnecessary, or contrary to the public interest. This



determination must be supported by a brief statement (5 U.S.C. 808(2)). As stated previously, EPA has made such a good cause finding, including the reasons therefor, and established an effective date of July 19, 2001. The EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the Federal Register. This action is not a "major rule" as defined by 5 U.S.C. 804(2).

#### List of Subjects in 40 CFR Part 63

Environmental protection, Air pollution control, Hazardous substances, Pulp and paper mills.

Dated: June 8, 2001

Robert D. Brenner,

Acting Assistant Administrator for Air and Radiation.

For the reasons set out in the preamble, title 40, chapter I, part 63 of the Code of Federal Regulations is amended as follows:

#### PART 63—[AMENDED]

1. The authority citation for part 63 continues to read as follows:

Authority: 42 U.S.C. 7401 *et seq.*

#### Subpart MM—National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semicheical Pulp Mills

2. Section 63.863 is amended by revising paragraph (a) and (b) to read as follows:

##### § 63.863 Compliance dates

(a) The owner or operator of an existing affected source or process unit must comply with the requirements in this subpart no later than March 13, 2004.

(b) The owner or operator of a new affected source that has an initial startup date after March 13, 2001 must comply with the requirements in this subpart immediately upon startup of the affected source, except as specified in § 63.6(b).

3. Section 63.865 is amended by:
- Revising paragraph (a) introductory text;
  - Removing paragraphs (a)(3) and (4);
  - Revising paragraphs (b) introductory text, (b)(2), and (b)(4);
  - Adding paragraphs (b)(5) and (6);
  - Revising paragraph (c) introductory text; and
  - Revising paragraph (d) introductory text

The revisions and additions read as follows:

##### § 63.865 Performance test requirements and test methods.

(a) The owner or operator of a process unit seeking to comply with a PM emission limit under § 63.862(a)(1)(ii)(A) must use the procedures in paragraphs (a)(1) and (2) of this section:

(b) The owner or operator seeking to determine compliance with § 63.862(a) or (b) must use the procedures in paragraphs (b)(1) through (6) of this section.

(2) For sources complying with paragraph (a) or (b) of § 63.862, the PM concentration must be corrected to the appropriate oxygen concentration using Equation 7 of this section as follows:

$$C_{\text{corr}} = C_{\text{meas}} \times (21 - X)/(21 - Y) \quad (\text{Eq. 7})$$

Where:

$C_{\text{corr}}$  = the measured concentration corrected for oxygen, g/dscm (gr/dscf).

$C_{\text{meas}}$  = the measured concentration uncorrected for oxygen, g/dscm (gr/dscf).

X = the corrected volumetric oxygen concentration (8 percent for kraft or soda recovery furnaces and sulfite combustion units and 10 percent for kraft or soda lime kilns)

Y = the measured average volumetric oxygen concentration

(4) For purposes of complying with of § 63.862(a)(1)(ii)(A), the volumetric gas flow rate must be corrected to the appropriate oxygen concentration using Equation 8 of this section as follows:

$$Q_{\text{corr}} = Q_{\text{meas}} \times (21 - Y)/(21 - X) \quad (\text{Eq. 8})$$

Where:

$Q_{\text{corr}}$  = the measured volumetric gas flow rate corrected for oxygen, dscm/min (dscf/min)

$Q_{\text{meas}}$  = the measured volumetric gas flow rate uncorrected for oxygen, dscm/min (dscf/min).

Y = the measured average volumetric oxygen concentration

X = the corrected volumetric oxygen concentration (8 percent for kraft or soda recovery furnaces and 10 percent for kraft or soda lime kilns).

(5) For purposes of selecting sampling port location and number of traverse points, determining stack gas velocity and volumetric flow rate, conducting gas analysis, and determining moisture content of stack gas, Methods 1 through 4 in appendix A of 40 CFR part 60 must be used.

(6) Process data measured during the performance test must be used to determine the black liquor solids firing

rate on a dry basis and the CaO production rate.

(c) The owner or operator seeking to determine compliance with the gaseous organic HAP standard in § 63.862(c)(1) without using an NDCE recovery furnace equipped with a dry ESP system must use Method 308 in appendix A of this part, as well as Methods 1 through 4 in appendix A of part 60 of this chapter. The sampling time and sample volume for each Method 308 run must be at least 60 minutes and 0.014 dscm (0.50 dscf), respectively.

(d) The owner or operator seeking to determine compliance with the gaseous organic HAP standards in § 63.862(c)(2) for semichemical combustion units must use Method 25A, as well as Methods 1 through 4, in appendix A of part 60 of this chapter. The sampling time for each Method 25A run must be at least 60 minutes.

[FR Doc. 01-17559 Filed 7-18-01; 8:45 am]  
BILLING CODE 6560-50-P

#### ENVIRONMENTAL PROTECTION AGENCY

##### 40 CFR Part 180

[OPP-301146 FRL-6793-8]

RIN 2070-AB78

#### Extension of Tolerances for Emergency Exemptions (Multiple Chemicals)

AGENCY: Environmental Protection Agency (EPA)

ACTION: Final rule

**SUMMARY:** This regulation extends time-limited tolerances for the pesticides listed in Unit II. of the **SUPPLEMENTARY INFORMATION.** These actions are in response to EPA's granting of emergency exemptions under section 18 of the Federal Insecticide, Fungicide, and Rodenticide Act authorizing use of these pesticides. Section 408(l)(6) of the Federal Food, Drug, and Cosmetic Act (FFDCA) requires EPA to establish a time-limited tolerance or exemption from the requirement for a tolerance for pesticide chemical residues in food that will result from the use of a pesticide under an emergency exemption granted by EPA.

**DATES:** This regulation is effective July 19, 2001. Objections and requests for hearings, identified by docket control number OPP-301146, must be received by EPA on or before August 20, 2001.

**ADDRESSES:** Written objections and hearing requests may be submitted by



## **Appendix B**

### **List of U.S. Pulp and Paper Mills Subject to the NESHAP**



**Table B-1. Pulp and Paper Mills**

<b>No.</b>	<b>Company name</b>	<b>City</b>	<b>State</b>	<b>Pulping process</b>
1	Alabama Pine Pulp Co., Inc.	Claiborne (Perdue Hill)	AL	Kraft
2	Alabama River Pulp Co., Inc.	Claiborne (Perdue Hill)	AL	Kraft
3	Boise Cascade Corp.	Jackson	AL	Kraft
4	International Paper Co.	Courtland	AL	Kraft
5	Georgia-Pacific Corp.	Pennington	AL	Kraft
6	Gulf States Paper Corp.	Demopolis	AL	Kraft
7	International Paper Co.	Mobile	AL	Kraft
8	International Paper Co.	Prattville	AL	Kraft
9	International Paper Co.	Selma	AL	Kraft
10	Weyerhaeuser Paper Co.	Montgomery (Pine Hill)	AL	Kraft (semichemical collocated)
11	Mead Corp	Phenix City	AL	Kraft
12	Mead Corp	Stevenson	AL	Semichemical
13	Smurfit-Stone Container Corp.	Brewton	AL	Kraft
14	Gaylord Container Corp.	Pine Bluff	AR	Kraft
15	Georgia-Pacific Corp	Ashdown	AR	Kraft
16	Georgia-Pacific Corp	Crossett	AR	Kraft
17	Green Bay Packaging Inc.	Morrilton	AR	Kraft
18	International Paper Co	Camden	AR	Kraft
19	International Paper Co	Pine Bluff	AR	Kraft
20	Potlatch Corp.	McGehee	AR	Kraft
21	Louisiana-Pacific Corp	Samoa	CA	Kraft
22	Buckeye Technologies Inc.	Perry	FL	Kraft
23	International Paper Co.	Cantonment (Pensacola)	FL	Kraft
24	Georgia-Pacific Corp.	Palatka	FL	Kraft
25	Rayonier, Inc.	Fernandina Beach	FL	Sulfite
26	Smurfit-Stone Container Corp.	Fernandina Beach	FL	Kraft
27	Smurfit-Stone Container Corp.	Panama City	FL	Kraft
28	Georgia-Pacific Corp.	Brunswick	GA	Kraft



**Table B-1. (Continued)**

<b>No.</b>	<b>Company name</b>	<b>City</b>	<b>State</b>	<b>Pulping process</b>
29	Georgia-Pacific Corp.	Cedar Springs	GA	Kraft (semichemical collocated)
30	Gilman Paper Co.	St. Mary's	GA	Kraft
31	International Paper Co.	Augusta	GA	Kraft
32	Interstate Paper Corp.	Riceboro	GA	Kraft
33	International Paper Co.	Savannah	GA	Kraft
34	Rayonier, Inc.	Jesup	GA	Kraft
35	Riverwood International Corp.	Macon	GA	Kraft
36	Temple-Inland, Inc.	Rome	GA	Kraft
37	Tenneco Inc.	Valdosta	GA	Kraft
38	Weyerhaeuser Paper Co.	Oglethorpe	GA	Kraft
39	Willamette Industries Inc	Port Wentworth	GA	Kraft
40	Four M Corp.	Fort Madison	IA	Semichemical
41	Potlatch Corp	Lewiston	ID	Kraft
42	International Paper Co.	Terre Haute	IN	Semichemical
43	Westvaco Corp.	Wickliffe	KY	Kraft
44	Willamette Industries Inc <sup>a</sup>	Hawesville	KY	Kraft (semichemical collocated)
45	Boise Cascade Corp	Deridder	LA	Kraft
46	Crown Vantage Inc	St. Francisville	LA	Kraft
47	Gaylord Container Corp	Bogalusa	LA	Kraft
48	International Paper Co.	Bastrop	LA	Kraft
49	International Paper Co.	Mansfield	LA	Kraft (semichemical collocated)
50	International Paper Co.	Pineville	LA	Kraft
51	Riverwood International Corp.	West Monroe	LA	Kraft (semichemical collocated)
52	Smurfit-Stone Container Corp.	Hodge	LA	Kraft (semichemical collocated)
53	Willamette Industries Inc.	Campti	LA	Kraft



**Table B-1. (Continued)**

<b>No.</b>	<b>Company name</b>	<b>City</b>	<b>State</b>	<b>Pulping process</b>
54	Westvaco Corp.	Luke	MD	Kraft
55	Bowater Inc.	Millinocket	ME	Sulfite
56	Eastern Paper Co., Inc.	Lincoln	ME	Kraft
57	Georgia-Pacific Corp.	Old Town	ME	Kraft
58	Georgia-Pacific Corp.	Woodland	ME	Kraft
59	International Paper Co.	Jay	ME	Kraft
60	Mead Corp.	Rumford	ME	Kraft
61	Sappi Fine Paper North America	Hinckley (Skowhegan)	ME	Kraft
62	International Paper Co.	Quinnesec (Norway)	MI	Kraft
63	Mead Corp.	Escanaba	MI	Kraft
64	Menasha Corp.	Otsego	MI	Semichemical
65	Sappi Fine Paper North America	Muskegon	MI	Kraft
66	Smurfit-Stone Container Corp.	Ontonagon	MI	Semichemical
67	Tenneco Inc.	Filer City	MI	Semichemical
68	Boise Cascade Corp.	International Falls	MN	Kraft
69	Potlatch Corp.	Cloquet	MN	Kraft
70	Georgia-Pacific Corp.	Monticello	MS	Kraft
71	Georgia-Pacific Corp.	New Augusta	MS	Kraft
72	International Paper Co.	Moss Point	MS	Kraft
73	International Paper Co.	Natchez	MS	Kraft
74	International Paper Co.	Redwood (Vicksburg)	MS	Kraft
75	Weyerhaeuser Paper Co.	Columbus	MS	Kraft
76	Smurfit-Stone Container Corp.	Missoula	MT	Kraft
77	International Paper Co.	Canton	NC	Kraft
78	International Paper Co.	Roanoke Rapids	NC	Kraft
79	International Paper Co.	Riegelwood	NC	Kraft
80	Weyerhaeuser Paper Co.	New Bern	NC	Kraft



**Table B-1. (Continued)**

<b>No.</b>	<b>Company name</b>	<b>City</b>	<b>State</b>	<b>Pulping process</b>
81	Weyerhaeuser Paper Co.	Plymouth	NC	Kraft (semichemical collocated)
82	Crown Vantage Inc.	Berlin	NH	Kraft
83	Wausau-Mosinee Paper Corp.	Groveton	NH	Semichemical
84	Finch, Pruyn, & Co., Inc.	Glens Falls	NY	Sulfite
85	International Paper Co.	Ticonderoga	NY	Kraft
86	Mead Corp.	Chillicothe	OH	Kraft
87	Smurfit-Stone Container Corp.	Coshocton	OH	Semichemical
88	Weyerhaeuser Paper Co.	Valliant	OK	Kraft (semichemical collocated)
89	Boise Cascade Corp.	St. Helens	OR	Kraft
90	Georgia-Pacific Corp.	Clatskanie	OR	Kraft
91	Georgia-Pacific Corp.	Toledo	OR	Kraft (semichemical collocated)
92	Pope & Talbot, Inc.	Halsey	OR	Kraft
93	Weyerhaeuser Paper Co.	Springfield	OR	Kraft
94	Appleton Papers Inc.	Roaring Spring	PA	Kraft
95	International Paper Co.	Erie	PA	Soda
96	P.H. Glatfelter Co.	Spring Grove	PA	Kraft
97	Willamette Industries Inc.	Johnsonburg	PA	Kraft
98	Bowater Inc.	Catawba	SC	Kraft
99	International Paper Co.	Eastover	SC	Kraft
100	International Paper Co.	Georgetown	SC	Kraft
101	Smurfit-Stone Container Corp.	Florence	SC	Kraft
102	Sonoco Products Co.	Hartsville	SC	Semichemical
103	Westvaco Corp.	N. Charleston	SC	Kraft
104	Willamette Industries Inc.	Bennettsville	SC	Kraft
105	Bowater Inc.	Calhoun	TN	Kraft
106	Tenneco Inc.	Counce	TN	Kraft



**Table B-1. (Continued)**

<b>No.</b>	<b>Company name</b>	<b>City</b>	<b>State</b>	<b>Pulping process</b>
107	Willamette Industries Inc.	Kingsport	TN	Soda
108	Donohue Inc.	Lufkin	TX	Kraft
109	Temple-Inland, Inc.	Evadale (Silsbee)	TX	Kraft
110	International Paper Co.	Texarkana (Domino)	TX	Kraft
111	Temple-Inland, Inc.	Orange	TX	Kraft
112	Georgia-Pacific Corp.	Big Island	VA	Semichemical
113	Greif Brothers Corp.	Amherst (Riverville)	VA	Semichemical
114	International Paper Co.	Franklin	VA	Kraft
115	St. Laurent Paperboard Inc.	West Point	VA	Kraft
116	Smurfit-Stone Container Corp.	Hopewell	VA	Kraft
117	Westvaco Corp.	Covington	VA	Kraft
118	Boise Cascade Corp.	Walla Walla	WA	Kraft (semichemical collocated)
119	Georgia-Pacific Corp.	Camas	WA	Kraft
120	Georgia-Pacific Corp.	Camas	WA	Sulfite
121	Kimberly-Clark Corp.	Everett	WA	Sulfite
122	Longview Fibre Co.	Longview	WA	Kraft (semichemical collocated)
123	Port Townsend Paper Corp.	Port Townsend	WA	Kraft
124	Simpson Paper Co.	Tacoma	WA	Kraft
125	Weyerhaeuser Paper Co.	Cosmopolis	WA	Sulfite
126	Weyerhaeuser Paper Co.	Longview	WA	Kraft (semichemical collocated)
127	Consolidated Papers, Inc.	Wisconsin Rapids	WI	Kraft
128	Georgia-Pacific Corp.	Nekoosa	WI	Kraft
129	Georgia-Pacific Corp.	Port Edwards	WI	Sulfite
130	Tenneco Inc.	Tomahawk	WI	Semichemical
131	International Paper Co.	Kaukauna	WI	Kraft
132	Wausau-Mosinee Paper Corp.	Brokaw	WI	Sulfite



**Table B-1. (Continued)**

No.	Company name	City	State	Pulping process
133	Wausau-Mosinee Paper Corp.	Mosinee	WI	Kraft
<sup>a</sup> This mill has both kraft and semichemical operations. The mill is counted as a single facility because there is one chemical recovery operation for both pulping operations.				
<sup>b</sup> This mill has both kraft and sulfite operations. The mill is counted as two facilities because there is a separate chemical recovery operation for each pulping operation.				



## **Appendix C**

### **List of EPA Regional Office Contacts**



**Table C-1. EPA Regional Office Contacts**

<b>Region</b>	<b>States</b>	<b>Address</b>	<b>Phone/Fax/Website</b>
Region I	Connecticut Maine Massachusetts New Hampshire Rhode Island Vermont	Director, Air Compliance Program 1 Congress Street Suite 1100 (SEA) Boston, MA 02114-2023	Phone: (617) 918-1650 Fax: (617) 918-1505 Website: <a href="http://www.epa.gov/region1">http://www.epa.gov/region1</a>
Region II	New Jersey New York Puerto Rico Virgin Islands	Air Compliance Branch 290 Broadway New York, NY 10007	Phone: (212) 637-4080 Fax: (212) 637-3998 Website: <a href="http://www.epa.gov/region2">http://www.epa.gov/region2</a>
Region III	Delaware District of Columbia Maryland Pennsylvania Virginia West Virginia	Chief, Air Enforcement Branch (3AP12) 1650 Arch Street Philadelphia, PA 19103-2029	Phone: (215) 814-3438 Fax: (215) 814-2134 Website: <a href="http://www.epa.gov/region3">http://www.epa.gov/region3</a>
Region IV	Alabama Florida Georgia Kentucky Mississippi North Carolina South Carolina Tennessee	Air and Radiation Technology Branch Atlanta Federal Center 61 Forsyth Street Atlanta, Georgia 30303-3104	Phone: (404) 562-9105 Fax: (404) 562-9095 Website: <a href="http://www.epa.gov/region4">http://www.epa.gov/region4</a>
Region V	Illinois Indiana Michigan Minnesota Ohio Wisconsin	Air Enforcement and Compliance Assurance Branch (AE-17J) 77 West Jackson Boulevard Chicago, IL 60604-3590	Phone: (312) 353-2088 Fax: (312) 353-8289 Website: <a href="http://www.epa.gov/region5">http://www.epa.gov/region5</a>
Region VI	Arkansas Louisiana New Mexico Oklahoma Texas	Chief, Toxics Enforcement Section (6EN-AT) 1445 Ross Avenue Dallas, TX 75202-2733	Phone: (214) 665-7224 Fax: (214) 665-7446 Website: <a href="http://www.epa.gov/region6">http://www.epa.gov/region6</a>
Region VII	Iowa Kansas Missouri Nebraska	901 N. 5th Street Kansas City, KS 66101	Phone: (913) 551-7020 Fax: (913) 551-7844 Website: <a href="http://www.epa.gov/region7">http://www.epa.gov/region7</a>



**Table C-1. (Continued)**

<b>Region</b>	<b>States</b>	<b>Address</b>	<b>Phone/Fax/Website</b>
Region VIII	Colorado Montana North Dakota South Dakota Utah Wyoming	Air Enforcement Program (8ENF-T) 999 18th Street Suite 500 Denver, CO 80202	Phone: (303) 312-6312 Fax: (303) 312-6409 Website: <a href="http://www.epa.gov/region8">http://www.epa.gov/region8</a>
Region IX	American Samoa Arizona California Guam Hawaii Nevada	Air Division 75 Hawthorne Street San Francisco, CA 94105	Phone: (415) 744-1219 Fax: (415) 744-1076 Website: <a href="http://www.epa.gov/region9">http://www.epa.gov/region9</a>
Region X	Alaska Idaho Oregon Washington	Office of Air Quality (OAQ-107) 1200 Sixth Avenue Seattle, WA 98101	Phone: (206) 553-4273 Fax: (206) 553-0110 Website: <a href="http://www.epa.gov/region10">http://www.epa.gov/region10</a>



## **Appendix D**

### **Responses to Commonly Asked Questions**



1. **If my recovery furnace is a cross-recovery furnace (i.e., it combusts spent liquor from both kraft and semichemical pulping processes), which standards apply to my mill?**

Cross-recovery furnaces are considered kraft recovery furnaces for the purposes of this NESHAP. Therefore, your recovery furnace and associated SDT must comply with the applicable requirements for kraft recovery furnaces and SDTs.

2. **Does the NESHAP for Pulp and Paper Combustion Sources supersede the NSPS for Kraft Pulp Mills?**

No, not in all cases. See **Table 13** of this document for a comparison of the NSPS and NESHAP requirements for kraft pulp mills. The NSPS limits emissions of PM and TRS from new sources at kraft pulp mills. The NSPS also includes an opacity limit for recovery furnaces. The NESHAP limits emissions of HAP metals (using PM as a surrogate) from both new and existing sources at kraft pulp mills and limits emissions of total gaseous organic HAP (measured as methanol) for new recovery furnaces at kraft pulp mills. The NESHAP does not include opacity limits. However, opacity monitoring is required for recovery furnaces and lime kilns equipped with ESPs. Therefore, PM is the only pollutant required to be controlled by both rules. For existing sources, the NESHAP PM limits are the same as the NSPS PM limits for recovery furnaces and SDTs and are more stringent than the NSPS PM limits for lime kilns.

However, under the NESHAP, existing sources have the option of bubbling (averaging) the PM emissions from combustion sources at the mill, such that some sources will over-control PM emissions while other sources may under-control PM emissions. In these cases, the process units that are under-controlled may have calculated emission limits that are less stringent than the established MACT PM limit and NSPS PM limit for that source. These less-stringent limits are permissible only if the process units are not already subject to the NSPS and the limits do not exceed any State-imposed PM emission limit for that process unit. Example Mill B in **Appendix G** shows how a mill with both NSPS and PSD sources can use the PM bubble compliance alternative.

3. **If I have already have performance test data from a previous compliance test (e.g., as required as part of my State permit), can I use the test report and the associated operating parameter data to set the compliant operating parameter levels for my combustion source?**

Previous or "historical" performance test data can be used to set the operating parameter values for continuous monitoring purposes only if: (1) the performance test data show compliance with the emission limits, (2) no changes have been made to the process equipment, chemicals, or control devices since the date of the test, (3) the operating parameter values were recorded during the period of testing, and (4) the performance test data used to establish the operating parameter values were obtained using the test methods required in the NESHAP.



**4. Are there any restrictions on the use of the PM bubble compliance alternative for meeting the PM standards for kraft and soda pulp mills?**

Yes. Only existing sources (i.e., those process units that were in operation on or before April 15, 1998) may use the PM bubble compliance alternative. New sources must comply with the emission limits for new sources. Also, stand-by units, defined as process units that operate for less than 6,300 hours per year, cannot be included in a mill's PM bubble. In addition, as explained in the response to question 2, above, existing process units already subject to the NSPS PM limits must continue to meet those limits.

**5. If I make changes to the chemical recovery system after the PM bubble limits have been approved by the permitting authority, must I recalculate the bubble and the associated emission limits?**

Yes, depending on the nature of the changes. After the PM emission limits have been approved, you must *notify* the permitting authority before you take any of the following actions:

1. Modify or replace any associated air pollution control equipment;
2. Shut down any process units included in the PM bubble calculations for more than 60 consecutive days;
3. Change a continuous monitoring parameter or the value or range of values of a continuous monitoring parameter; or
4. Increase the 24-hour average black liquor solids firing rate for any recovery furnace by more than 10 percent above the level measured during the most recent performance test.

Of the four changes listed above, **only 1 and 2** automatically require that the PM bubble be recalculated. Therefore, if you **(1) modify or replace any of the associated air pollution control systems or (2) shut down any of the process units included in the PM bubble calculations for more than 60 consecutive days**, you must recalculate the PM bubble limits and resubmit them to your permitting authority for approval.

**6. If I am complying with the PM standards using the PM bubble compliance alternative and one of the process units in the bubble is shut down for more than 60 days, do I have to retest all of the process units in the bubble when re-establishing the bubble limits?**

This decision will be up to the permitting authority. If production is shifted from one process unit to another when one process unit shuts down, the emissions from the operating process unit would presumably be increased, and, therefore, the affected process units should be retested.

If a process unit is being shut down and replaced with a new process unit, the new process unit cannot be part of the PM bubble, and, therefore, the bubble must be recalculated (e.g., by substituting a "zero" into the bubble equation for the shutdown process unit). However, depending upon the other changes that are made when a process unit is shut down, the emissions from the existing process units may or may not be affected. In general, if the



shutdown of the process unit is believed to affect emissions from other process units included in the PM bubble, then the affected process units should be retested. Note that if the process unit that was shut down was a source that was being over-controlled, then the bubble is compromised because credit is being given for over-control of emissions that is no longer taking place.

- 7. If I have a lime kiln that is sometimes fired using natural gas and sometimes fired using fuel oil, can I establish two different bubble limits (and two different sets of associated PM emission limits) to account for any potential performance differences between the two lime kiln operating scenarios?**

Yes, if the State permitting authority approves the bubble calculations and documentation. Also, you must keep records on when the lime kilns are firing oil versus gas. You must also establish the appropriate operating parameter levels for each operating scenario as part of the continuous monitoring requirements. If a “dual bubble” approach is used, then the mill may end up with two permit limits and two sets of compliant operating parameter levels for each process unit included in the PM bubble.

- 8. When complying with the PM standards using the PM bubble compliance alternative, can we also establish the opacity levels for each process unit using a bubble approach?**

No. The final rule does not include any provisions for “opacity bubbling.” Any recovery furnace or lime kiln equipped with an ESP must comply with the same continuous opacity monitoring requirements that apply to existing process units that are not part of a PM bubble.



## **Appendix E**

### **Glossary of Commonly Used Terms**



## Definitions

**Air pollution control device (APCD):** An add-on device used to remove air pollutants from gas streams. Includes both PM and gaseous pollution control equipment, such as an ESP, venturi scrubber, fiber-bed mist eliminator system, or RTO.

**Ash dissolving tank (ADT):** A vessel used for dissolving the ash collected from a fluidized-bed reactor or rotary liquor kiln at a stand-alone semichemical pulp mill.

**Black liquor:** Spent cooking liquor that has been separated from the pulp produced by the kraft, soda, or semichemical pulping process.

**Black liquor gasification:** The thermochemical conversion of the organics in black liquor into a combustible gaseous product, which can be used as an energy source for the gasification unit and as an alternative boiler fuel, leaving the residual pulping chemicals (primarily  $\text{Na}_2\text{CO}_3$ ) for reuse.

**Black liquor gasification system:** The reactor and associated equipment used to convert the organics in black liquor into a combustible gaseous product.

**Black liquor oxidation (BLO):** The process of oxidizing black liquor with air or  $\text{O}_2$  prior to evaporation in the DCE, thereby reducing the emissions of TRS compounds.

**BLO system:** A vessel used to oxidize the black liquor, with air or  $\text{O}_2$ , and the associated storage tank(s).

**Black liquor solids (BLS):** The dry weight of the solids in the black liquor that enters the recovery furnace or semichemical combustion unit.

**BLS firing rate:** The rate at which black liquor solids are fed to the recovery furnace or the semichemical combustion unit.

**Calcining:** The process of converting lime mud ( $\text{CaCO}_3$ ) from the causticizing area to reburned lime ( $\text{CaO}$ ).

**Causticizing:** The process of converting the decanted green liquor ( $\text{Na}_2\text{CO}_3$ ) from the SDT to  $\text{NaOH}$  and lime mud ( $\text{CaCO}_3$ ) by the addition of  $\text{Ca}(\text{OH})_2$ , which is generated in the slaker tank by the reaction of water and lime ( $\text{CaO}$ ) from the lime kiln.

**Chemical recovery combustion source:** Any source in the chemical recovery area of a kraft, soda, sulfite or stand-alone semichemical pulp mill that is an NDCE recovery furnace, a DCE recovery furnace system, an SDT, a lime kiln, a sulfite combustion unit, or a semichemical combustion unit.



**Chemical recovery system:** All existing recovery furnaces, SDTs, and lime kilns at a kraft or soda pulp mill. Each existing recovery furnace, SDT, or lime kiln is considered a process unit within a chemical recovery system.

**Cross-recovery furnace:** A kraft recovery furnace which, on a quarterly basis, contains more than 7 weight percent of the total pulp solids from the NSSC process and has a green liquor sulfidity of more than 28 percent.

**Direct contact evaporator (DCE):** A vessel which concentrates spent liquor by direct contact between the hot recovery furnace exhaust gases and the spent liquor.

**DCE recovery furnace:** A recovery furnace equipped with a DCE.

**DCE recovery furnace system:** A DCE recovery furnace and any BLO system, if present, at the pulp mill.

**DCE to NDCE furnace conversion:** The process of converting a DCE recovery furnace system to an NDCE recovery furnace, which includes replacing the DCE with a concentrator and associated equipment, extending or replacing the economizer, rebuilding or replacing the ESP, and removing the BLO system.

**Dry ESP system:** A recovery furnace ESP with a dry bottom (i.e., no black liquor or HAP-contaminated process water is used in the ESP bottom) and a dry PM return system (i.e., no black liquor or HAP-contaminated process water is used to transport the collected PM to the mix tank).

**Electrostatic precipitator (ESP):** An APCD which recovers PM from the flue gas by first charging the particles using high-voltage electrodes and then collecting them on oppositely charged collecting plates.

**Fiber-bed mist eliminator system:** An APCD which removes PM from the flue gas using numerous filter elements densely packed with glass or polyester fibers.

**Fluidized-bed reactor:** An enclosed combustion device used to recover pulping chemicals at sulfite or semichemical pulp mills by pelletizing the spent liquor as it falls toward the bed and passing fluidizing gas up through the bed of solid pellets, setting the bed in fluid motion

**Green liquor:** A solution of carbonate salts (primarily  $\text{Na}_2\text{S}$  and  $\text{Na}_2\text{CO}_3$ ) and dregs (unburned carbon and inorganic impurities) formed when smelt is drawn off from the SDT and dissolved in weak wash water from the causticizing area.

**Hazardous air pollutant (HAP) metals:** The sum of all emissions of antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, mercury, nickel, and selenium as measured by EPA Method 29 (40 CFR part 60, appendix A).



**Kraft pulp mill:** Any stationary source that produces pulp from wood by cooking (digesting) wood chips in a solution of sodium hydroxide and sodium sulfide. The recovery process used to regenerate pulping chemicals is also considered part of the kraft pulp mill.

**Kraft recovery furnace:** A recovery furnace that is used to burn black liquor produced by the kraft pulping process, as well as any recovery furnace that burns black liquor produced from both the kraft and semichemical pulping processes, and includes the DCE, if applicable.

**Lime:** Calcium oxide (CaO) produced in the lime kiln from the calcining of lime mud (CaCO<sub>3</sub>) from the causticizing area.

**Lime kiln:** A enclosed combustion device (e.g., rotary lime kiln or fluidized-bed calciner) used at a kraft or soda pulp mill to calcine lime mud, which consists primarily of CaCO<sub>3</sub>, into CaO.

**Lime production rate:** The rate at which dry lime, measured as CaO, is produced in the lime kiln.

**Multiple-effect evaporator (MEE) system:** The evaporators and associated condensers used in series to concentrate the black liquor prior to the DCE and/or NDCE.

**Neutral sulfite semichemical (NSSC):** A pulping process, used at stand-alone semichemical pulp mills and at kraft pulp mills collocated with semichemical pulping operations, which cooks the wood chips in a solution of sodium sulfite and sodium bicarbonate, followed by mechanical defibrating (grinding).

**Noncondensable gases (NCGs):** Gases from various process vents, such as digester and evaporator vents, which include TRS compounds, turpentine, methanol, acetone, alpha-pinene, water vapor, nitrogen, and O<sub>2</sub>.

**Nondirect contact evaporator (NDCE):** An indirect, steam-heated spent liquor concentrator.

**NDCE recovery furnace:** A recovery furnace that burns spent liquor that has been concentrated by indirect contact with steam.

**Particulate matter (PM):** Total PM as measured by EPA Method 5, EPA Method 17 (§63.865(b)(1) of subpart MM), or EPA Method 29 (40 CFR part 60, appendix A).

**Pink liquor:** Spent cooking liquor that has been separated from the pulp produced by the NSSC pulping process.

**Process unit:** An existing recovery furnace, SDT, or lime kiln in a chemical recovery system at a kraft or soda mill.



**Recovery furnace:** An enclosed combustion device where concentrated spent liquor produced by the kraft, soda, sulfite, or semichemical pulping process is burned to recover pulping chemicals and produce steam.

**Red liquor:** Spent cooking liquor that has been separated from the pulp produced by the sulfite pulping process.

**Red liquor solids (RLS):** The dry weight of the solids in the red liquor that enters the sulfite recovery furnace or fluidized-bed reactor.

**Regenerative thermal oxidizer (RTO):** A thermal oxidizer that transfers heat from the exhaust gas stream to the inlet gas stream by passing the exhaust stream through a bed of ceramic stoneware or other heat-absorbing medium before releasing it to the atmosphere, then reversing the gas flow so the inlet gas stream passes through the heated bed, raising the temperature of the inlet stream close to or at its ignition temperature.

**Rotary liquor kiln:** An enclosed combustion device used to recover pulping chemicals at two stand-alone semichemical pulp mills by drawing combustion gases through from the lower end of the kiln and firing the spent liquor halfway between the upper and lower ends, with the resulting  $\text{Na}_2\text{CO}_3$  ash falling to the lower end of the kiln.

**Semichemical combustion unit:** Any equipment, such as a fluidized-bed reactor, rotary liquor kiln, or smelter, used to combust spent liquor at a stand-alone semichemical pulp mill to recover pulping chemicals.

**Smelter:** An enclosed combustion device converted from a small kraft recovery furnace which recovers pulping chemicals at a stand-alone semichemical pulp mill by burning spent liquor in a manner similar to a recovery furnace, except that the smelter does not produce excess steam for mill processes and is actually a net user of heat.

**Smelt dissolving tank (SDT):** A vessel used for dissolving the smelt collected from a recovery furnace at a kraft, soda, or stand-alone semichemical pulp mill.

**Soda pulp mill:** Any stationary source that produces pulp from wood by cooking (digesting) wood chips in a sodium hydroxide solution. The recovery process used to regenerate pulping chemicals is also considered part of the soda pulp mill.

**Soda recovery furnace:** A recovery furnace used to burn black liquor produced by the soda pulping process and includes the direct contact evaporator, if applicable.

**Specific collecting area (SCA):** A means of expressing the size of an ESP, defined as the total ESP collecting plate surface area divided by the flue gas flow rate.

**Stand-alone semichemical pulp mill:** Any stationary source that produces pulp from wood by partially digesting wood chips in a chemical solution followed by mechanical defibrating



(grinding), and has an onsite chemical recovery process that is not integrated with a kraft pulp mill.

**Sulfite combustion unit:** An enclosed combustion device, such as a recovery furnace or fluidized-bed reactor, used to burn spent liquor from the sulfite pulping process (i.e., red liquor) to recover pulping chemicals.

**Sulfite pulp mill:** Any stationary source that produces pulp from wood by cooking (digesting) wood chips in a solution of sulfurous acid and bisulfite ions. The recovery process used to regenerate pulping chemicals is also considered part of the sulfite pulp mill.

**Total hydrocarbons (THC):** The sum of organic compounds measured as carbon using EPA Method 25A (40 CFR part 60, appendix A).

**Total reduced sulfur (TRS):** The sum of the sulfur compounds  $H_2S$ , methyl mercaptan, dimethyl sulfide, and dimethyl disulfide that are released during the kraft pulping operation and measured by EPA Method 16 (40 CFR part 60, appendix A).

**Venturi scrubber:** An APCD which removes PM from the flue gas by impaction through high-energy contact between the scrubbing liquid and suspended PM in the gas stream. A venturi scrubbing system typically consists of a venturi scrubbing vessel and cyclonic separator.

**Wet ESP:** A type of ESP in which PM is removed by an intermittent or continuous stream of water or other conducting fluid that flows down over the collection electrodes and into a receiving sump. Among other uses, could be installed prior to an RTO since RTOs require a high degree of PM control for proper operation.

**Wet ESP system:** A recovery furnace ESP with a wet bottom (i.e., black liquor or HAP-contaminated process water is used in the ESP bottom) and/or a wet PM return system (i.e., black liquor or HAP-contaminated process water is used to transport the collected PM to the mix tank).

**Wet to dry ESP system conversion:** The process of converting a recovery furnace ESP system to eliminate the black liquor or HAP-contaminated process water from the system, which includes removing the existing agitator paddles and liquor piping; installing a perpendicular drag scraper system, shallow fallout hoppers, drag chain conveyors, rotary valves, ash mixing tank, agitator, and associated instrumentation; and making piping modifications.

**White liquor:** Cooking liquor used in the pulping area of a kraft or soda pulp mill, which is an aqueous solution of NaOH and  $Na_2S$  (kraft process only).



## Acronyms and Abbreviations

<b>ADT</b>	ash dissolving tank
<b>AF&amp;PA</b>	American Forest & Paper Association
<b>APCD</b>	air pollution control device
<b>As</b>	arsenic
<b>ATW</b>	Air Toxics Website ( <a href="http://www.epa.gov/ttn/atw/index.html">http://www.epa.gov/ttn/atw/index.html</a> )
<b>BACT</b>	best available control technology
<b>Be</b>	beryllium
<b>BLO</b>	black liquor oxidation
<b>BLS</b>	black liquor solids
<b>BMP</b>	best management practices
<b>Ca</b>	calcium
<b>Ca(OH)<sub>2</sub></b>	calcium hydroxide
<b>CAA</b>	Clean Air Act as amended in 1990
<b>CaCO<sub>3</sub></b>	calcium carbonate
<b>CaO</b>	calcium oxide
<b>Cd</b>	cadmium
<b>CEMS</b>	continuous emissions monitoring system
<b>CERCLA</b>	Comprehensive Environmental Response, Compensation, and Liability Act
<b>CFR</b>	Code of Federal Regulations
<b>CH<sub>4</sub></b>	methane
<b>CMS</b>	continuous monitoring system
<b>Co</b>	cobalt
<b>CO</b>	carbon monoxide
<b>CO<sub>2</sub></b>	carbon dioxide
<b>COMS</b>	continuous opacity monitoring system
<b>Cr</b>	chromium
<b>CWA</b>	Clean Water Act
<b>DAS</b>	data acquisition system
<b>DCE</b>	direct contact evaporator
<b>EPA</b>	U. S. Environmental Protection Agency
<b>EPCRA</b>	Emergency Planning and Community Right-to-Know Act
<b>ESP</b>	electrostatic precipitator
<b>FR</b>	Federal Register
<b>GPO</b>	Government Printing Office
<b>H<sub>2</sub></b>	hydrogen



<b>H<sub>2</sub>O</b>	water
<b>H<sub>2</sub>S</b>	hydrogen sulfide
<b>HAP</b>	hazardous air pollutant
<b>HCl</b>	hydrochloric acid
<b>Hg</b>	mercury
<b>L/G</b>	liquid-to-gas
<b>LAER</b>	lowest achievable emission rate
<b>LK</b>	lime kiln
<b>MACT</b>	maximum achievable control technology
<b>MEE</b>	multiple effect evaporator
<b>Mg</b>	magnesium
<b>Mg(OH)<sub>2</sub></b>	magnesium hydroxide
<b>MgO</b>	magnesium oxide
<b>N<sub>2</sub></b>	nitrogen
<b>Na</b>	sodium
<b>Na<sub>2</sub>CO<sub>3</sub></b>	sodium carbonate
<b>Na<sub>2</sub>S</b>	sodium sulfide
<b>Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub></b>	sodium thiosulfate
<b>Na<sub>2</sub>SO<sub>4</sub></b>	sodium sulfate
<b>NAAQS</b>	national ambient air quality standards
<b>NaCl</b>	sodium chloride
<b>NaOH</b>	sodium hydroxide
<b>NCASI</b>	National Council of the Paper Industry for Air and Stream Improvement, Inc.
<b>NCG</b>	noncondensable gas
<b>NDCE</b>	nondirect contact evaporator
<b>NESHAP</b>	national emission standards for hazardous air pollutants
<b>NH<sub>3</sub></b>	ammonia
<b>Ni</b>	nickel
<b>NO<sub>x</sub></b>	nitrogen oxides
<b>NPDES</b>	national pollutant discharge elimination system
<b>NSPS</b>	new source performance standard
<b>NSR</b>	new source review
<b>NSSC</b>	neutral sulfite semichemical
<b>NTIS</b>	National Technical Information Services
<b>O<sub>2</sub></b>	oxygen
<b>OAQPS</b>	Office of Air Quality Planning and Standards
<b>Pb</b>	lead



<b>PM</b>	particulate matter
<b>POTW</b>	publicly-owned treatment works
<b>PSD</b>	prevention of significant deterioration
<b>RCRA</b>	Resource Conservation and Recovery Act
<b>RF</b>	recovery furnace
<b>RLS</b>	red liquor solids
<b>RTO</b>	regenerative thermal oxidizer
<b>Sb</b>	antimony
<b>SCA</b>	specific collecting area
<b>SDT</b>	smelt dissolving tank
<b>Se</b>	selenium
<b>SIP</b>	State Implementation Plan
<b>SO<sub>2</sub></b>	sulfur dioxide
<b>SPCC</b>	spill prevention control and countermeasure
<b>SSM</b>	startup, shutdown, and malfunction
<b>STAPPA/ALAPCO</b>	State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officials
<b>THC</b>	total hydrocarbon
<b>TRI</b>	Toxics Release Inventory
<b>TRS</b>	total reduced sulfur
<b>TSD</b>	technical support document
<b>TTN</b>	Technology Transfer Network ( <a href="http://www.epa.gov/ttn">http://www.epa.gov/ttn</a> )
<b>VOC</b>	volatile organic compound
<b>WWW</b>	World Wide Web
<b>XL</b>	Excellence in Leadership



## **Appendix F**

### **Equipment Diagrams for Chemical Recovery Combustion Sources**



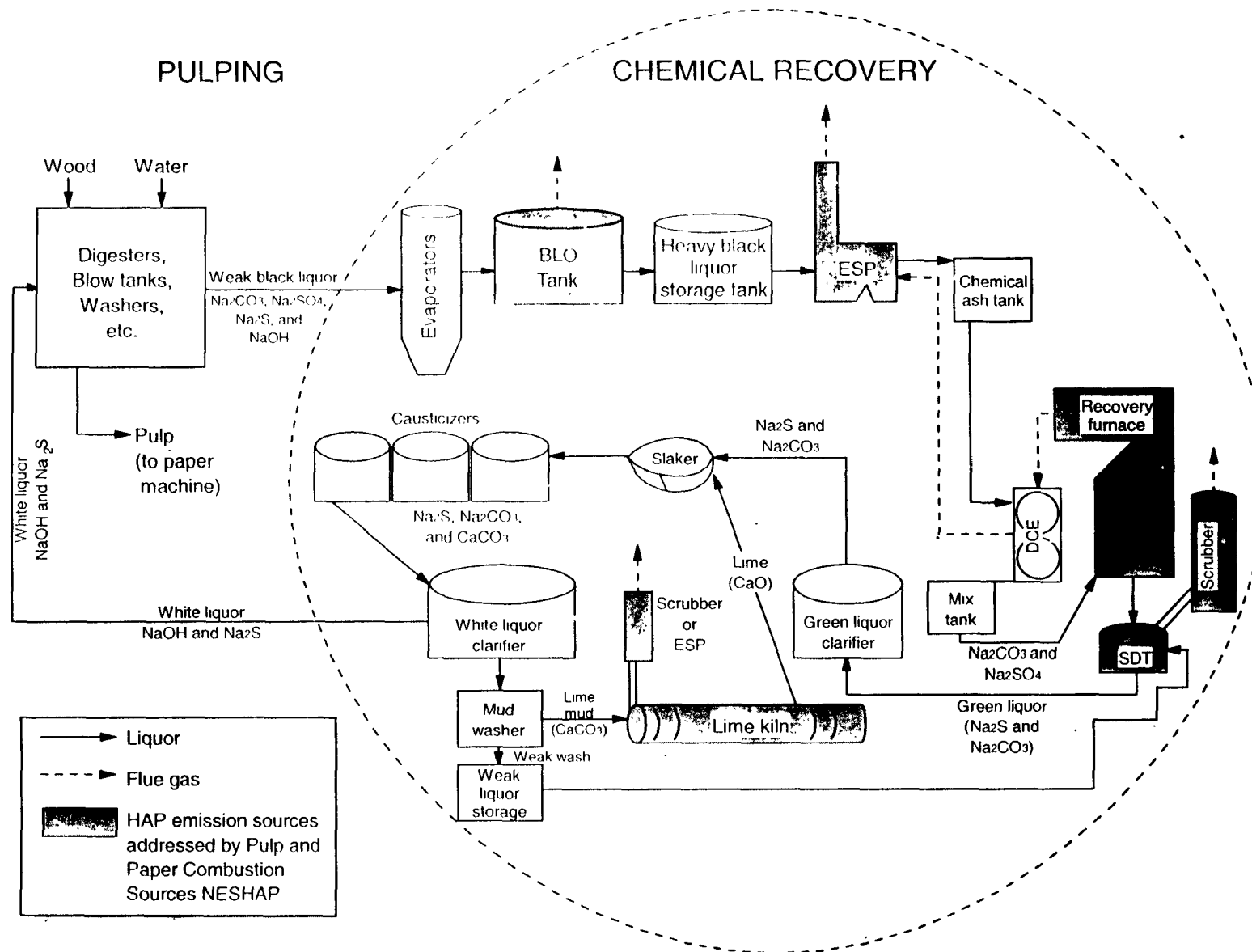


Figure F-1. Chemical Recovery Area (with DCE Recovery Furnace) for the Kraft Pulp Process.



F-4

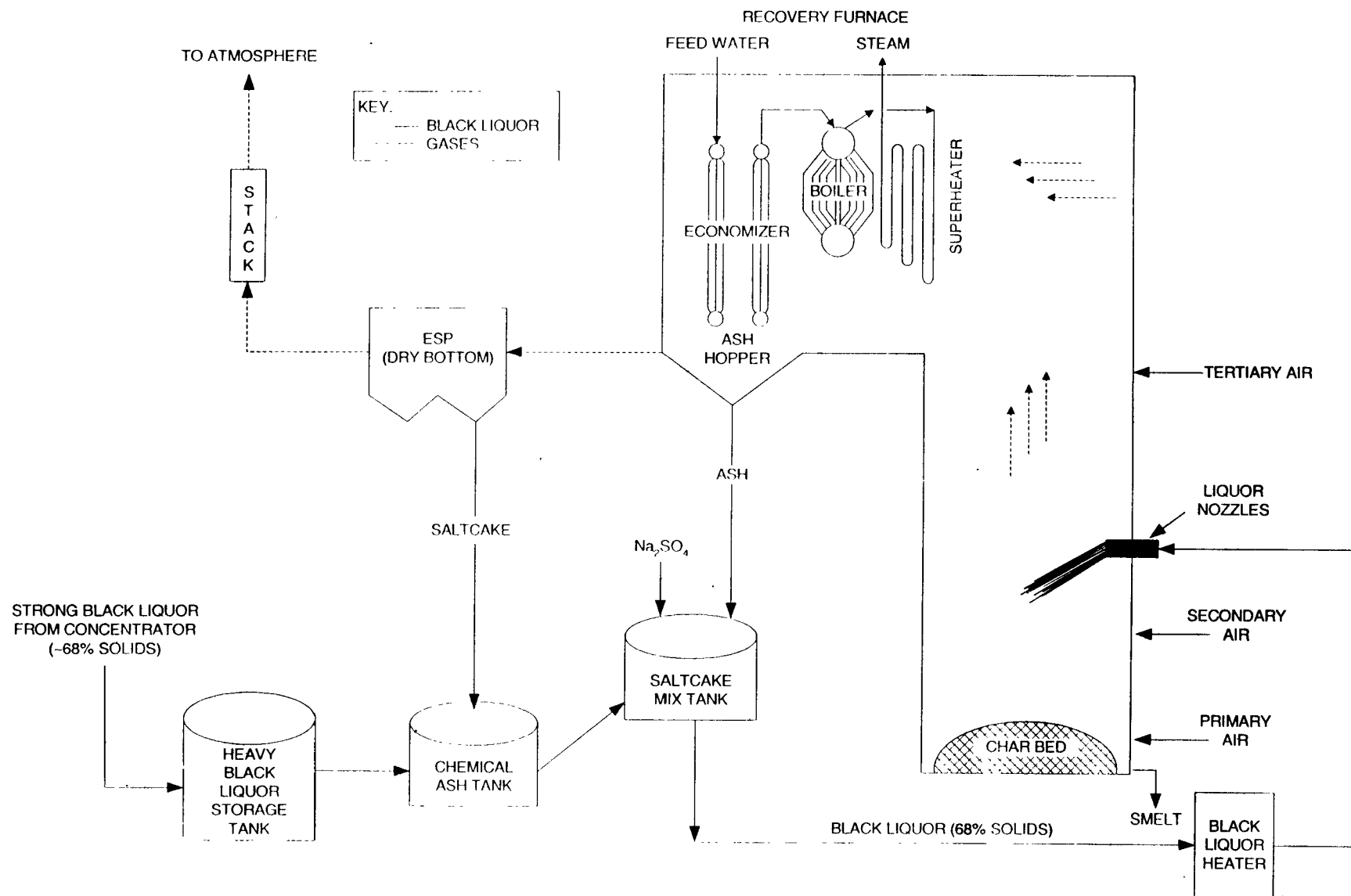
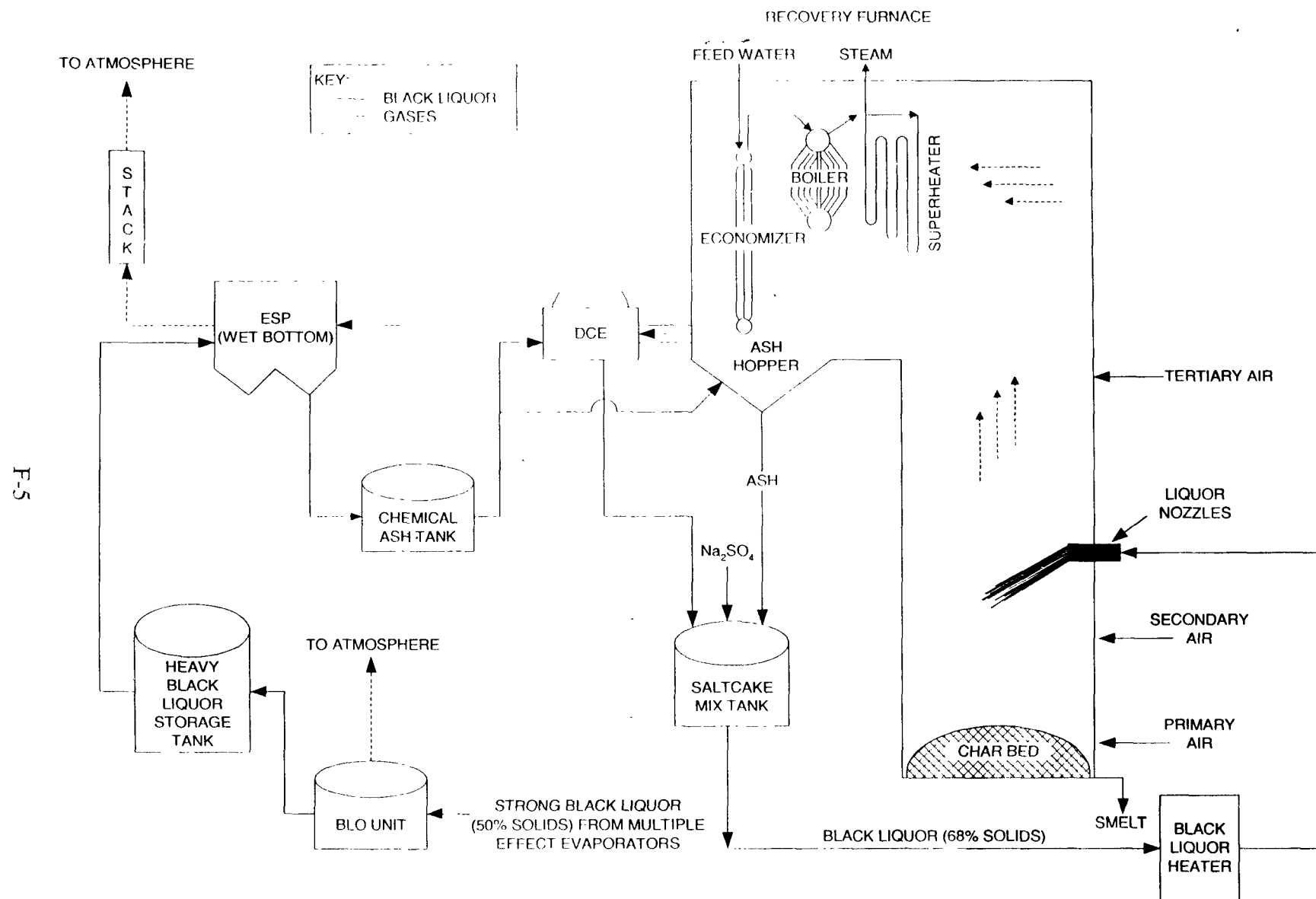


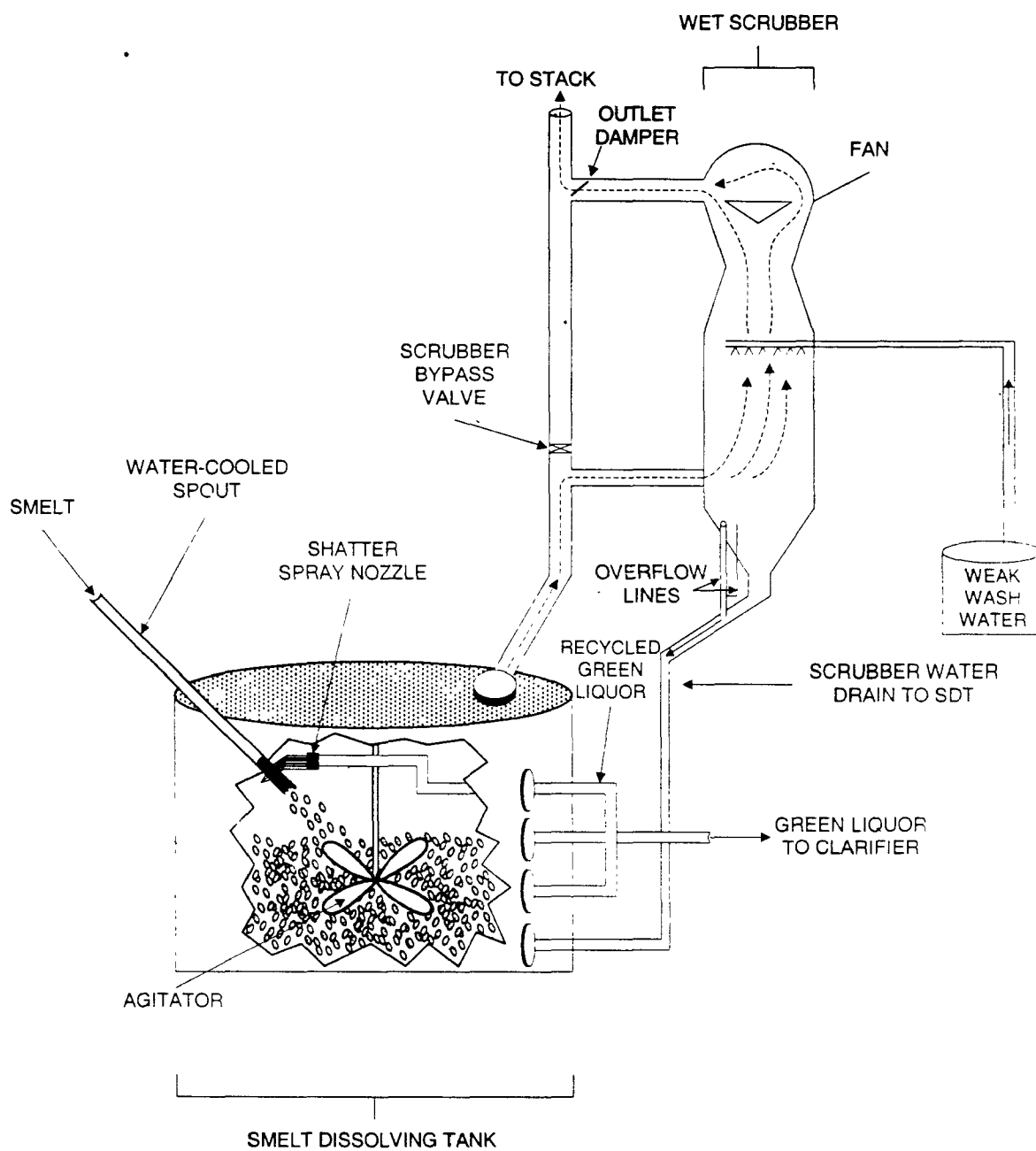
Figure F-2. NDCE Recovery Furnace and Associated Equipment.





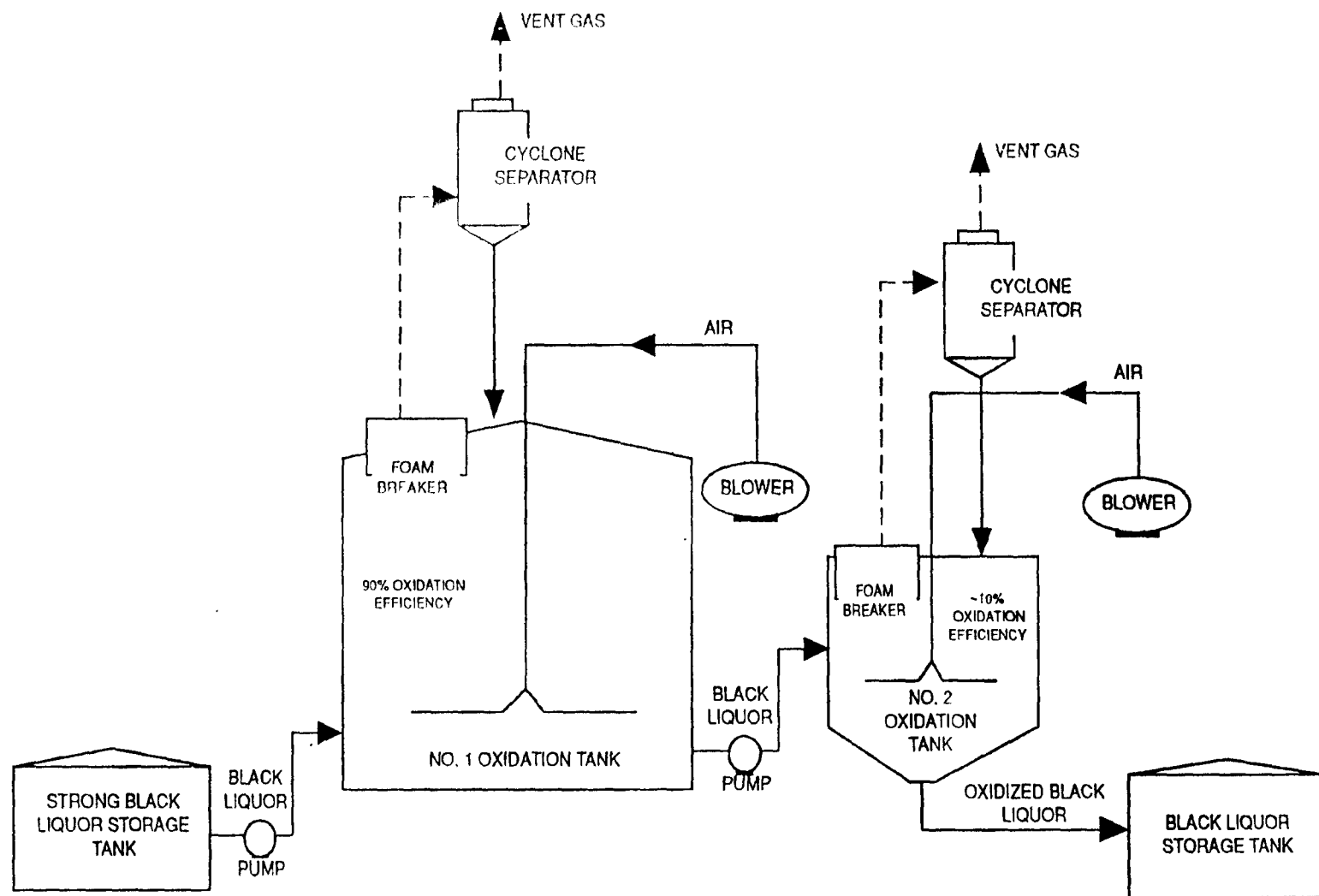
**Figure F-3.** DCE Recovery Furnace and Associated Equipment.





**Figure F-4.** Smelt Dissolving Tank and Wet Scrubber.





**Figure F-5.** Two-Stage Air-Sparging Black Liquor Oxidation System.



F-8

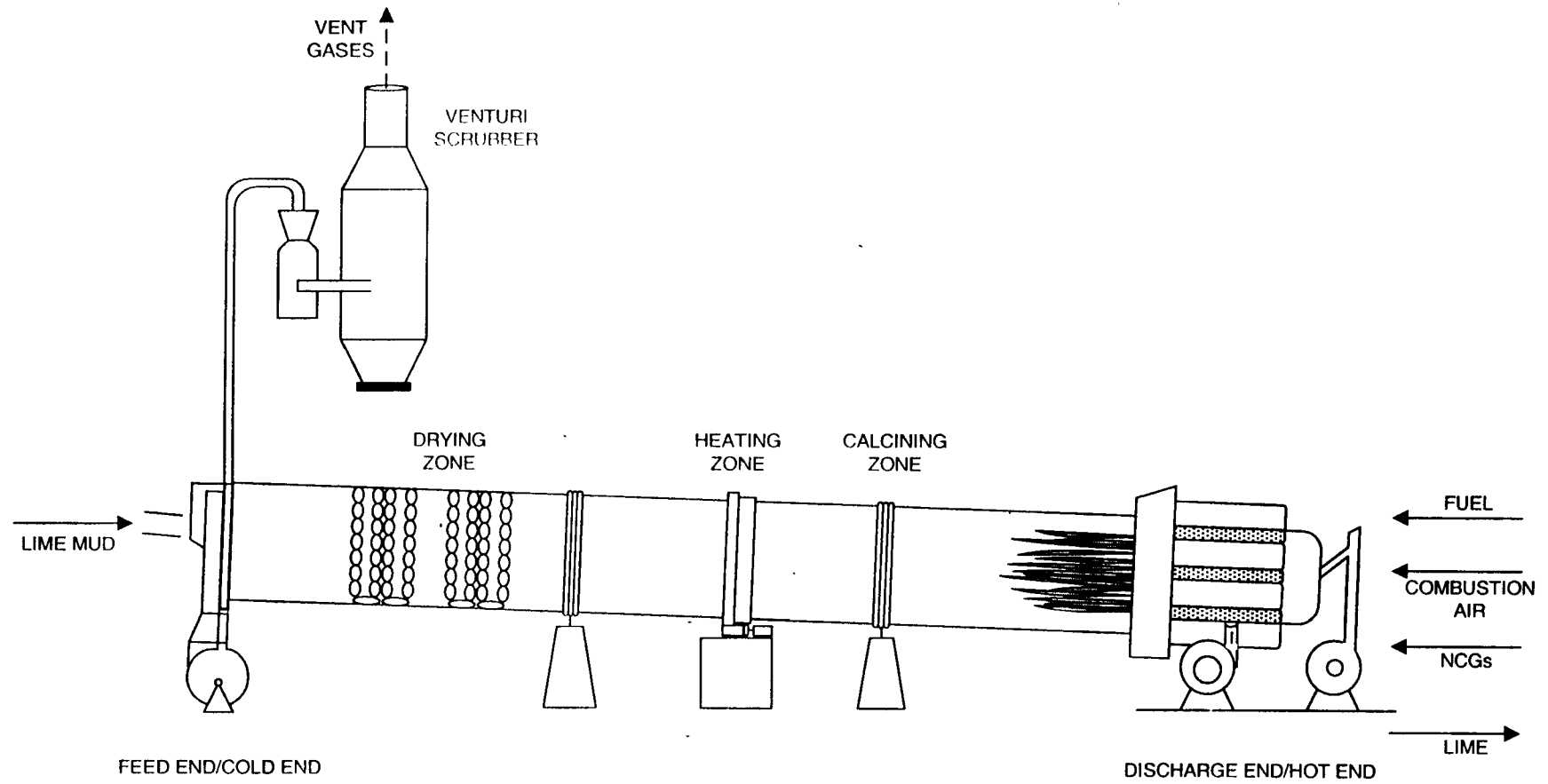
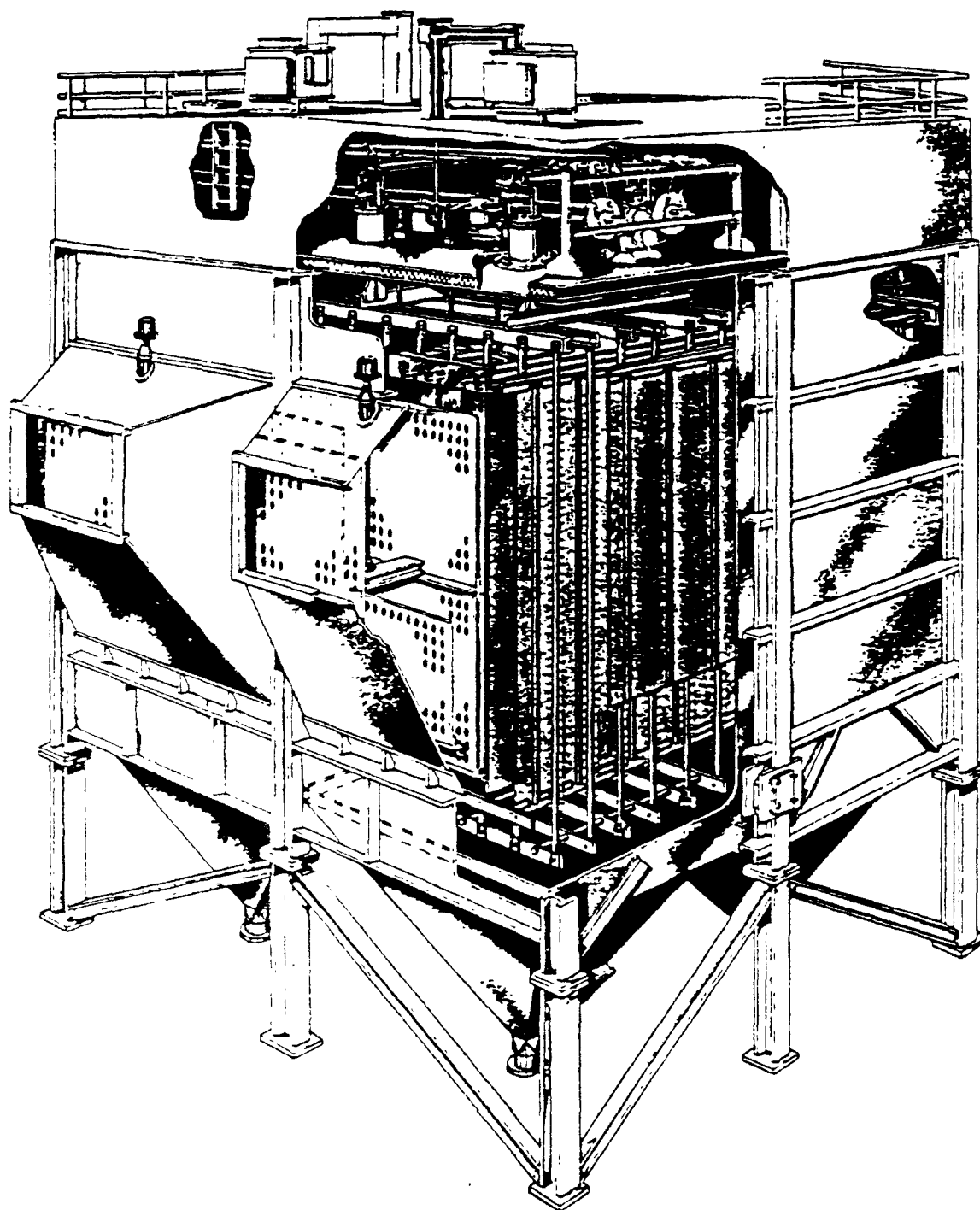


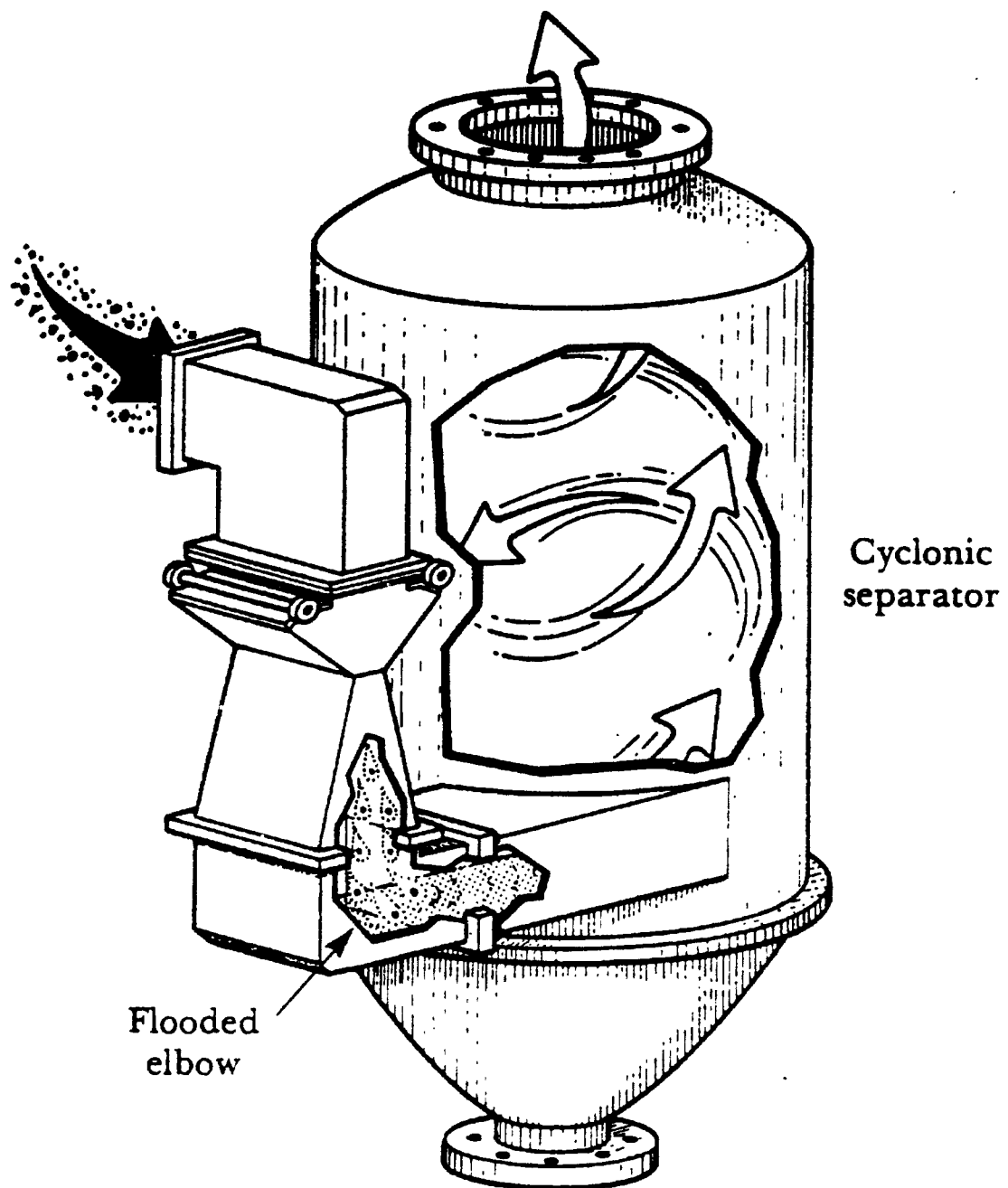
Figure F-6. Lime Kiln and Wet Scrubber.





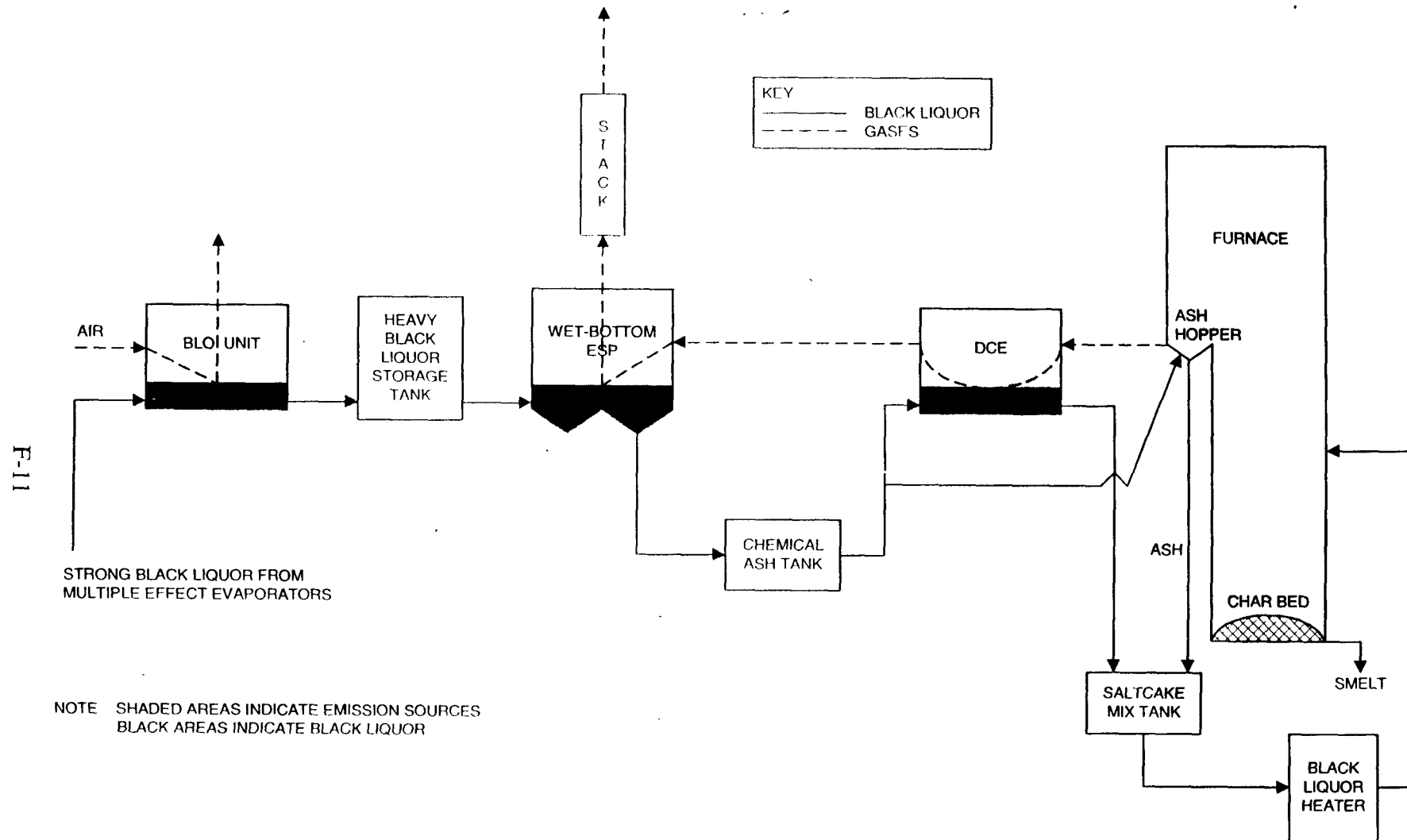
**Figure F-7.** Electrostatic Precipitator.





**Figure F-8.** Venturi Scrubber.





**Figure F-9.** Emission Sources for a DCE Recovery Furnace System.



F-12

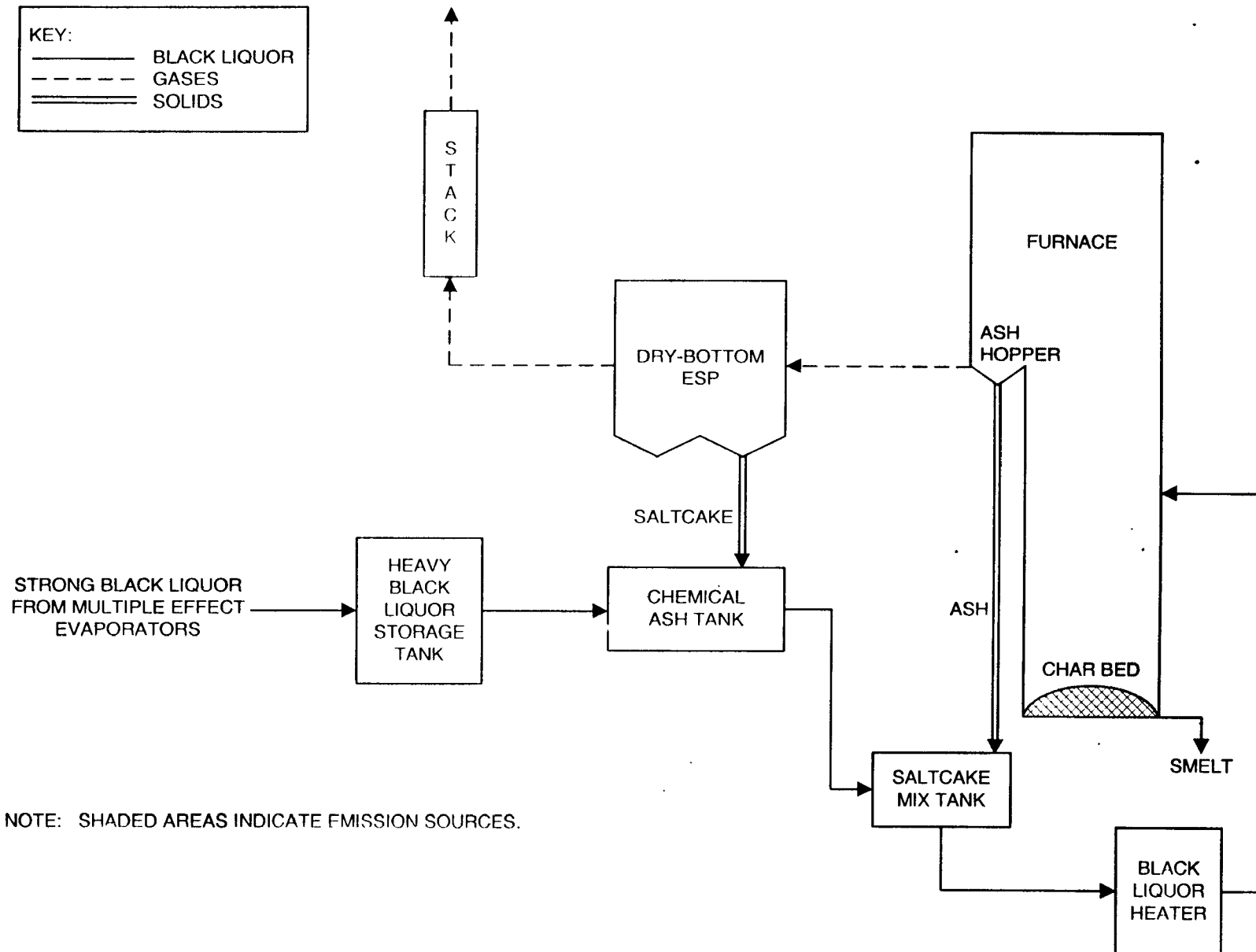


Figure F-10. Emission Sources for an NDCE Recovery Furnace.



F-13

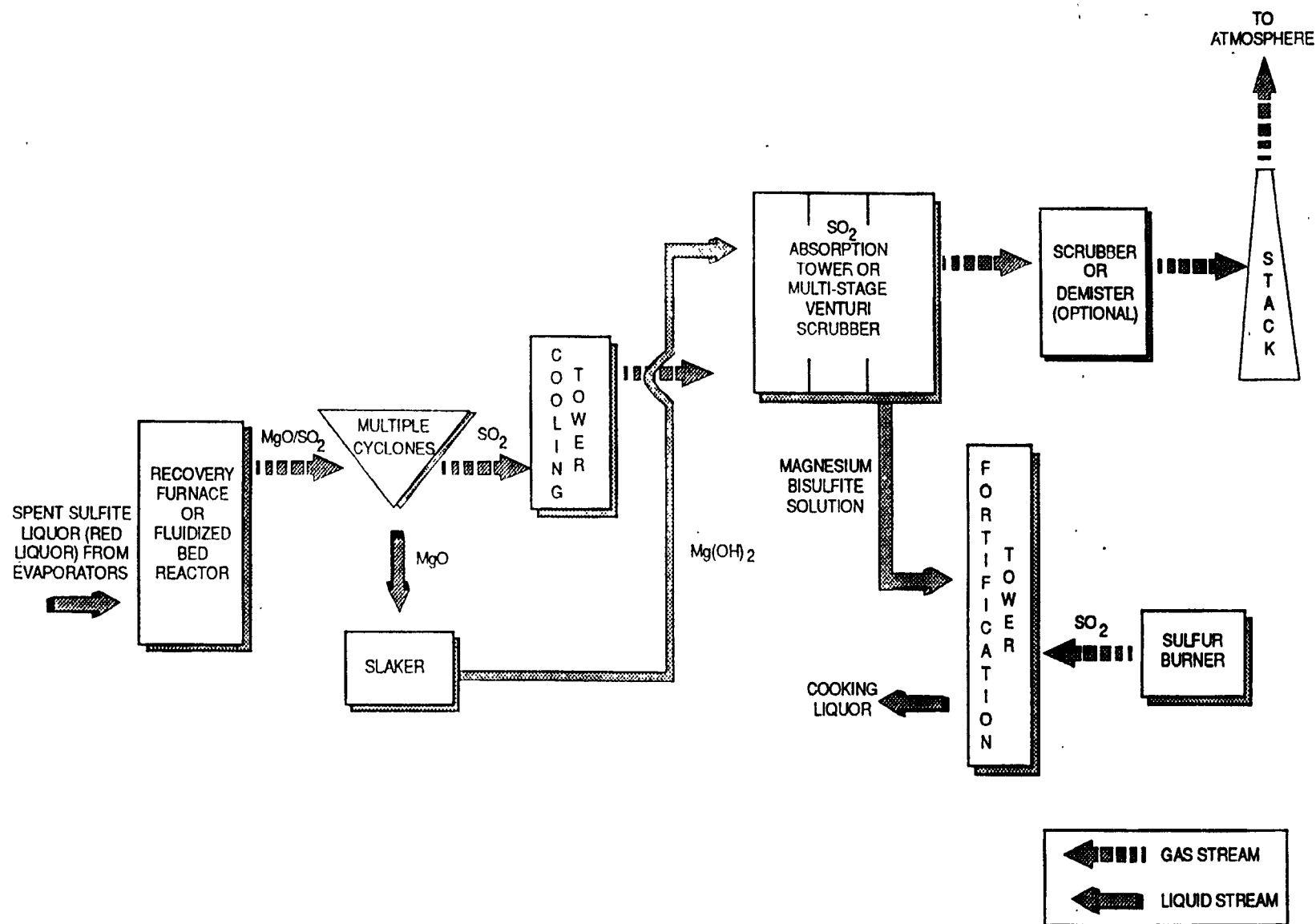
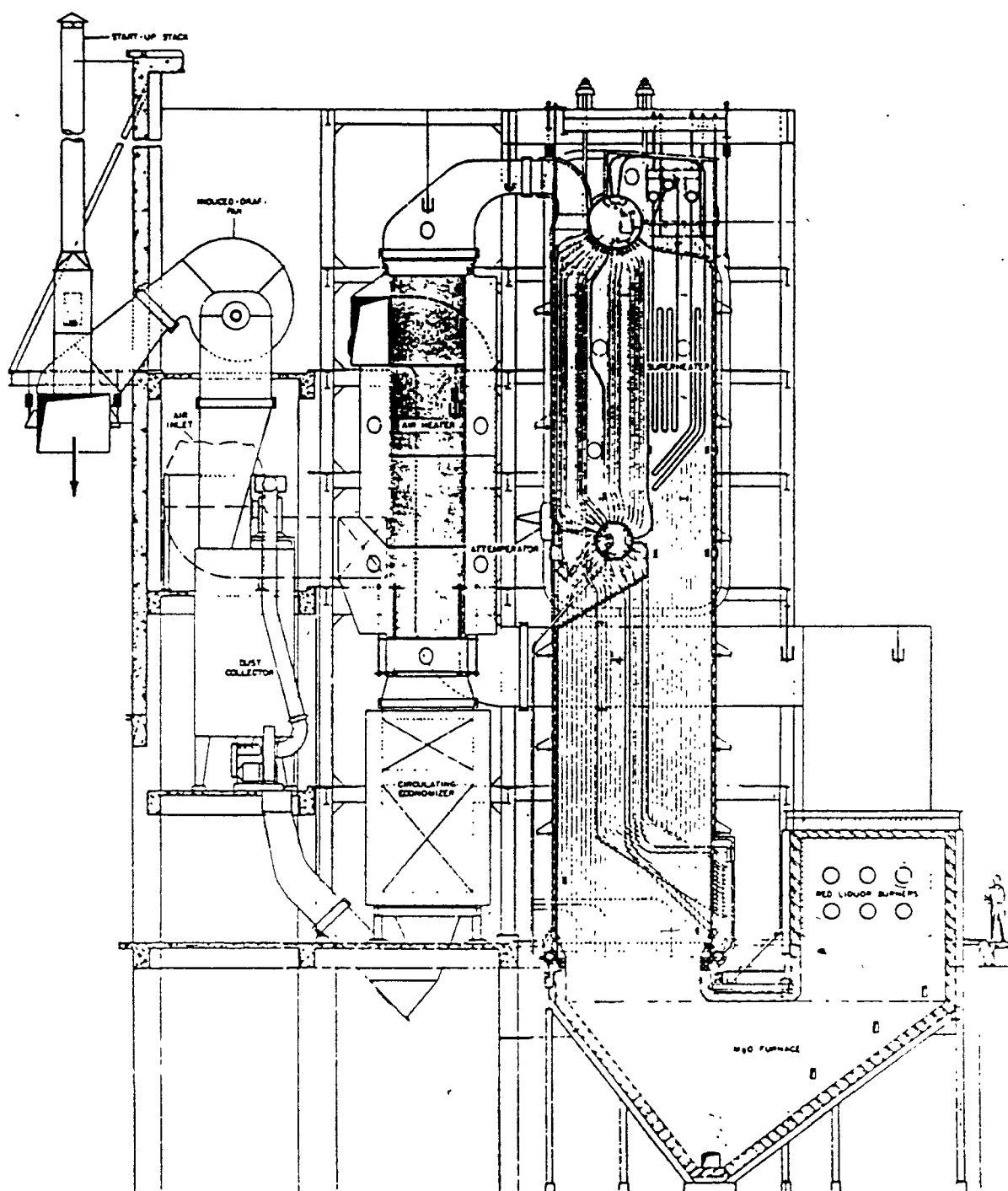


Figure F-11. Chemical Recovery Process for the Mg-Based Sulfite Pulping Process.





**Figure F-12.** Mg-Based Sulfite Recovery Furnace.



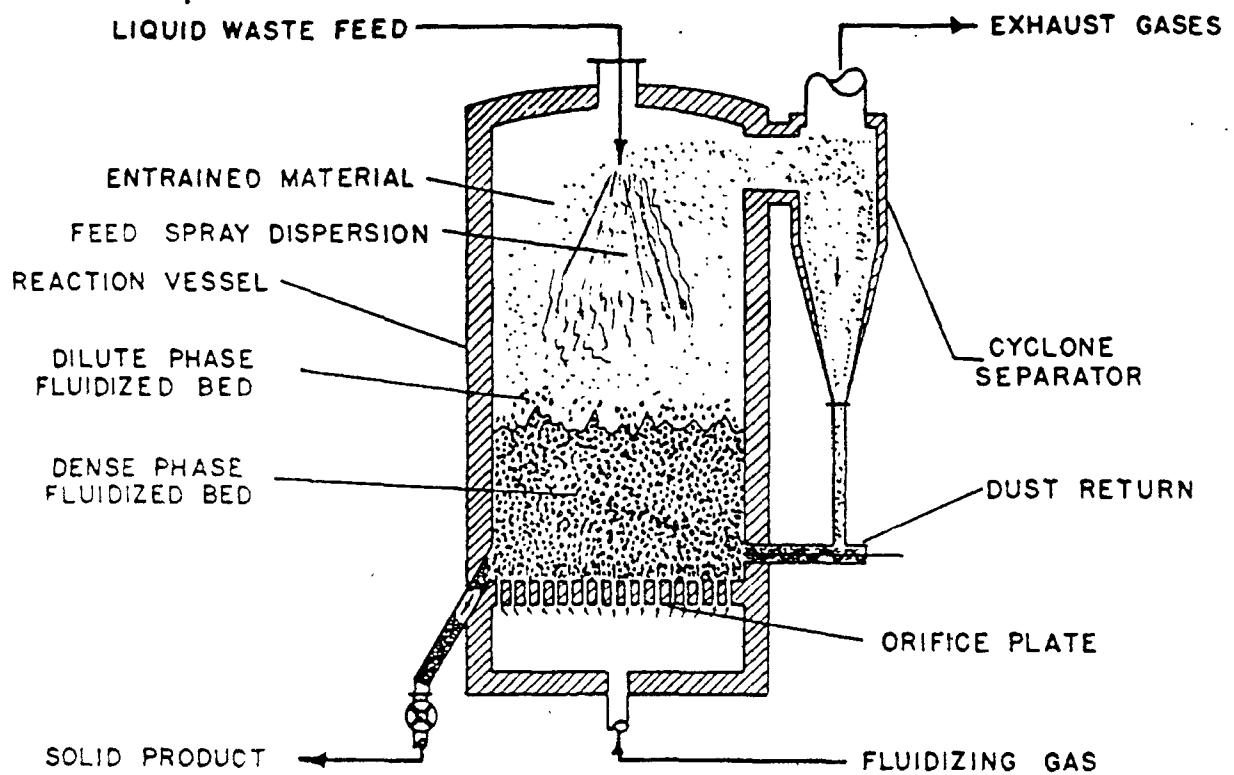


Figure 13. Fluidized-Bed Reactor.



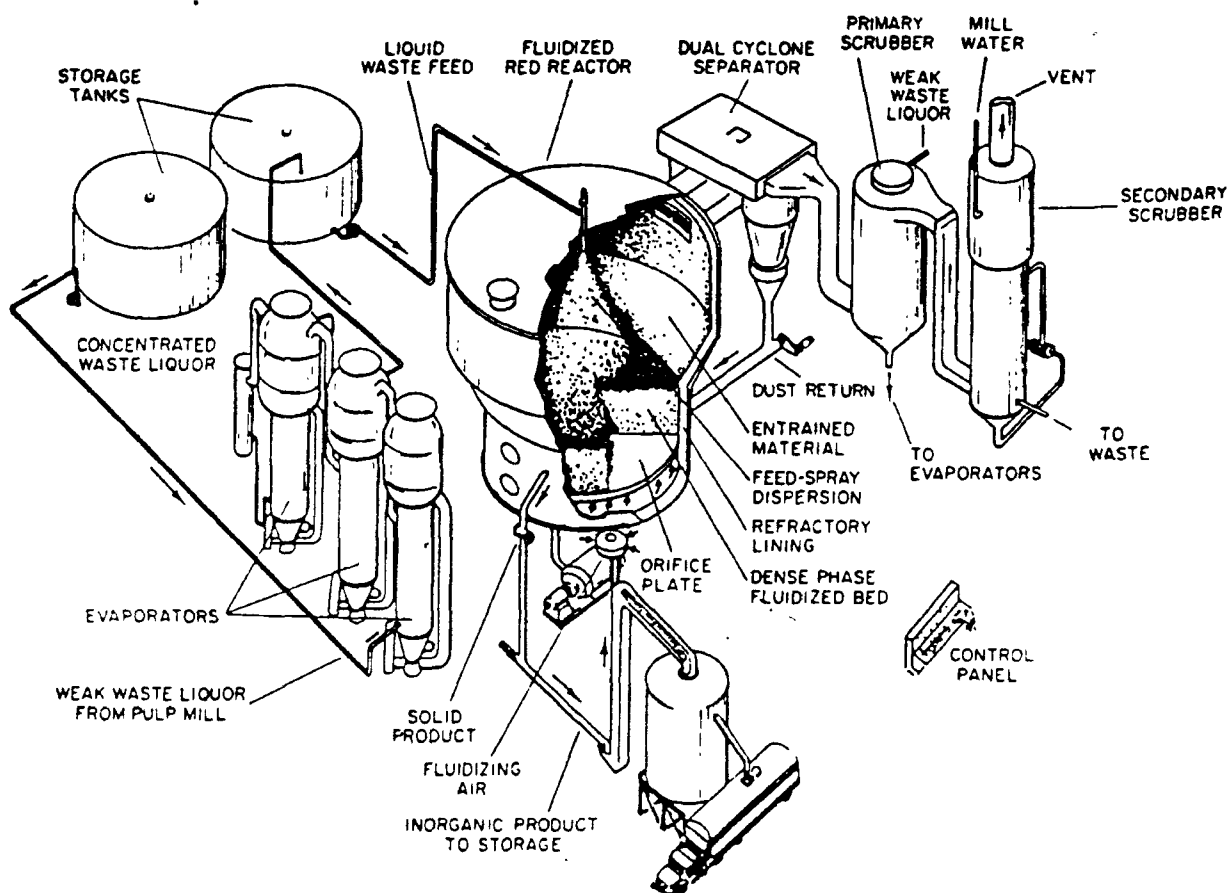


Figure 14. Mg-Based Sulfite Fluidized-Bed Reactor System.



F-17

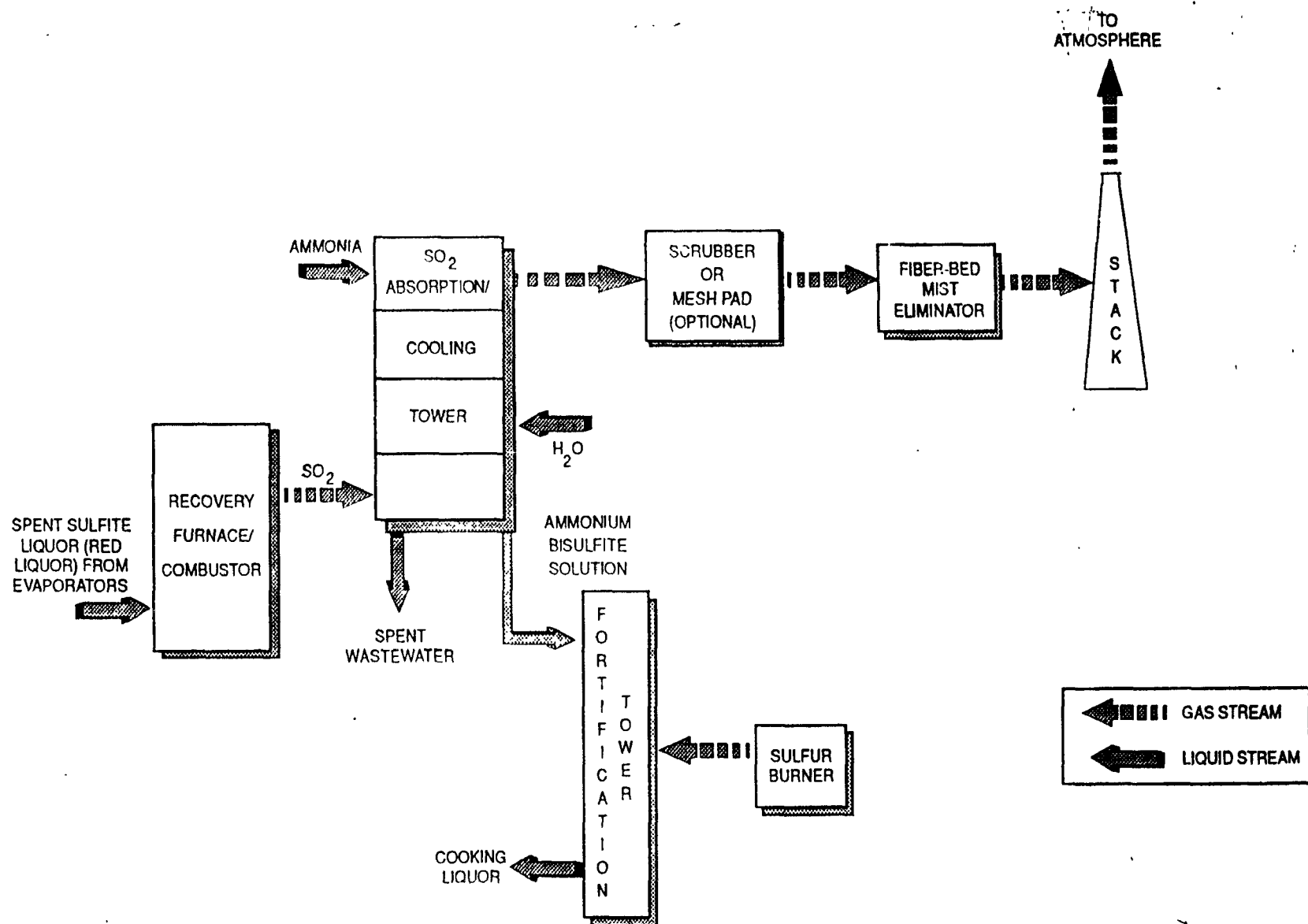


Figure F-15. Chemical Recovery Process for the  $\text{NH}_3$ -Based Sulfite Pulping Process.



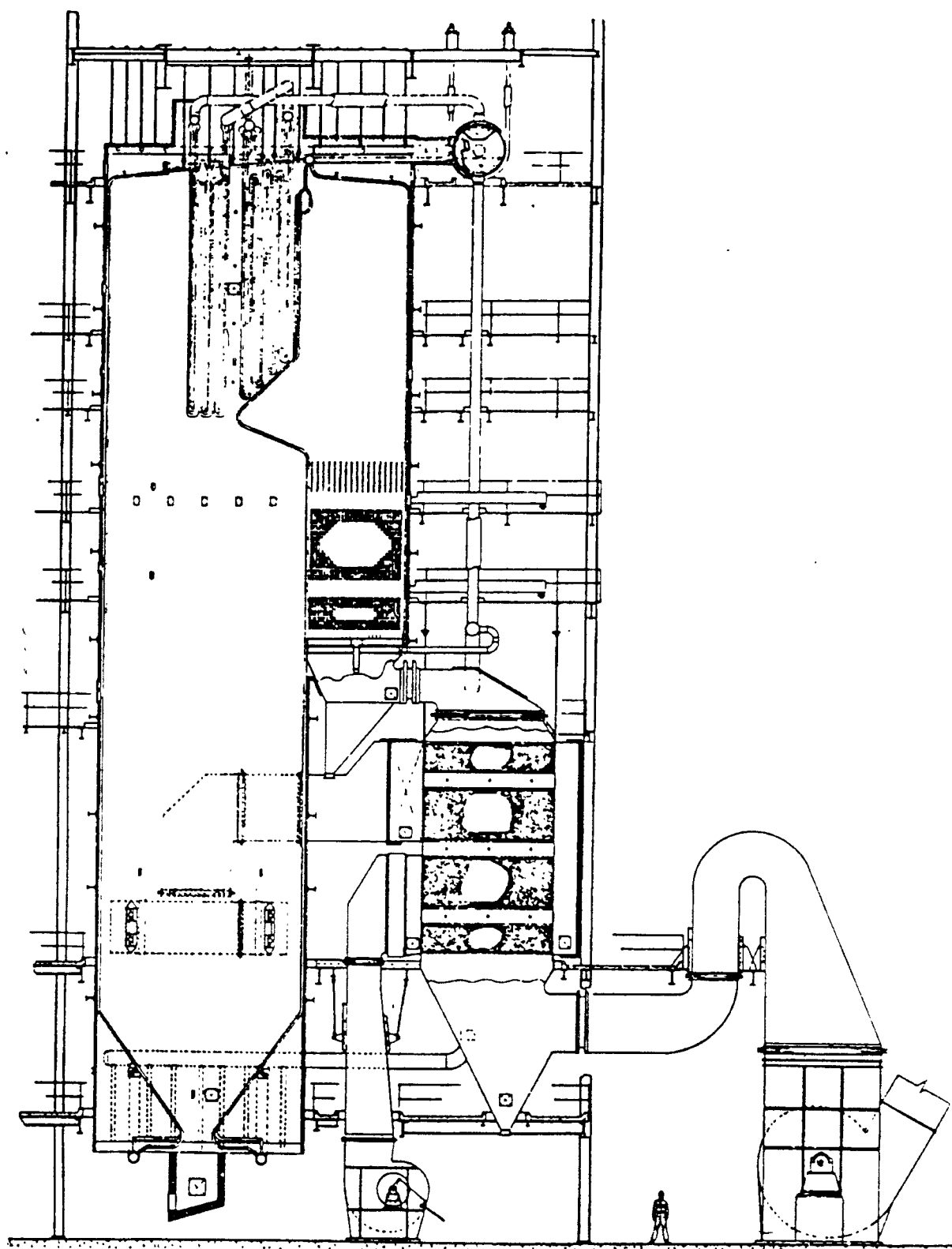


Figure F-16.  $\text{NH}_3$ -Based Sulfite Recovery Furnace.



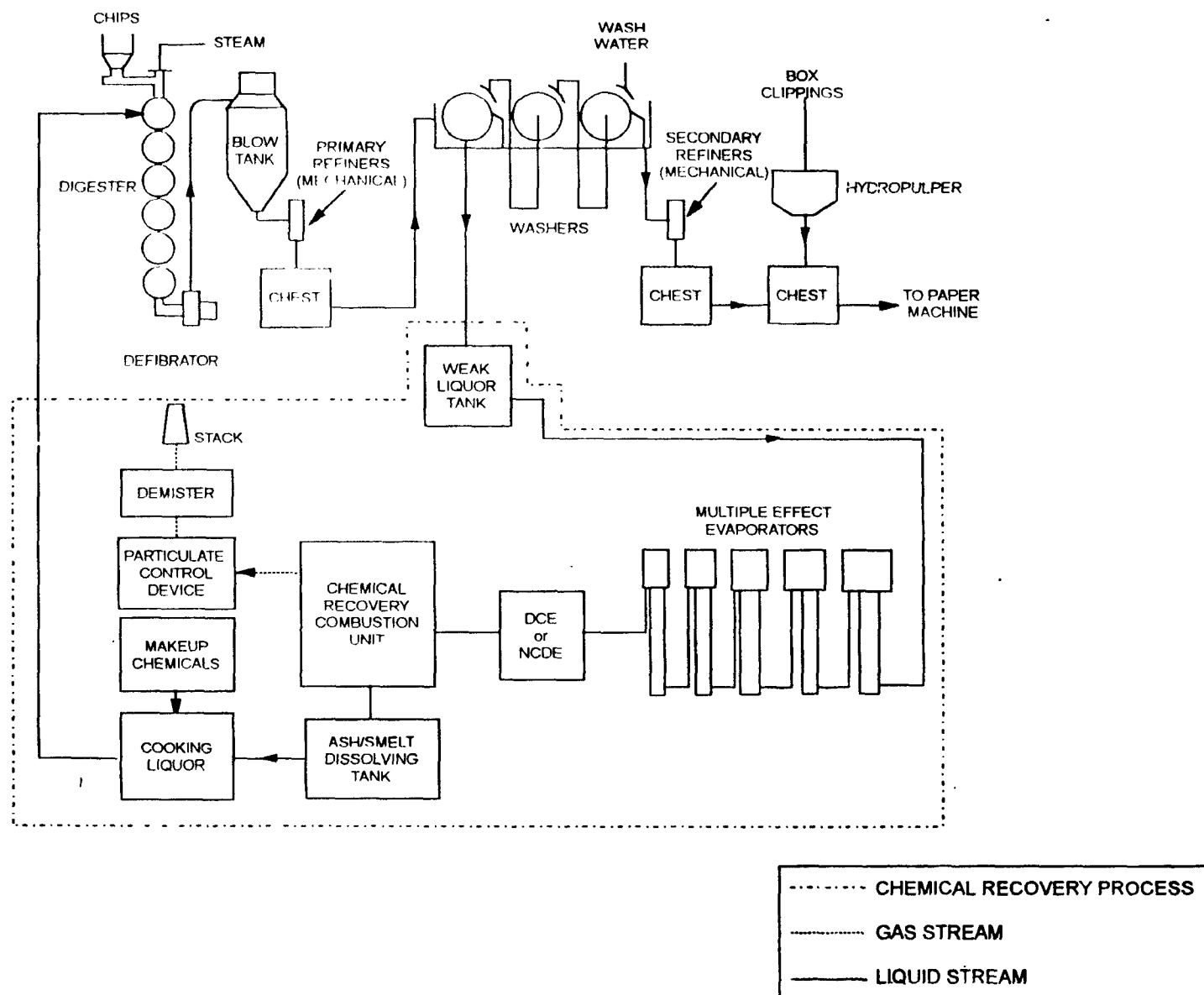


Figure F-17. Chemical Recovery Process for the Semichemical Pulping Process.



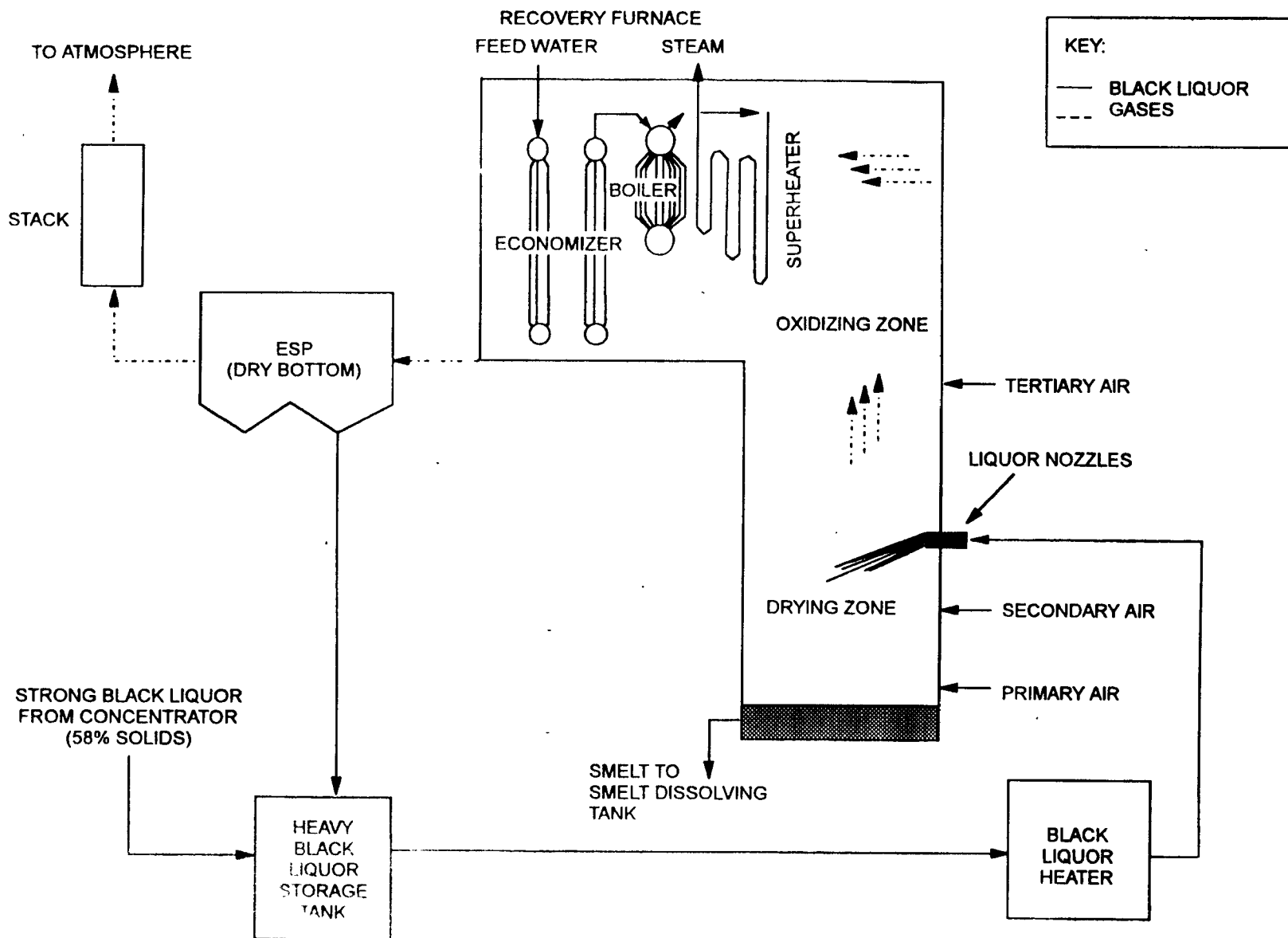


Figure F-18. Recovery Furnace.



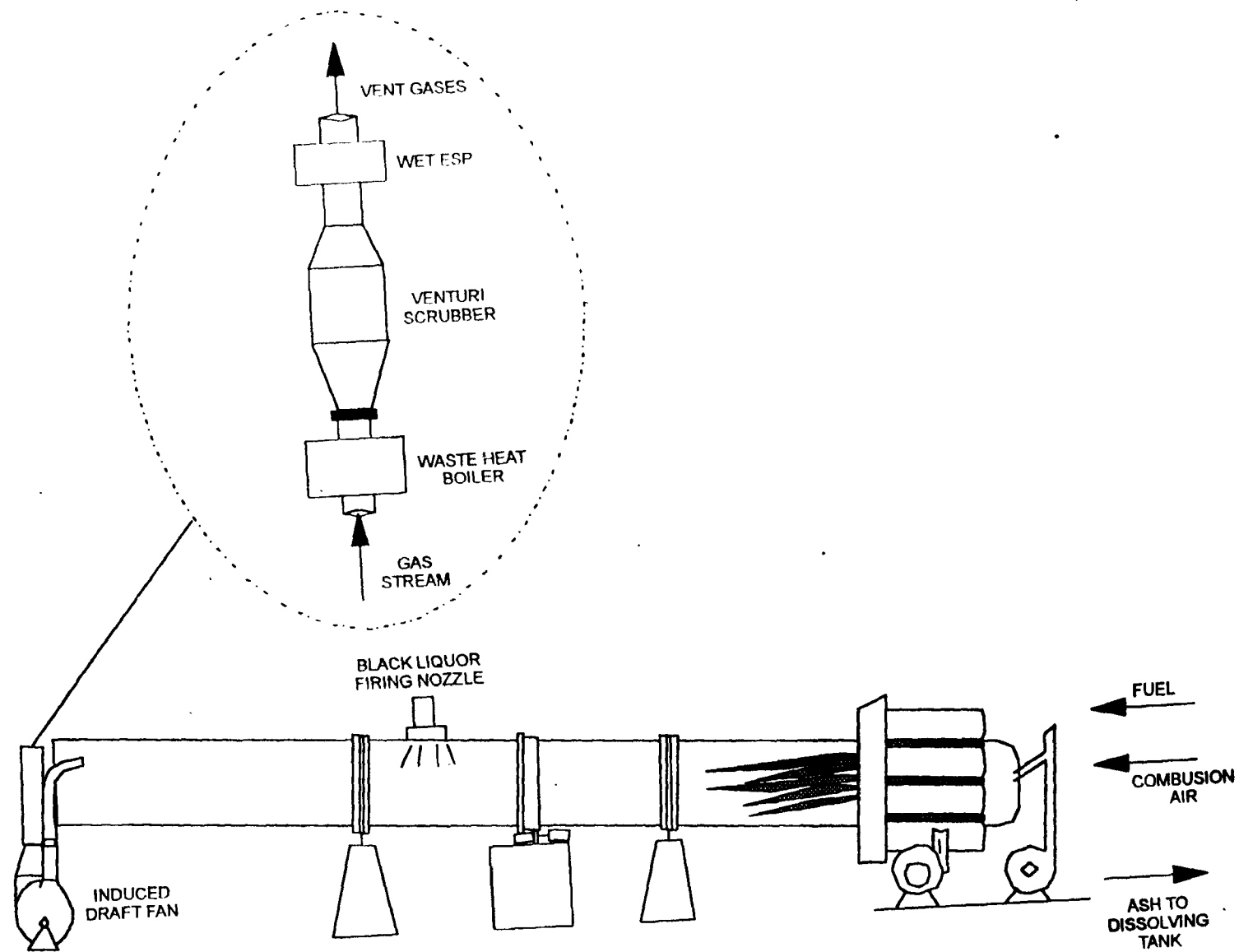


Figure F-19. Rotary Liquor Kiln.



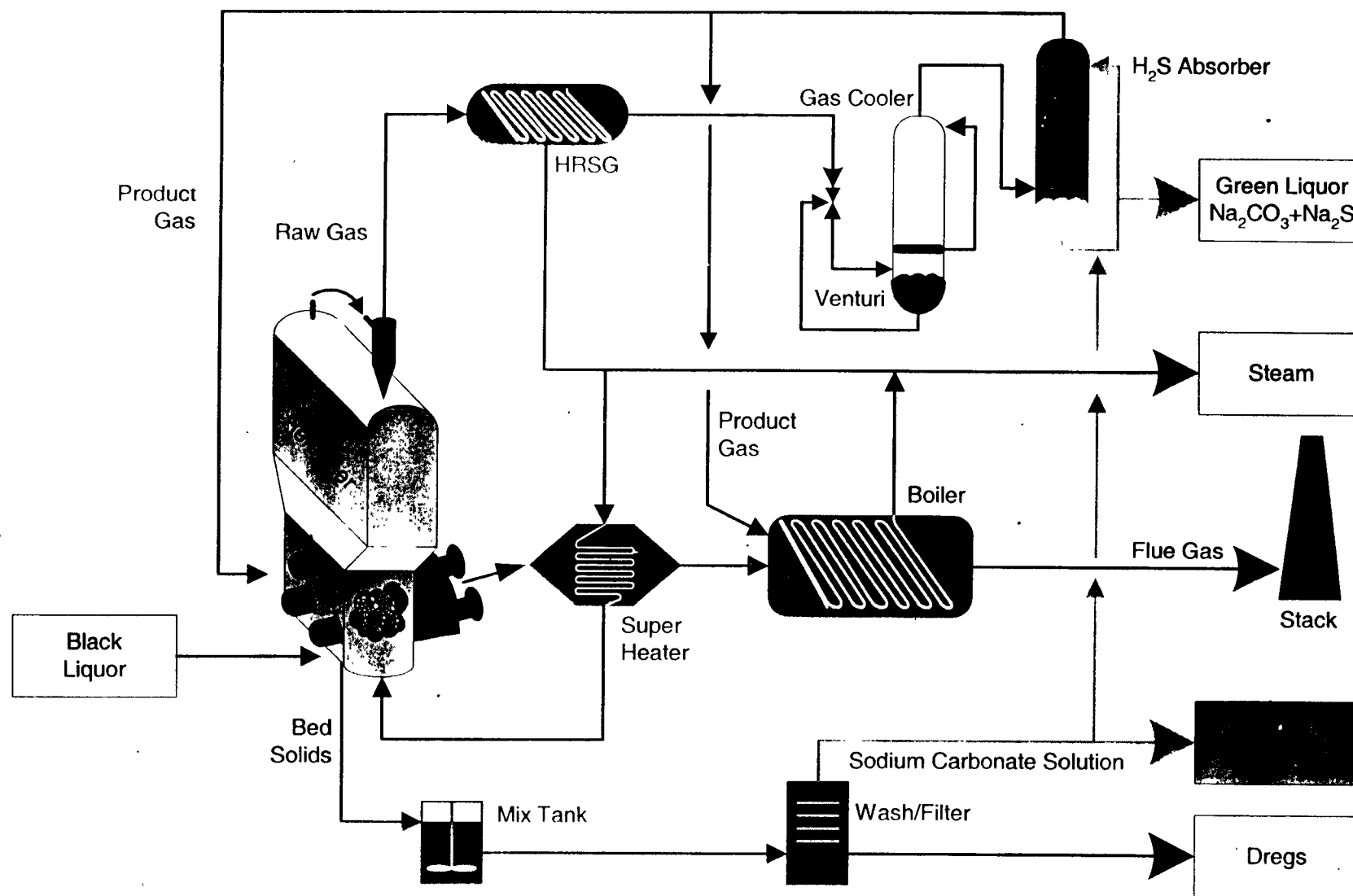


Figure F-20. Black Liquor Gasification System.



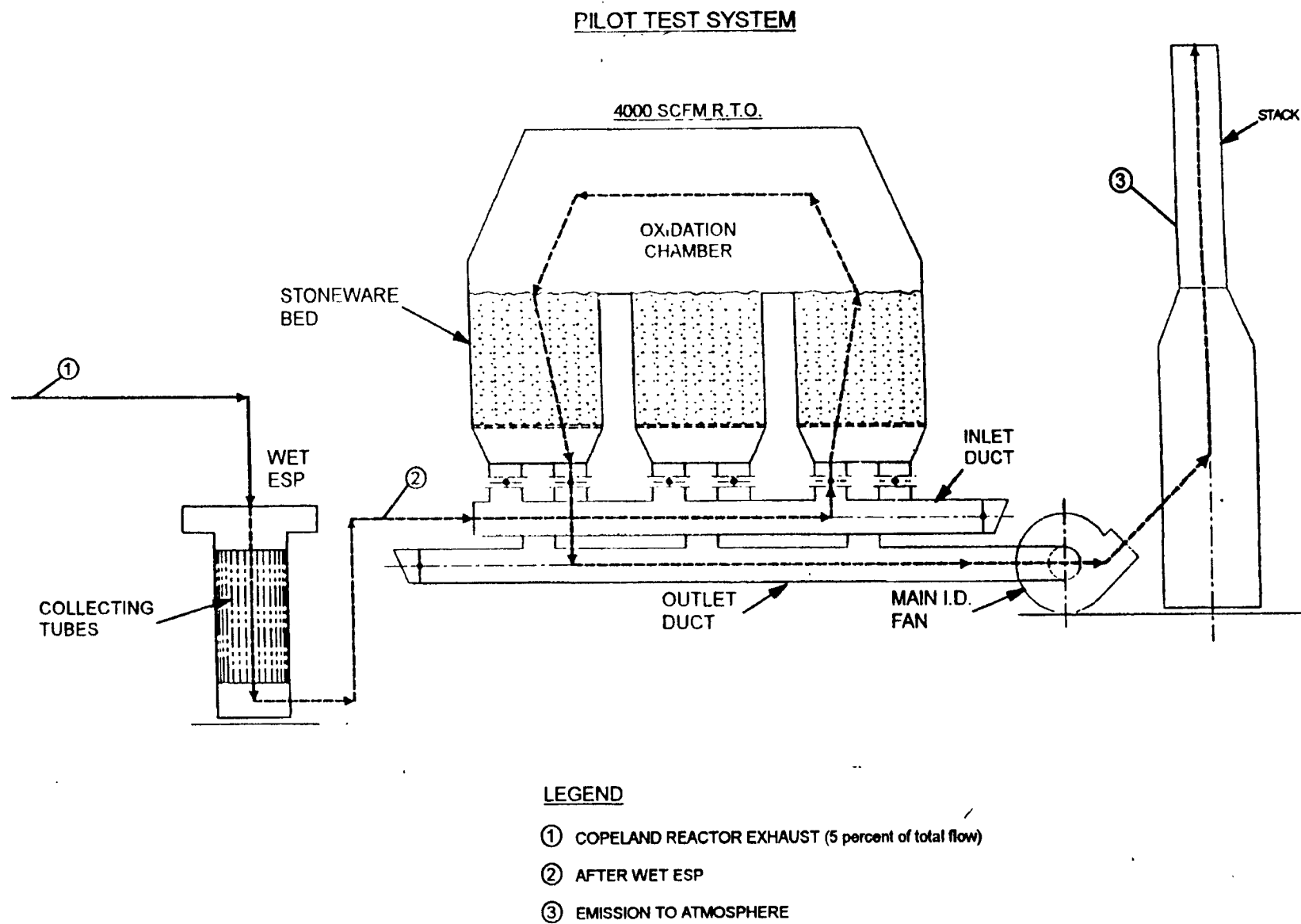


Figure F-21. Regenerative Thermal Oxidizer.



## **Appendix G**

### **Example Calculations**



### **Note**

This appendix includes two examples of how kraft and soda mills can use the equations in the Pulp and Paper Combustion Sources NESHAP to determine mill-specific PM emission limits for existing recovery furnaces, SDTs, and lime kilns at their mill as part of the PM bubble compliance alternative. Spreadsheet and data base programs (in Microsoft® Excel and Access) also have been prepared based on these equations to assist mills in determining the emission limits. (These programs are available for downloading at <http://www.epa.gov/ttn/atw/pulp/pulppg.html>.)

This appendix also includes examples of how kraft and soda mills can use the equations in the NESHAP to determine methanol emission rates for their new recovery furnace systems and determine oxygen corrections for their PM concentrations and gas flow rates. Finally, this appendix includes an example of how stand-alone semichemical mills can use the equations in the NESHAP to determine THC emission rates and percent THC reduction for their semichemical combustion units.



# OXYGEN CORRECTION

## EXAMPLE: MILL A

### ► PROCESS UNITS AT MILL A:

- 1 Recovery furnace (RF1)
- 1 Smelt dissolving tank (SDT1)
- 1 Lime kiln (LK1)

### ► RELEVANT DATA FROM RECENT STACK TESTS AT MILL A:

#### Recovery furnace test results:

Stack gas flowrate: 47.476 dscfm  
Volumetric oxygen concentration: 6 percent oxygen  
PM emissions: 0.053 gr/dscf

#### Lime kiln test results:

Stack gas flowrate: 6,295 dscfm  
Volumetric oxygen concentration: 9 percent oxygen  
PM emissions: 0.038 gr/dscf

Using emissions and process data from the recent stack test and Equations 7 and 8 provided in the regulation (see Appendix A), calculate PM concentrations and gas flow rates corrected for oxygen for Mill A as follows:

### PM OXYGEN CORRECTION EQUATION:

$$C_{\text{corr}} = C_{\text{meas}} * (21-X)/(21-Y) \quad (\text{Equation 7 in final rule})$$

Where:

$C_{\text{corr}}$	=	measured PM concentration corrected for oxygen, gr/dscf
$C_{\text{meas}}$	=	measured PM concentration uncorrected for oxygen, gr/dscf
X	=	corrected volumetric oxygen concentration, percent oxygen
Y	=	measured average volumetric oxygen concentration, percent oxygen

#### Constants in oxygen correction equation:

X	=	8 percent for kraft or soda recovery furnaces and sulfite combustion units
	=	10 percent for kraft or soda lime kilns

#### Stack test/process data from Mill A:

$C_{\text{meas}}$	=	0.053 gr/dscf for RF1
	=	0.038 gr/dscf for LK1
Y	=	6 percent oxygen for RF1
	=	9 percent oxygen for LK1



Therefore:

$$\begin{aligned} C_{\text{corr}} \text{ for RF1} &= 0.053 * (21 - 8)/(21 - 6) \\ &= \underline{0.046 \text{ gr/dscf at 8 percent oxygen}} \end{aligned}$$

$$\begin{aligned} C_{\text{corr}} \text{ for LK1} &= 0.038 * (21 - 10)/(21 - 9) \\ &= \underline{0.035 \text{ gr/dscf at 10 percent oxygen}} \end{aligned}$$

GAS FLOW RATE OXYGEN CORRECTION EQUATION:

$$Q_{\text{corr}} = Q_{\text{meas}} * (21 - Y)/(21 - X) \quad (\text{Equation 8 in final rule})$$

Where:

$$\begin{aligned} Q_{\text{corr}} &= \text{measured volumetric gas flow rate corrected for oxygen, dscfm} \\ Q_{\text{meas}} &= \text{measured volumetric gas flow rate uncorrected for oxygen, dscfm} \\ Y &= \text{measured average volumetric oxygen concentration, percent oxygen} \\ X &= \text{corrected volumetric oxygen concentration, percent oxygen} \end{aligned}$$

Constants in oxygen correction equation:

$$\begin{aligned} X &= 8 \text{ percent for kraft or soda recovery furnaces and sulfite combustion units} \\ &= 10 \text{ percent for kraft or soda lime kilns} \end{aligned}$$

Stack test/process data from Mill A:

$$\begin{aligned} Q_{\text{meas}} &= 47.476 \text{ dscfm for RF1} \\ &= 6.295 \text{ dscfm for LK1} \\ Y &= 6 \text{ percent oxygen for RF1} \\ &= 9 \text{ percent oxygen for LK1} \end{aligned}$$

Therefore:

$$\begin{aligned} Q_{\text{corr}} \text{ for RF1} &= 47.476 * (21 - 6)/(21 - 8) \\ &= \underline{54.780 \text{ dscfm at 8 percent oxygen}} \end{aligned}$$

$$\begin{aligned} Q_{\text{corr}} \text{ for LK1} &= 6.295 * (21 - 9)/(21 - 10) \\ &= \underline{6.867 \text{ dscfm at 10 percent oxygen}} \end{aligned}$$



## PM BUBBLE COMPLIANCE ALTERNATIVE

### EXAMPLE 1: MILL A ("SIMPLE" MILL)

#### ► PROCESS UNITS AT MILL A:

- 1 Recovery furnace (RF1)
- 1 Smelt dissolving tank (SDT1)
- 1 Lime kiln (LK1)

#### ► DATA FROM RECENT STACK TESTS AT MILL A:

##### Recovery furnace test results:

Stack gas flow rate: 54,780 dscfm @ 8 percent oxygen  
Black liquor solids firing rate: 450 ton BLS/d  
PM emissions: 0.046 gr/dscf @ 8 percent oxygen

##### Smelt dissolving tank test results:

Stack gas flow rate: 4,830 dscfm  
PM emissions: 0.050 gr/dscf

##### Lime kiln test results:

Stack gas flow rate: 6.867 dscfm @ 10 percent oxygen  
Lime production rate: 72 ton CaO/d  
PM emissions: 0.035 gr/dscf @ 10 percent oxygen



**Using emissions and process data from the recent stack test and equations provided in the regulation (see Appendix A), calculate/develop proposed PM emission limits for Mill A as follows:**

- STEP 1: Calculate the mill-specific (overall) PM bubble limit for Mill A.
- STEP 2: Substitute PM data from recent stack tests into appropriate equations to determine how close Mill A is to the PM bubble limit calculated in Step 1.
- STEP 3: Propose PM emission limits for the recovery furnace, SDT, and lime kiln based on the results of Step 2.
- STEP 4: Substitute proposed PM emission limits for each recovery furnace, SDT, and lime kiln into appropriate equations to determine if the total estimated PM emissions at the proposed emission levels are less than or equal to the overall PM bubble limit calculated in Step 1.
- STEP 5: If the total estimated PM emissions calculated in Step 4 are less than or equal to the overall PM bubble limit calculated in Step 1, Mill A can submit the proposed PM emission limits and supporting documentation to the permitting authority for approval; otherwise, Mill A repeats Steps 3 and 4 until the total estimated PM emissions calculated in Step 4 are less than or equal to the overall PM emission limit calculated in Step 1.
- STEP 6: After the proposed PM emission limits are approved by the permitting authority for each recovery furnace, SDT, and lime kiln, the overall PM bubble "limit" calculated in Step 1 is no longer used. The mill simply must comply with the approved permit limits for each piece of equipment.

*STEPS 1-5 are shown on the following pages for Mill A.*



## STEP 1: CALCULATE THE MILL-SPECIFIC PM BUBBLE LIMIT FOR MILL A:

### PM BUBBLE LIMIT EQUATION:

$$EL_{PM} = [(C_{ref,RF} * Q_{RFtot}) + (C_{ref,LK} * Q_{LKtot})] * F1 / BLS_{tot} + (EL_{ref,SDT})$$

*(Equation 1 in final rule)*

Where:

$EL_{PM}$	=	PM bubble limit (mill-specific), lb/ton BLS
$C_{ref,RF}$	=	reference PM concentration for recovery furnaces = <b>0.044 gr/dscf</b>
$Q_{RFtot}$	=	sum of stack gas flows from all recovery furnaces, dscfm
$C_{ref,LK}$	=	reference PM concentration for lime kilns = <b>0.064 gr/dscf</b>
$Q_{LKtot}$	=	sum of stack gas flows from all lime kilns, dscfm
$F1$	=	conversion factor, 0.206 lb*min/d*gr
$BLS_{tot}$	=	sum of black liquor solids fired in all recovery furnaces, ton/d
$EL_{ref,SDT}$	=	reference PM emission rate for SDTs = <b>0.20 lb/ton BLS</b>

### Constants in bubble equation:

$C_{ref,RF}$	=	0.044 gr/dscf
$C_{ref,LK}$	=	0.064 gr/dscf
$F1$	=	0.206 lb*min/d*gr
$EL_{ref,SDT}$	=	0.20 lb/ton BLS

### Stack test/process data from Mill A:

$Q_{RFtot}$	=	54.780 dscfm
$Q_{LKtot}$	=	6.867 dscfm
$BLS_{tot}$	=	450 ton BLS/d

Therefore:

$$EL_{PM} = [(0.044)(54,780) + (0.064)(6.867)] * (0.206/450) + 0.20$$
$$= \underline{\underline{1.505 \text{ lb/ton BLS}}}$$



**STEP 2: SUBSTITUTE PM DATA FROM RECENT STACK TESTS INTO APPROPRIATE EQUATIONS TO DETERMINE HOW CLOSE MILL A IS TO THE CALCULATED PM BUBBLE LIMIT:**

Total measured emissions,  $ER_{tot}$  must be less than or equal to 1.514 lb/ton BLS, which is the PM bubble limit calculated in Step 1,  $EL_{PM}$ .

$ER_{tot}$  is calculated as follows:

$$ER_{tot} = ER_{RFtot} + ER_{SDTtot} + ER_{LKtot} \quad (\text{Equation 6 in final rule})$$

Where:

$$\begin{aligned} ER_{tot} &= \text{total measured emissions from Mill A, lb/ton BLS} \\ ER_{RFtot} &= \text{total measured emissions from recovery furnaces, lb/ton BLS} \\ ER_{SDTtot} &= \text{total measured emissions from smelt dissolving tanks, lb/ton BLS} \\ ER_{LKtot} &= \text{total measured emissions from lime kilns, lb/ton BLS} \end{aligned}$$

**I. First calculate mass emission rate from recovery furnaces,  $ER_{RFtot}$ :**

Because there is only one recovery furnace at Mill A, the equation for  $ER_{RFtot}$  is:

$$ER_{RFtot} = F1 * C_{ELRF} * Q_{RF} / BLS \quad (\text{Equation 2 in final rule})$$

Where:

$$\begin{aligned} F1 &= \text{conversion factor} = 0.206 \text{ lb} * \text{min/d} * \text{gr} \\ C_{ELRF} &= \text{measured PM emissions from RF1 at Mill A} = 0.046 \text{ gr/dscf (see NOTE below)} \\ Q_{RF} &= \text{measured gas flow rate from RF1 at Mill A} = 54,780 \text{ dscfm} \\ BLS &= \text{firing rate of RF1 at Mill A} = 450 \text{ ton BLS/d} \end{aligned}$$

Therefore:

$$\begin{aligned} ER_{RFtot} &= 0.206 * 0.046 * 54,780 / 450 \\ &= \underline{\underline{1.154 \text{ lb/ton BLS}}} \end{aligned}$$

Note:  $C_{ELRF}$  is defined differently in the regulation because Equation 2 is intended to be used to determine the preliminary recovery furnace PM emission limit that the owner/operator will propose to the permitting authority; however, the same equation can be used here to determine the actual emission rate from the recovery furnace (based on the recent stack tests)



## II. Next, calculate mass emission rate from smelt dissolving tanks:

Because there is only one SDT at Mill A, the equation for  $ER_{SDT_{tot}}$  is:

$$ER_{SDT_{tot}} = F1 * C_{EL,SDT} * Q_{SDT} / BLS \quad (\text{Equation 3 in final rule})$$

Where:

$$\begin{aligned} F1 &= \text{conversion factor} = \mathbf{0.206 \text{ lb} * \text{min} / \text{d} * \text{gr}} \\ C_{EL,SDT} &= \text{measured PM emissions from SDT1 at Mill A} = \mathbf{0.050 \text{ gr/dscf}} \\ Q_{SDT} &= \text{measured gas flow rate from SDT1 at Mill A} = \mathbf{4,830 \text{ dscfm}} \\ BLS &= \text{firing rate of RF1 at Mill A} = \mathbf{450 \text{ ton BLS/d}} \end{aligned}$$

Therefore:

$$\begin{aligned} ER_{SDT_{tot}} &= 0.206 * 0.050 * 4,830 / 450 \\ &= \underline{\underline{0.111 \text{ lb/ton BLS}}} \end{aligned}$$

## III. Next, calculate mass emission rate from lime kilns:

Because there is only one lime kiln at Mill A, the equation for  $ER_{LK_{tot}}$  reduces to:

$$ER_{LK_{tot}} = F1 * C_{EL,LK} * Q_{LK} / BLS_{tot} \quad (\text{Equation 4 in final rule})$$

Where:

$$\begin{aligned} F1 &= \text{conversion factor} = \mathbf{0.206 \text{ lb} * \text{min} / \text{d} * \text{gr}} \\ C_{EL,LK} &= \text{measured PM emissions from LK1 at Mill A} = \mathbf{0.035 \text{ gr/dscf}} \\ Q_{LK} &= \text{measured gas flow rate from LK1 at Mill A} = \mathbf{6,867 \text{ dscfm}} \\ BLS_{tot} &= \text{firing rate of RF1 at Mill A} = \mathbf{450 \text{ ton BLS/d}} \end{aligned}$$

Therefore:

$$\begin{aligned} ER_{LK_{tot}} &= 0.206 * 0.035 * 6.867 / 450 \\ &= \underline{\underline{0.110 \text{ lb/ton BLS}}} \end{aligned}$$

## IV. Finally, determine the total emission rate for Mill A, $ER_{tot}$ :

$$\begin{aligned} ER_{tot} &= ER_{RF_{tot}} + ER_{LK_{tot}} + ER_{SDT_{tot}} \\ &= 1.154 + 0.111 + 0.110 \\ &= \underline{\underline{1.375 \text{ lb/ton BLS}}} \end{aligned} \quad (\text{Equation 6 in final rule})$$

**CONCLUSION:** MILL A IS BELOW THE OVERALL CALCULATED PM BUBBLE LIMIT OF 1.505 lb/ton BLS, BY 0.130 lb/ton BLS.



**STEP 3: PROPOSE PM EMISSION LIMITS FOR THE RECOVERY FURNACE, SDT, AND LIME KILN, BASED ON RESULTS OF STEP 2:**

In most cases, the Mill owner/operator will want to build in as much “cushion” as he/she can, so that the proposed permit limits will be somewhat above the historical performance of the equipment. For example, the following limits could be proposed based on the most recent stack data (see page A-1) and the results of Step 2:

Proposed limit for recovery furnace: **0.050 gr/dscf**

Proposed limit for SDT: **0.060 gr/dscf**

Proposed limit for lime kiln: **0.045 gr/dscf**

**STEP 4: SUBSTITUTE PROPOSED PM EMISSION LIMITS ( $C_{EL}$ ) FOR EACH RECOVERY FURNACE, SDT, AND LIME KILN INTO THE APPROPRIATE EQUATIONS TO DETERMINE IF THE TOTAL ESTIMATED PM EMISSIONS ( $ER_{tot}$ ) AT THE PROPOSED EMISSION LEVELS ARE LESS THAN OR EQUAL TO THE OVERALL PM BUBBLE LIMIT ( $EL_{PM}$ ) CALCULATED IN STEP 1:**

**I. Calculate the emission rate from RF1:**

$$\begin{aligned} ER_{RF1} &= F1 * C_{EL,RF} * Q_{RF} / BLS && \text{(Equation 2 in final rule)} \\ &= 0.206 * \mathbf{0.050} * 54,780 / 450 = \underline{\underline{1.254 \text{ lb/ton BLS}}} \end{aligned}$$

**II. Calculate the emission rate from SDT1:**

$$\begin{aligned} ER_{SDT1} &= F1 * C_{EL,SDT} * Q_{SDT} / BLS && \text{(Equation 3 in final rule)} \\ &= 0.206 * \mathbf{0.060} * 4,830 / 450 = \underline{\underline{0.133 \text{ lb/ton BLS}}} \end{aligned}$$

**III. Calculate the emission rate from LK1:**

$$\begin{aligned} ER_{LK1} &= F1 * C_{EL,LK} * Q_{LK} / BLS_{IC} && \text{(Equation 4 in final rule)} \\ &= 0.205 * \mathbf{0.045} * 6,867 / 450 = \underline{\underline{0.141 \text{ lb/ton BLS}}} \end{aligned}$$

**IV. Total the calculated PM emissions from each source:**

$$ER_{tot} = 1.254 + 0.133 + 0.141 = \underline{\underline{1.528 \text{ lb/ton BLS}}}$$

**V. Compare  $ER_{tot}$  with the mill-wide emission limit,  $EL_{PM}$ , calculated in Step 1:**

$$ER_{tot} (1.528) > EL_{PM} (1.505)$$



**VI. Because  $ER_{tot} > EL_{PM}$ , the owner or operator must redo Steps 3 and 4 (substituting increasingly more stringent proposed PM limits), until  $ER_{tot} \leq EL_{PM}$ .**

For example, if the proposed PM limit for the lime kiln (LK1) is tightened from 0.045 gr/dscf to 0.035 gr/dscf (and the proposed limits for the recovery furnace and SDT are unchanged), then  $ER_{tot} = 1.497$  lb/ton BLS, which is less than  $EL_{PM}$  (1.505 lb/ton BLS). Therefore, Mill A can propose these PM permit limits to the permitting authority.

**Table G-1** below shows the actual emission rates and proposed emission limits for Mill A along with the MACT emission limits for comparison.

**Table G-1. Results of Example Mill A**

	Stack test results	Proposed PM limit	MACT limits
RF1	0.046 gr/dscf	0.050 gr/dscf *	0.044 gr/dscf
SDT1	0.050 gr/dscf (0.111 lb/ton BLS)	0.060 gr/dscf * (0.133 lb/ton BLS)	— 0.20 lb/ton BLS
LK1	0.035 gr/dscf	0.035 gr/dscf *	0.064 gr/dscf
$ER_{tot}$	1.375 lb/ton BLS	1.497 lb/ton BLS	1.505 lb/ton BLS
$EL_{PM}$	1.505 lb/ton BLS	1.505 lb/ton BLS	1.505 lb ton/BLS

\* If these proposed limits are approved by the permitting authority, then these limits become part of Mill A's permit.

As shown in Example 1 (Mill A), the PM bubble allows a mill to propose some PM permit limits that are less stringent than the MACT limits (e.g., RF1) as long as the overall bubble limit value ( $EL_{PM}$ ) is met. In this example, this was achieved by proposing PM permit limits for the remaining sources (i.e., SDT1 and LK1) that were more stringent than the MACT limits.

**COMMENTS ON EXAMPLE 1—MILL A:**

In this example, the mill is performing sufficiently below the calculated PM bubble to allow for some "cushioning" of the proposed permit limits. However, to allow for potential emission variations and to ensure continuous compliance with the standards, Mill A might find it more practical to upgrade/replace the ESP on the recovery furnace so that the proposed PM emission limit for the recovery furnace can be lowered (which would significantly lower  $ER_{tot}$ ). For example, if the ESP were upgraded such that the recovery furnace could easily meet a proposed PM limit of 0.035 gr/dscf,  $ER_{tot}$  would be equal to 1.121 lb/ton BLS, which is significantly less than  $EL_{PM}$  (1.505 lb/ton BLS), assuming that the proposed PM limits for the SDT and lime kiln are unchanged. In addition, upgrading the recovery furnace ESP would allow the owner or operator to "loosen" the proposed permit limits for the SDT and lime kiln up until the point where  $ER_{tot} = EL_{PM}$ .



## EXAMPLE 2. MILL B ("TYPICAL" MILL)

### ► AFFECTED SOURCES AT MILL B:

Same sources found at Mill A (Example 1), e.g.,

- 1 Recovery furnace (RF1)
- 1 Smelt dissolving tank (SDT1)
- 1 Lime kiln (LK1)

Plus, four additional sources:

- Recovery furnace No. 2 (RF2)
- Smelt dissolving tanks, Nos. 2a and 2b (SDT2a and SDT2b)
- Lime kiln No. 2 (LK2)

### Assumptions:

- RF2 is subject to an existing PSD permit limit of **0.033 gr/dscf**
- SDT2a and SDT2b are subject to the NSPS limit of **0.20 lb/ton BLS**
- SDT 2a and 2b are the same size.

### ► DATA FROM STACK TESTS AT MILL B:

#### RF1 test results (same as Mill A):

- Stack gas flow rate: 54,780 dscfm @ 8 percent oxygen
- Black liquor solids firing rate: 450 ton BLS/d
- PM emissions: 0.046 gr/dscf @ 8 percent oxygen

#### RF2 test results:

- Stack gas flow rate: 236,730 dscfm @ 8 percent oxygen
- Black liquor solids firing rate: 1.950 ton BLS/d
- PM emissions: 0.028 gr/dscf @ 8 percent oxygen

#### SDT1 test results (same as Mill A):

- Stack gas flow rate: 4,830 dscfm
- PM emissions: 0.050 gr/dscf

#### SDT2a test results:

- Stack gas flow rate: 10,400 dscfm
- PM emissions: 0.057 gr/dscf

#### SDT2b test results:

- Stack gas flow rate: 10,520 dscfm
- PM emissions: 0.060 gr/dscf



**LK1 test results (same as Mill A):**

Stack gas flow rate: 6,867 dscfm @ 10 percent oxygen

Lime production rate: 72 ton CaO/d

PM emissions: 0.035 gr/dscf @ 10 percent oxygen

**LK2 test results:**

Stack gas flow rate: 29,760 dscfm @ 10 percent oxygen

Lime production rate: 312 ton CaO/d

PM emissions: 0.055 gr/dscf @ 10 percent oxygen

**Using emissions and process data from the recent stack test and equations provided in the final rule, calculate/develop proposed PM emission limits for Mill B as follows:**

- STEP 1: Calculate the mill-specific (overall) PM bubble limit for Mill B.
- STEP 2: Substitute PM data from recent stack tests into appropriate equations to determine how close Mill B is to the PM bubble limit calculated in Step 1.
- STEP 3: Propose PM emission limits for each recovery furnace, SDT, and lime kiln based on the results of Step 2.
- STEP 4: Substitute proposed PM emission limits for each recovery furnace, SDT, and lime kiln into appropriate equations to determine if the total estimated PM emissions at the proposed emission levels are less than or equal to the overall PM bubble limit calculated in Step 1.
- STEP 5: If the total estimated PM emissions calculated in Step 4 are less than or equal to the overall PM bubble limit calculated in Step 1, Mill B can submit the proposed PM emission limits and supporting documentation to the permitting authority for approval; otherwise, Mill B repeats Steps 3 and 4 until the total estimated PM emissions calculated in Step 4 are less than or equal to the overall PM bubble limit calculated in Step 1.
- STEP 6: After the proposed PM emission limits are approved by the permitting authority for each recovery furnace, SDT, and lime kiln, the overall PM bubble limit calculated in Step 1 is no longer used. The mill simply must comply with the approved permit limits for each piece of equipment.

**STEPS 1-5 are shown on the following pages for Mill B.**



## STEP 1: CALCULATE THE MILL-SPECIFIC PM BUBBLE LIMIT FOR MILL B:

PM BUBBLE LIMIT EQUATION:

(Equation 1 in final rule)

$$EL_{PM} = [(C_{ref,RF} * Q_{RFtot}) + (C_{ref,LK} * Q_{LKtot})] * F1 / BLS_{tot} + (EL_{ref,SDT})$$

Where:

$EL_{PM}$	=	PM bubble limit (mill-specific), lb/ton BLS
$C_{ref,RF}$	=	reference PM concentration for recovery furnaces, <b>0.044 gr/dscf</b>
$Q_{RFtot}$	=	sum of stack gas flows from all recovery furnaces, dscfm
$C_{ref,LK}$	=	reference PM concentration for lime kilns, <b>0.064 gr/dscf</b>
$Q_{LKtot}$	=	sum of stack gas flows from all lime kilns, dscfm
$F1$	=	conversion factor, 0.206 lb*min/d*gr
$BLS_{tot}$	=	sum of black liquor solids fired in all recovery furnaces, ton/d
$EL_{ref,SDT}$	=	reference PM emission rate for SDTs, <b>0.20 lb/ton BLS</b>

Constants in bubble equation:

$C_{ref,RF}$	=	0.044 gr/dscf
$C_{ref,LK}$	=	0.064 gr/dscf
$F1$	=	0.206 lb*min/d*gr
$EL_{ref,SDT}$	=	0.20 lb/ton BLS

Stack test/process data from Mill B:

$Q_{RFtot}$	=	54,780 + 236,730 = <b>291,510 dscfm</b>
$Q_{LKtot}$	=	6,867 + 29,760 = <b>36,627 dscfm</b>
$BLS_{tot}$	=	450 + 1,950 = <b>2,400 ton BLS/d</b>

Therefore:

$$\begin{aligned} EL_{PM} &= [(0.044)(291,510) + (0.064)(36,627)] * (0.206/2,400) + 0.20 \\ &= \underline{\underline{1.502 \text{ lb/ton BLS}}} \end{aligned}$$

## STEP 2: SUBSTITUTE PM DATA FROM RECENT STACK TESTS INTO APPROPRIATE EQUATIONS TO DETERMINE HOW CLOSE MILL B IS TO THE CALCULATED PM BUBBLE LIMIT:

Total measured emissions,  $ER_{tot}$ , must be less than or equal to 1.502 lb/ton BLS, which is the PM bubble limit calculated previously, ( $EL_{PM}$ ).

$ER_{tot}$  is calculated as follows:

$$ER_{tot} = ER_{RFtot} + ER_{SDTtot} + ER_{LKtot} \quad \text{(Equation 6 in final rule)}$$



Where:

$ER_{tot}$	=	total measured PM emissions from Mill B, lb/ton BLS
$ER_{RFtot}$	=	total measured PM emissions from recovery furnaces, lb/ton BLS
$ER_{SDTtot}$	=	total measured PM emissions from SDTs, lb/ton BLS
$ER_{LKtot}$	=	total measured PM emissions from lime kilns, lb/ton BLS

## I. First, calculate mass emission rate from recovery furnaces, $ER_{RFtot}$ :

Because there are two recovery furnaces at Mill B, the equation for  $ER_{RFtot}$  is:

$$ER_{RFtot} = (ER_{RF1} * PR_{RF1} / PR_{RFtot}) + (ER_{RF2} * PR_{RF2} / PR_{RFtot}) \quad (\text{Equation 5 in final rule})$$

$$ER_{RF1} = F1 * C_{EL, RF1} * Q_{RF1} / PR_{RF1} \quad (\text{Equation 2 in final rule})$$

Where:

F1	=	conversion factor = <b>0.206 lb*min/d*gr</b>
$C_{EL, RF1}$	=	measured emissions from RF1 at Mill B = <b>0.046 gr/dscf</b>
$Q_{RF1}$	=	measured gas flow rate from RF1 at Mill B = <b>54,780 dscfm</b>
$PR_{RF1}$	=	firing rate of RF1 at Mill A = <b>450 ton BLS/d</b>

$$ER_{RF2} = F1 * C_{EL, RF2} * Q_{RF2} / PR_{RF2} \quad (\text{Equation 2 in final rule})$$

Where:

F1	=	conversion factor = <b>0.206 lb*min/d*gr</b>
$C_{EL, RF2}$	=	measured emissions from RF2 at Mill B = <b>0.028 gr/dscf</b>
$Q_{RF2}$	=	measured gas flow rate from RF2 at Mill B = <b>236,730 dscfm</b>
$PR_{RF2}$	=	firing rate of RF2 at Mill A = <b>1,950 ton BLS/d</b>

and:

$$PR_{RFtot} = \text{total black liquor solids firing rate (both recovery furnaces): } \mathbf{2,400 \text{ ton BLS/d}}$$

Therefore:

$$\begin{aligned} ER_{RFtot} &= (0.206 * 0.046 * 54,780 / 450) * 450 / 2400 + \\ &\quad (0.206 * 0.028 * 236,730 / 1950) * 1950 / 2400 \\ &= \underline{\underline{0.785 \text{ lb/ton BLS}}} \end{aligned}$$

## II. Next, calculate mass emission rate from the 3 smelt dissolving tanks:

(See **Table G-2** for equations and resulting calculations)

$$ER_{SDTto} = \underline{\underline{0.126 \text{ lb/ton BLS}}}$$



**III. Next, calculate mass emission rate from lime kilns:**

(See **Table G-2** for equations and resulting calculations)

$$ER_{LKtot} = \underline{0.161 \text{ lb/ton BLS}}$$

**IV. Finally, determine the total emission rate for Mill B,  $ER_{tot}$ :**

$$\begin{aligned} ER_{tot} &= ER_{RFtot} + ER_{SDTtot} + ER_{LKtot} \\ &= 0.785 + 0.126 + 0.161 \\ &= \underline{1.072 \text{ lb/ton BLS}} \end{aligned}$$

**CONCLUSION: MILL B IS OPERATING SUBSTANTIALLY BELOW THE MILL-SPECIFIC PM BUBBLE LIMIT OF 1.502 lb/ton BLS.**

**STEPS 3 - 5: PROPOSE PM EMISSION LIMITS FOR EACH RECOVERY FURNACE, SDT, AND LIME KILN AT MILL B:**

As mentioned in Example 1 (Mill A), the owner/operator will want to build in as much “cushion” as he/she can, so that the proposed permit limits will be somewhat above the historical performance of the equipment. In this example, there are some restrictions. First, recovery furnace No. 2 must meet a PSD permit limit of 0.033 gr/dscf; therefore, the proposed permit limit for that recovery furnace cannot be less stringent than 0.033 gr/dscf. Second, the SDTs associated with recovery furnace No. 2 must meet the NSPS limit of 0.20 lb/ton BLS; therefore, the proposed permit limits for SDTs 2a and 2b must be less than or equal to 0.20 lb/ton BLS.

**Table G-2** shows how the equations in the final rule can be used to set the proposed permit limits. In this example, 3 different sets of proposed PM limits are shown along with the resulting total emission rates ( $ER_{tot}$ ). In each trial, the mill owner/operator tries to get  $ER_{tot}$  as close to  $EL_{PM}$  as possible without exceeding that value. On the third trial, the owner or operator is able to build a substantial cushion into most of the emission limits, while still meeting the total PM bubble limit,  $EL_{PM}$ .

In this example, Mill B is operating substantially under the mill-specific PM bubble limit, and therefore, Mill B has more flexibility in setting the permit limits for each piece of equipment than did Mill A in Example 1. Based on the results shown on the previous page, the Mill B owner or operator would submit the proposed emission limits from trial 3 (and the supporting documentation) to the permitting authority for approval. Once approved, the proposed PM emission limits would become part of the operating permit for the mill.



## EXAMPLE 2. (Continued)

Table G-2. Results of Example Mill B

Parameter	Description	Units	Use					
			Recent Stack Test Values	Substitute Preliminary PM Permit Limits (1)	Substitute Preliminary PM Permit Limits (2)	Substitute Preliminary PM Permit Limits (3)		
$ER_{RF1}$	emission limit for RF1	lb/ton BLS	1 154	1 630	1 881	1 956	$ER_{RF1} = F1 \cdot (C_{EL, RF1}) \cdot (Q_{RF1}) / (BLS_{RF1})$	(Equation 2 in final rule)
F1	conversion factor	min <sup>3</sup> /lb/d <sup>3</sup> gr	0 206	0 206	0 206	0 206	set value	
$C_{EL, RF1}$	"proposed" emission limit for RF1	gr/dscf	0 046	0 065	0 075	0 078	mill-specific	
$Q_{RF1}$	measured stack flow rate from RF1	dscfm	54,780	54,780	54,780	54,780	mill-specific	
$BLS_{RF1}$	measured BLS firing rate of RF1	ton BLS/d	450	450	450	450	mill-specific	
$ER_{RF2}$	emission limit for RF2	lb/ton BLS	0 700	0 825	0 825	0.825	$ER_{RF2} = F1 \cdot (C_{EL, RF2}) \cdot (Q_{RF2}) / (BLS_{RF2})$	(Equation 2 in final rule)
$C_{EL, RF2}$	"proposed" emission limit for RF2	gr/dscf	0 028	0 033	0 033	0 033	mill-specific	
$Q_{RF2}$	measured stack flow rate from RF2	dscfm	236,730	236,730	236,730	236,730	mill-specific	
$BLS_{RF2}$	measured BLS firing rate of RF2	ton BLS/d	1,950	1,950	1,950	1,950	mill-specific	
$PR_{RFtot}$	total BLS firing rates, all RFs	ton BLS/d	2400	2400	2400	2400	$(BLS_{RF1}) + (BLS_{RF2})$	
$ER_{RFtot}$	calculated emission rate, all RFs	lb/ton BLS	0 785	0 976	1 023	1.037	$ER_{RFtot} = (ER_{RF1}) \cdot (PR_{RF1}) / (PR_{RFtot}) + (ER_{RF2}) \cdot (PR_{RF2}) / (PR_{RFtot})$	(Equation 5 in final rule)
$ER_{SDT1}$	emission limit for SDT1	lb/ton BLS	0 111	0 166	0 199	0.199	$ER_{SDT1} = F1 \cdot (C_{EL, SDT1}) \cdot (Q_{SDT1}) / (BLS_{SDT1})$	(Equation 3 in final rule)
$C_{EL, SDT1}$	"proposed" emission limit for SDT1	gr/dscf	0 05	0.075	0.09	0.09	mill-specific	
$Q_{SDT1}$	measured stack flow rate from SDT1	dscfm	4,830	4,830	4,830	4,830	mill-specific	
$BLS_{SDT1}$	measured BLS firing rate of RF1	ton BLS/d	450	450	450	450	mill-specific	
$ER_{SDT2a}$	emission limit for SDT2a	lb/ton BLS	0 125	0 198	0 198	0 198	$ER_{SDT2a} = F1 \cdot (C_{EL, SDT2a}) \cdot (Q_{SDT2a}) / (BLS_{SDT2a})$	(Equation 3 in final rule)
$C_{EL, SDT2a}$	"proposed" emission limit for SDT2a	gr/dscf	0 057	0 09	0 09	0.09	mill-specific	
$Q_{SDT2a}$	measured stack flow rate from SDT2a	dscfm	10,400	10,400	10,400	10,400	mill-specific	
$BLS_{SDT2a}$	measured BLS firing rate of RF2*0.5	ton BLS/d	975	975	975	975	mill-specific	
$ER_{SDT2b}$	emission limit for SDT2b	lb/ton BLS	0 133	0 200	0 200	0 200	$ER_{SDT2b} = F1 \cdot (C_{EL, SDT2b}) \cdot (Q_{SDT2b}) / (BLS_{SDT2b})$	(Equation 3 in final rule)
$C_{EL, SDT2b}$	"proposed" emission limit for SDT2b	gr/dscf	0 06	0 09	0 09	0 09	mill-specific	
$Q_{SDT2b}$	measured stack flow rate from SDT2b	dscfm	10,520	10,520	10,520	10,520	mill-specific	
$BLS_{SDT2b}$	measured BLS firing rate of RF2*0.5	ton BLS/d	975	975	975	975	mill-specific	
$PR_{SDTtot}$	total BLS firing rates, all RFs	ton BLS/d	2400	2400	2400	2400	same as $PR_{RFtot}$	
$ER_{SDTtot}$	calculated emission rate, all SDTs	lb/ton BLS	0 126	0 193	0 199	0.199	$ER_{SDTtot} = (ER_{SDT1}) \cdot (PR_{SDT1}) / (PR_{SDTtot}) + (ER_{SDT2a}) \cdot (PR_{SDT2a}) / (PR_{SDTtot}) + (ER_{SDT2b}) \cdot (PR_{SDT2b}) / (PR_{SDTtot})$	(Equation 5 in final rule)
$ER_{LK1}$	emission limit for LK1	lb/ton BLS	0 110	0.189	0 189	0.189	$ER_{LK1} = F1 \cdot (C_{EL, LK1}) \cdot (Q_{LK1}) \cdot (CaO_{tot} / BLS_{tot}) / CaO_{LK1}$	(Equation 4 in final rule)
$C_{EL, LK1}$	"proposed" emission limit for LK1	gr/dscf	0 035	0.06	0 06	0.06	mill-specific	
$Q_{LK1}$	measured stack flow rate from LK1	dscfm	6,867	6,867	6,867	6,867	mill-specific	
$CaO_{LK1}$	measured lime production from LK1	ton CaO/d	72	72	72	72	mill-specific	
$BLS_{tot}$	total BLS firing rates, all RFs	ton BLS/d	2400	2400	2400	2400		
$ER_{LK2}$	emission limit for LK2	lb/ton BLS	0 173	0 236	0 283	0.283	$ER_{LK2} = F1 \cdot (C_{EL, LK2}) \cdot (Q_{LK2}) \cdot (CaO_{tot} / BLS_{tot}) / CaO_{LK2}$	(Equation 4 in final rule)
$C_{EL, LK2}$	"proposed" emission limit for LK2	gr/dscf	0 055	0 075	0 09	0 09	mill-specific	
$Q_{LK2}$	measured stack flow rate from LK2	dscfm	29,760	29,760	29,760	29,760	mill-specific	
$CaO_{LK2}$	measured lime production from LK2	ton CaO/d	312	312	312	312	mill-specific	
$PR_{LKtot} (CaO_{tot})$	total lime production, all LKs	ton CaO/d	384	384	384	384	$(CaO_{LK1}) + (CaO_{LK2})$	
$ER_{LKtot}$	calculated emission rate, all LKs	lb/ton BLS	0 161	0 227	0 265	0 265	$ER_{LKtot} = (ER_{LK1}) \cdot (PR_{LK1}) / (PR_{LKtot}) + (ER_{LK2}) \cdot (PR_{LK2}) / (PR_{LKtot})$	(Equation 5 in final rule)
$ER_{tot}$	total emission rate, all sources	lb/ton BLS	1 072	1 399	1 487	1 501	$ER_{tot} = ER_{RFtot} + ER_{SDTtot} + ER_{LKtot}$	



## METHANOL EMISSIONS

### EXAMPLE: MILL C

#### ► AFFECTED SOURCES AT MILL C:

- 1 existing DCE recovery furnace (RF1) and associated BLO unit (BLO1)
- 1 new NDCE recovery furnace with dry ESP system (RF2)
- 1 new NDCE recovery furnace with wet ESP system (RF3)
- 1 existing smelt dissolving tank (SDT1)
- 2 new smelt dissolving tanks (SDT2 and SDT3)
- 2 existing lime kilns (LK1 and LK2)

#### ► RELEVANT DATA FROM RECENT STACK TESTS AT MILL C:

Because the gaseous organic HAP emission limit for kraft and soda recovery furnaces only applies to new sources, only the new NDCE recovery furnaces would be subject to the requirements. Also, because NDCE recovery furnaces with dry ESP systems are not required to conduct an initial performance test, only RF3 (new NDCE recovery furnace with wet ESP system) would be required to test.

##### RF3 test results:

Black liquor solids firing rate: 2,000 ton BLS/d

Methanol emissions: 0.82 lb/hr

Using emissions and process data from the recent stack test and Equation 9 provided in the regulation (see Appendix A), calculate methanol emission rate for RF3 at Mill C as follows:

$$ER_{NDCE} = (MR_{meas, RF3}) / (BLS_{RF3}) \quad (\text{Equation 9 in final rule})$$

Where:

$ER_{NDCE}$  = methanol emission rate from NDCE recovery furnace, lb/ton of black liquor solids fired

$MR_{meas, RF3}$  = average measured methanol mass emission rate from RF3, lb/hr

$BLS_{RF3}$  = average black liquor solids firing rate for RF3, ton/hr; determined using process data measured during the performance test

##### Stack test/process data from Mill C:

$$MR_{meas, RF3} = 0.82 \text{ lb/hr}$$

$$BLS_{RF3} = (2,000 \text{ ton BLS/d}) * (1 \text{ d/24 hr}) = 83.3 \text{ ton/hr}$$

Therefore:

$$\begin{aligned} ER_{NDCE} &= (0.82) / (83.3) \\ &= \underline{\underline{0.0098 \text{ lb/ton of black liquor solids fired}}} \end{aligned}$$



## TOTAL HYDROCARBON EMISSIONS

### EXAMPLE: MILL D

#### ► AFFECTED SOURCES AT MILL D:

1 Semichemical combustion unit (fluidized-bed reactor) (FBR1)

#### ► RELEVANT DATA FROM RECENT STACK TESTS AT MILL D:

##### Test results:

Black liquor solids firing rate: 30,000 ton BLS/d

Control device inlet THC emissions: 77.2 lb/hr

Control device outlet THC emissions: 5.9 lb/hr

Using emissions and process data from the recent stack test and Equations 11 or 12 provided in the regulation (see Appendix A), calculate THC emission rate or THC percent reduction for Mill D as follows:

#### SEMICHEMICAL COMBUSTION UNIT THC EMISSION RATE EQUATION:

$$ER_{SCCU} = (THC_{meas})/(BLS) \quad (Equation 11 in final rule)$$

Where:

$$\begin{aligned} ER_{SCCU} &= \text{THC emission rate from each semichemical combustion unit, lb/ton of black liquor solids fired} \\ THC_{meas} &= \text{measured THC mass emission rate, lb/hr} \\ BLS &= \text{average black liquor solids firing rate, ton/hr; determined using process data measured during the performance test} \end{aligned}$$

##### Stack test/process data from Mill D:

$$\begin{aligned} ER_{SCCU} &= 5.9 \text{ lb/hr} \\ BLS &= (30,000 \text{ ton BLS/d}) * (1 \text{ d}/24 \text{ hr}) = 1,250 \text{ ton/hr} \end{aligned}$$

Therefore:

$$\begin{aligned} ER_{SCCU} &= (5.9)/(1,250) \\ &= \underline{0.0047 \text{ lb/ton of black liquor solids fired}} \end{aligned}$$

#### SEMICHEMICAL COMBUSTION UNIT PERCENT REDUCTION EQUATION

$$(\%R_{THC}) = [(E_i - E_o)/E_i] * 100 \quad (Equation 12 in final rule)$$

Where:

$$\%R_{THC} = \text{percentage reduction of THC emissions achieved}$$



$E_i$  = measured THC mass emission rate at the THC control device inlet, lb/hr  
 $E_o$  = measured THC mass emission rate at the THC control device outlet, lb/hr

Stack test/process data from Mill D:

$E_i$  = 77.2 lb/hr

$E_o$  = 5.9 lb/hr

Therefore:

$\%R_{\text{THC}}$  =  $[(77.2 - 5.9)/77.2] * 100$

= 92.4 percent reduction



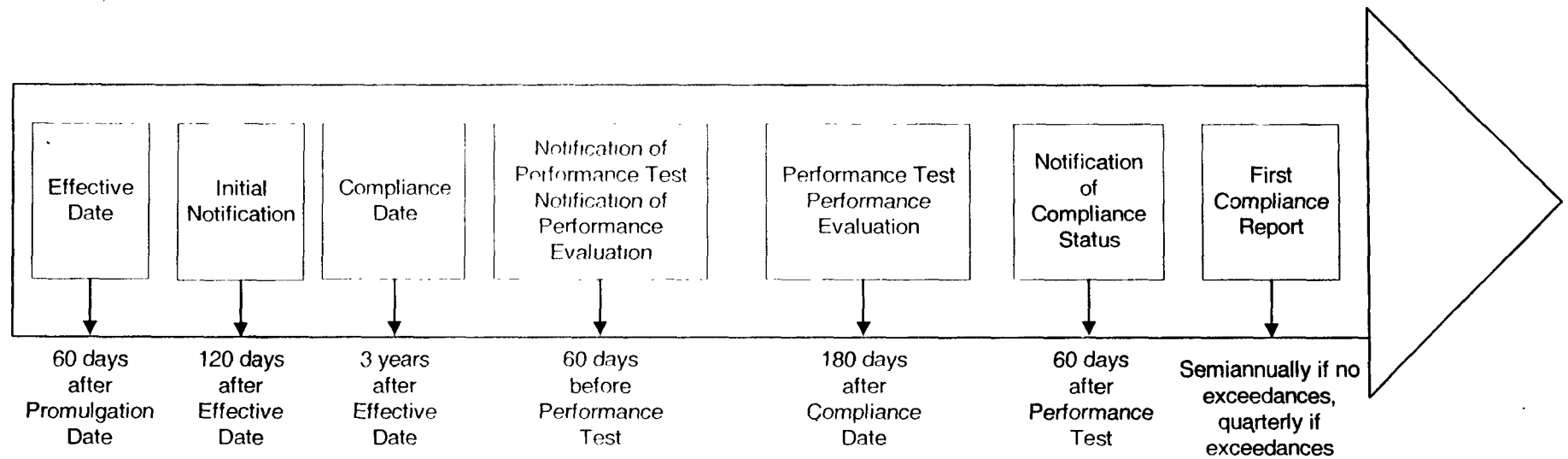
## **Appendix H**

### **Compliance Timelines for Existing and New Sources**



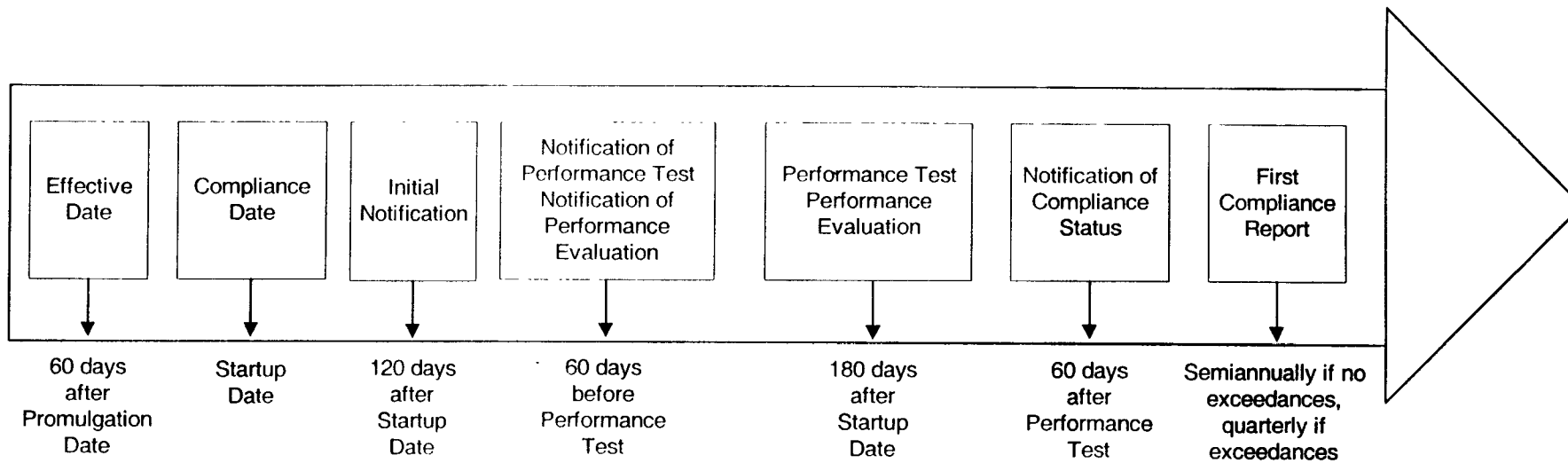






**Figure H-1.** Compliance Timeline for Existing Sources and Area Sources that Become Major Sources.





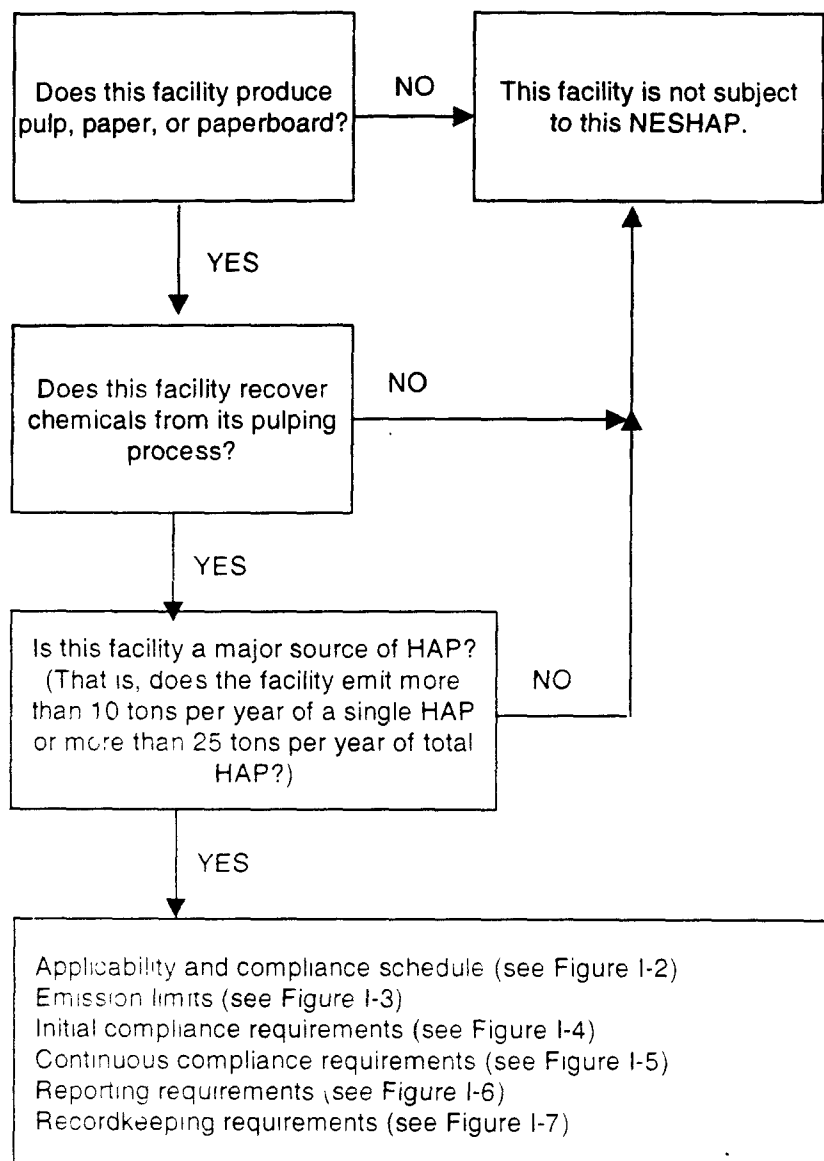
**Figure H-2.** Compliance Timeline for New or Reconstructed Sources with Startup after Promulgation Date.



## **Appendix I**

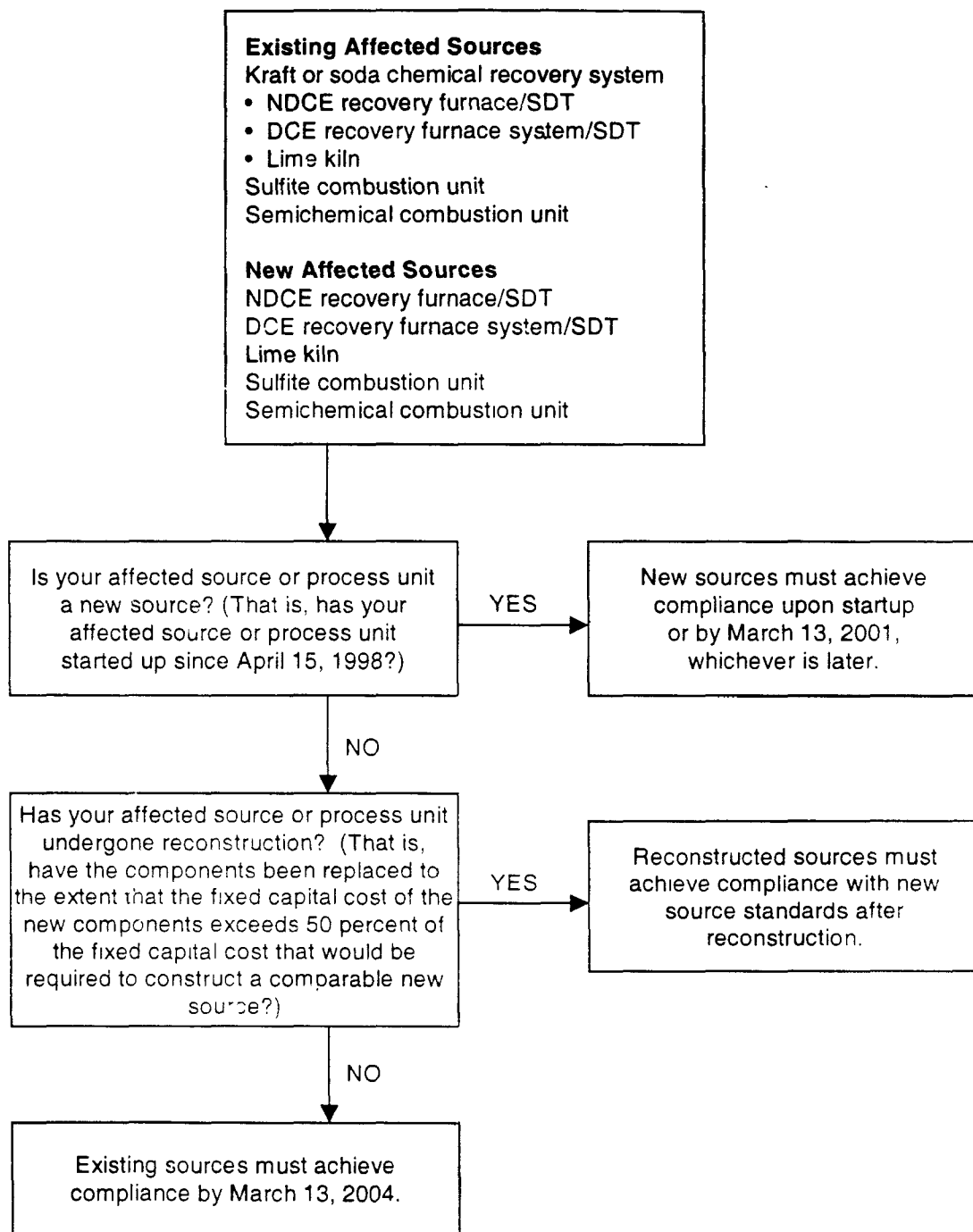
### **Flowchart Summary of the NESHAP**





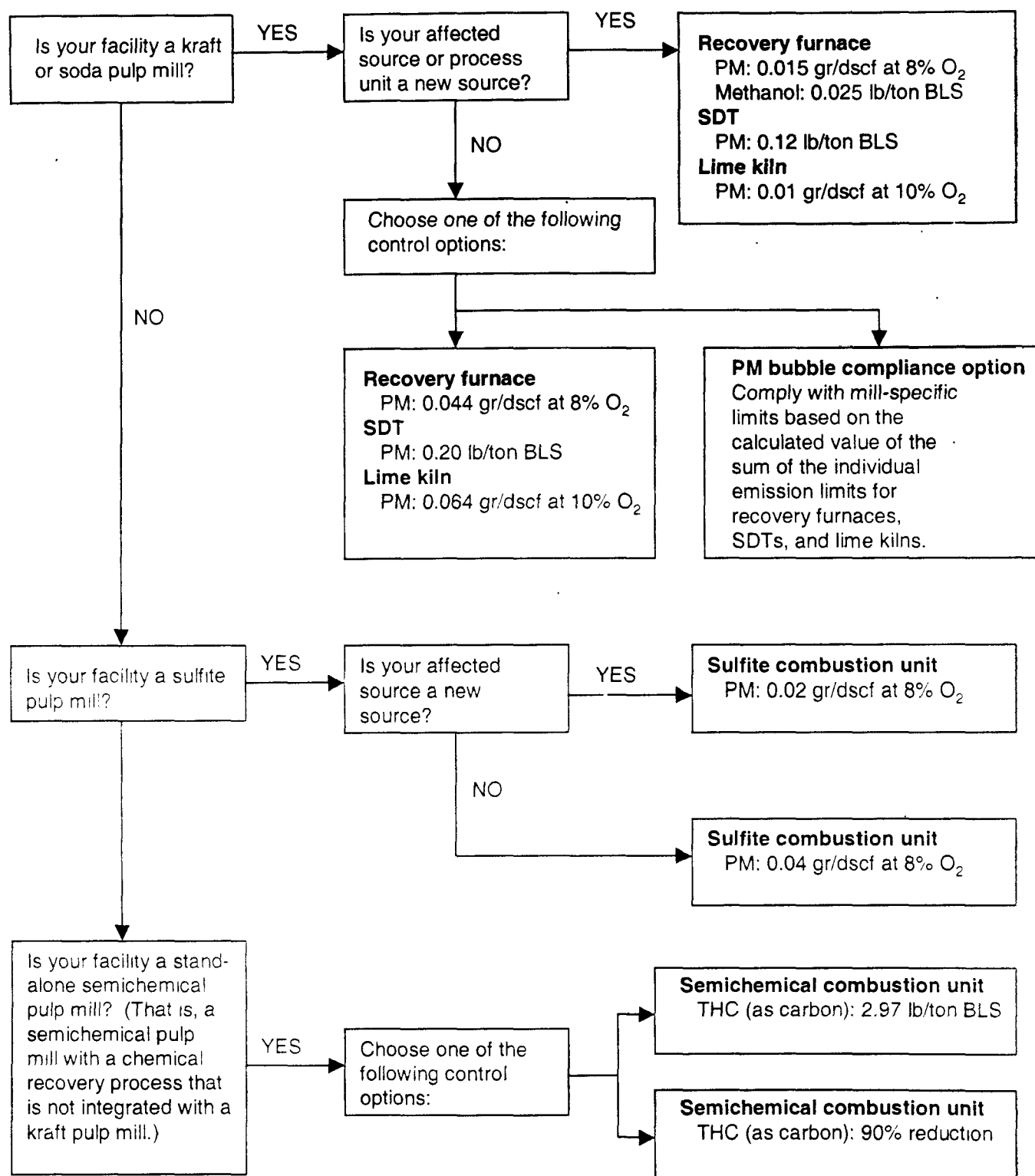
**Figure I-1. Mill Applicability**





**Figure I-2.** Applicability and Compliance Schedule





**Figure I-3. Emission Limits**



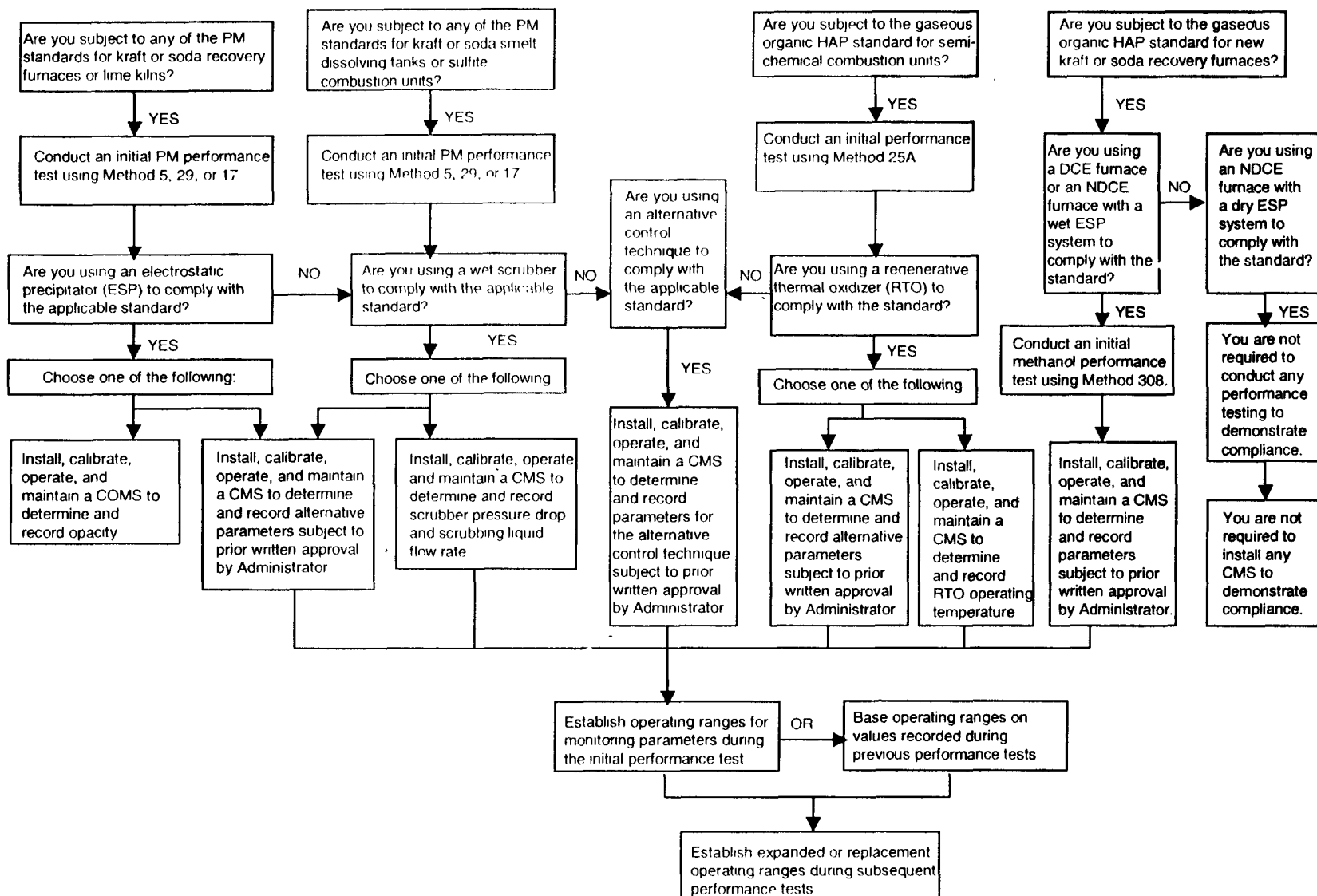


Figure I-4. Initial Compliance Requirements



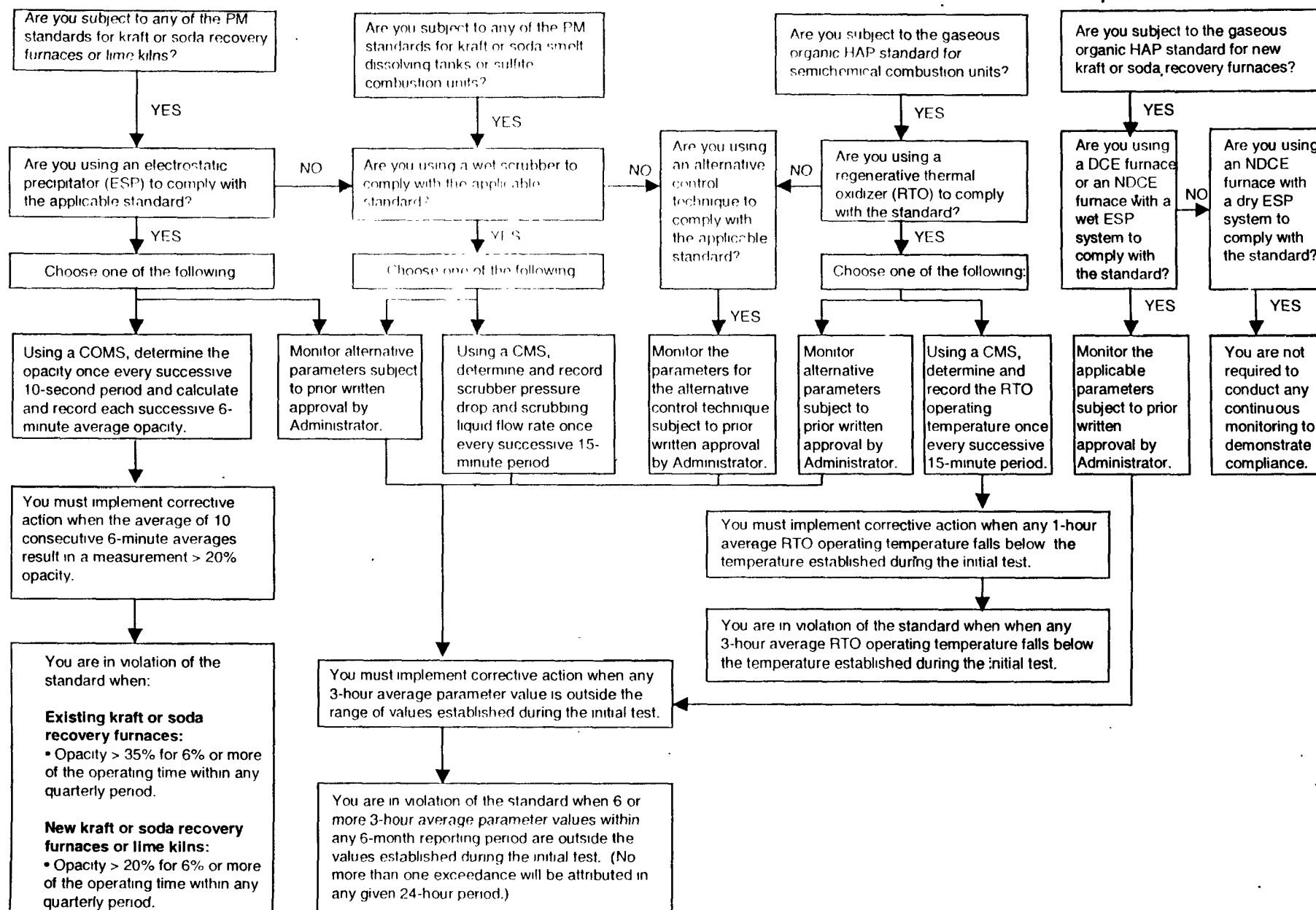
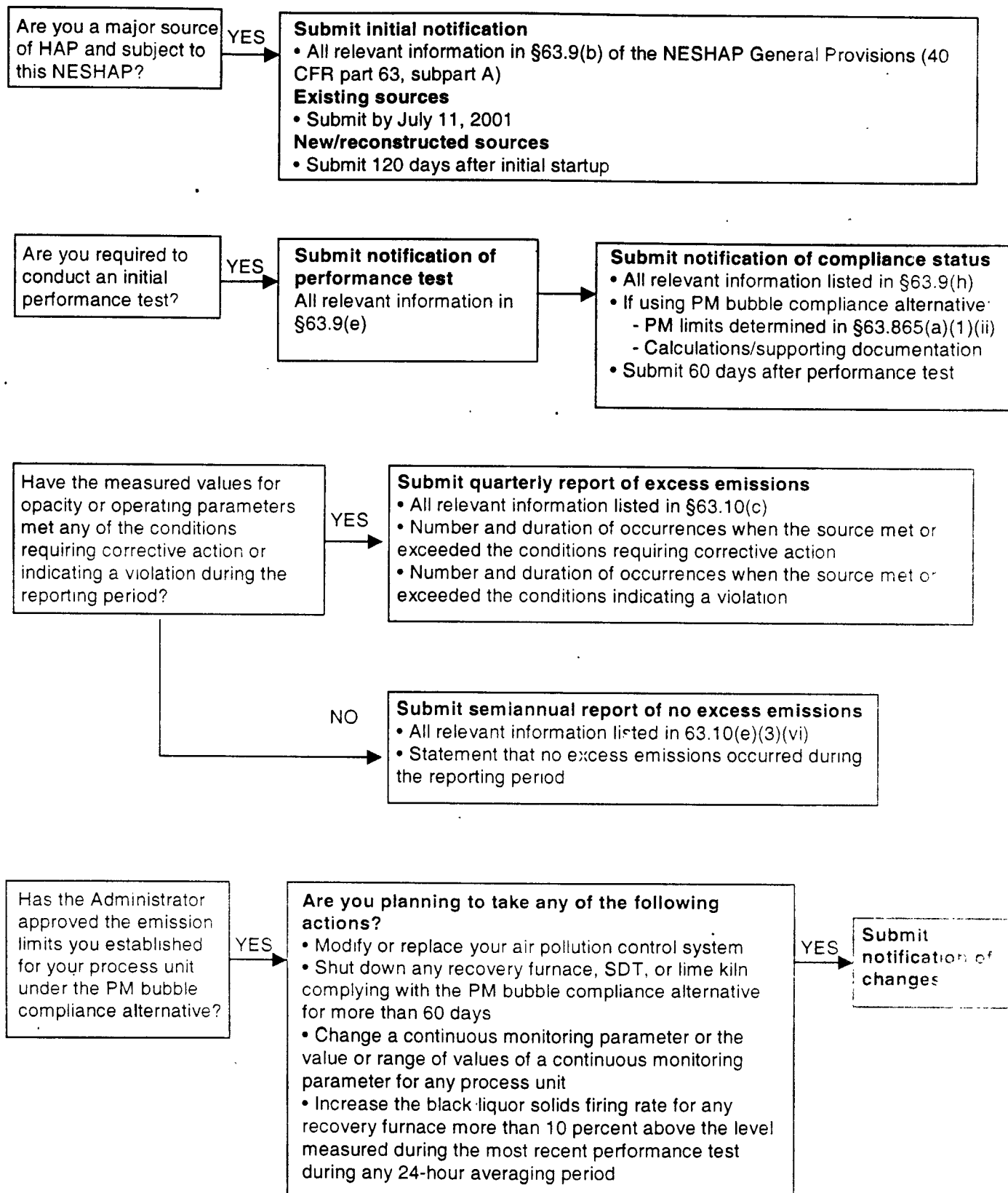


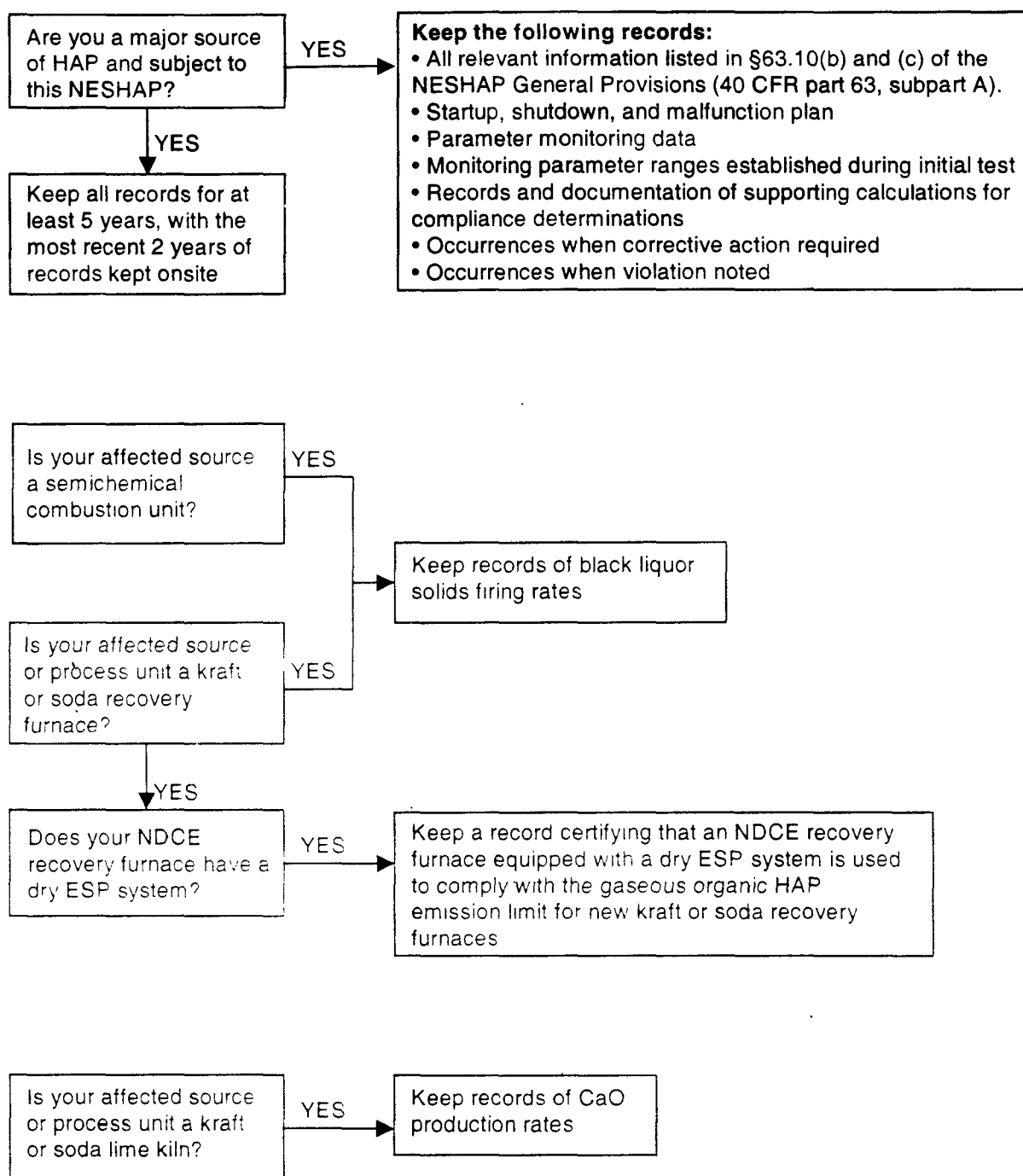
Figure I-5. Continuous Compliance Requirements





**Figure I-6. Reporting Requirements**





**Figure I-7. Recordkeeping Requirements**



## Inspection Checklist

Applicable Rule: 40 CFR Part 63, Subpart MM - National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills

### General Information

Facility Name \_\_\_\_\_

Facility Location \_\_\_\_\_

Facility TRI ID No. \_\_\_\_\_

Date of Inspection \_\_\_\_\_

Inspector(s) name	Title/Affiliation	Phone Number
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____



## Applicability

	Facility Applicability	Comments
1.	My facility produces pulp, paper, or paperboard. <span style="float: right;"><input type="checkbox"/> Yes <input type="checkbox"/> No</span>	
2.	My facility recovers chemicals from its pulping process. <span style="float: right;"><input type="checkbox"/> Yes <input type="checkbox"/> No</span>	
3.	My facility is a major source of hazardous air pollutants (that is, emits at least 10 tons/yr of any HAP OR at least 25 tons/yr of any combination of HAP). <span style="float: right;"><input type="checkbox"/> Yes <input type="checkbox"/> No</span>	
4.	My affected source or process unit started up on or before April 15, 1998. <span style="float: right;"><input type="checkbox"/> Yes <input type="checkbox"/> No</span>	

If you answer NO to question 1, 2, or 3, do not continue. This rule does not apply to your facility. If you answer YES to questions 1, 2, and 3, your facility is subject to the rule and you will need to answer questions for each part of your plant. If you answer YES to question 4, you will need to answer the questions that apply to existing sources. If you answer NO to question 4, you will need to answer the questions that apply to new sources. Start with question 5 and answer each question that applies to you.



## Emission Limits

This section covers requirements for all affected sources and process units to which the NESHAP applies. For each **new** affected source, you are in compliance if you answer YES to each of the following questions 5 through 10 which apply.

Emission Limits For New Affected Sources			
No.	Question	Answer	Comments
5.	I am maintaining an outlet PM concentration of 0.015 gr/dscf at 8 percent oxygen from my kraft or soda recovery furnace.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
6.	I am maintaining an outlet methanol emission rate of 0.025 lb/ton BLS from my kraft or soda recovery furnace system.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
7.	I am maintaining an outlet PM emission rate of 0.12 lb/ton BLS from my kraft or soda smelt dissolving tank.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
8.	I am maintaining an outlet PM concentration of 0.01 gr/dscf at 10 percent oxygen from my kraft or soda lime kiln.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
9.	I am maintaining an outlet PM concentration of 0.02 gr/dscf at 8 percent oxygen from my sulfite combustion unit	<input type="checkbox"/> Yes <input type="checkbox"/> No	
10.	I am maintaining an outlet THC emission rate of 2.97 lb/ton BLS from my semichemical combustion unit <b>OR</b> I am reducing THC emissions from my semichemical combustion unit by at least 90 percent	<input type="checkbox"/> Yes <input type="checkbox"/> No	

For each **existing** affected source or process unit, you are in compliance if you answer YES to each of the following questions 11 through 17 which apply.

Emission Limits For Existing Affected Sources Or Process Units			
No.	Question	Answer	Comments
11.	I am complying with the provisions of the PM bubble compliance alternative for all process units in my chemical recovery system (all existing recovery furnaces, smelt dissolving tanks and lime kilns at the mill) which operate at least 6,300 hours per year <b>OR</b> I am complying with items 13, 14, and 15.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
12.	I am complying with items 13, 14, and 15 for any process units in my chemical recovery system (any existing recovery furnaces, smelt dissolving tanks, and lime kilns at the mill) which operate less than 6,300 hours per year.	<input type="checkbox"/> Yes <input type="checkbox"/> No	
13.	I am maintaining an outlet PM concentration of 0.044 gr/dscf at 8 percent oxygen from my kraft or soda recovery furnace.	<input type="checkbox"/> Yes <input type="checkbox"/> No	



**Emission Limits**

14. I am maintaining an outlet PM emission rate of 0.20 lb/ton BLS ☐ Yes ☐ No  
from my kraft or soda smelt dissolving tank.
15. I am maintaining an outlet PM concentration of 0.064 gr/dscf at ☐ Yes ☐ No  
10 percent oxygen from my kraft or soda lime kiln.
16. I am maintaining an outlet PM concentration of 0.04 gr/dscf at 8 ☐ Yes ☐ No  
percent oxygen from my sulfite combustion unit.
17. I am maintaining an outlet THC emission rate of 2.97 lb/ton ☐ Yes ☐ No  
BLS from my semichemical combustion unit **OR** I am reducing  
THC emissions from my semichemical combustion unit by at  
least 90 percent.



## Initial Compliance Requirements

For each affected source or process unit, you have demonstrated initial compliance if you answer YES to each of the following questions 18 through 31 which apply.

No.	Compliance Question		Yes	No
18.	I have conducted all required initial PM performance tests for my sulfite combustion units and my kraft or soda recovery furnaces, smelt dissolving tanks, and lime kilns using Method 5, 29, or 17.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19.	I have conducted all required initial methanol performance tests for my new kraft or soda DCE recovery furnace systems and NDCE recovery furnace systems with wet ESP systems using Method 308. (No initial methanol performance test is required for NDCE recovery furnace systems with dry ESP systems.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.	I have conducted all required initial THC performance tests for my semichemical combustion units using Method 25A.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21.	I have calculated the PM concentrations and emission rates from the initial PM performance tests and am meeting all of the applicable PM emission limits in items 5, 7 through 9, and 11 through 16	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22.	I have calculated the methanol emission rates from the initial methanol performance tests and am meeting the methanol emission limit in item 6	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23.	I have calculated the THC emission rates from the initial THC performance tests and am meeting either of the THC emission limits in items 10 and 17	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



24. If I am using the PM bubble compliance alternative, I have done the following:
- a. Determined the overall PM emission limit for my chemical recovery system according to the equations in Appendix G using the reference concentrations (emission limits in items 13, 14, and 15) for the process units in my chemical recovery system. ☐ Yes ☐ No
  - b. Established mill-specific PM emission limits for all of the process units in my chemical recovery system. ☐ Yes ☐ No
  - c. Used these established emission limits to determine the overall PM emission rate for my chemical recovery system according to the equations in Appendix G. ☐ Yes ☐ No
  - d. Determined that the overall PM emission rate calculated in item 24c is less than or equal to the overall PM emission limit calculated in item 24a. ☐ Yes ☐ No
  - e. Applied for and received approval from the Administrator to use the mill-specific PM emission limits established in item 24c. ☐ Yes ☐ No
- 
25. I have installed and calibrated the continuous opacity monitoring system for my kraft or soda recovery furnaces and lime kilns equipped with ESPs. ☐ Yes ☐ No
- 
26. I have installed and calibrated continuous monitoring systems for scrubber pressure drop and scrubbing liquid flow rate for my sulfite combustion units, kraft or soda recovery furnaces, kraft or soda smelt dissolving tanks, and kraft or soda lime kilns equipped with wet scrubbers. ☐ Yes ☐ No
- 
27. I have installed and calibrated the continuous monitoring system for RTO operating temperature for my semichemical combustion units equipped with RTOs. ☐ Yes ☐ No
- 
28. If I decide to use alternative monitoring parameters to demonstrate compliance, I have applied for and received approval from the Administrator to use the alternative monitoring parameters, and I have installed and calibrated continuous monitoring systems to measure the alternative monitoring parameters. ☐ Yes ☐ No
- 
29. If I decide to use an alternative control device to comply, I have applied for and received approval from the Administrator to use the alternative control device and the associated monitoring parameters, and I have installed and calibrated continuous monitoring systems to measure the monitoring parameters for the alternative control device. ☐ Yes ☐ No



**Initial Compliance Requirements**

**No. Question**

30. I have established operating values or ranges for my monitoring parameters during the initial performance test, other previous performance tests, and/or any additional performance tests according the specified requirements. ☐ Yes ☐ No

31. I have certified that all control techniques and processes have not been modified subsequent to the testing upon which the data used to establish the monitoring parameter ranges were obtained. ☐ Yes ☐ No



## Continuous Compliance Requirements

For each affected source or process unit, you have demonstrated continuous compliance if you answer YES to each of the following questions 32 through 52 which apply.

Continuous Compliance Requirements	
32.	I am maintaining and operating the continuous opacity monitoring systems for my kraft or soda recovery furnaces and lime kilns equipped with ESPs. <input type="checkbox"/> Yes <input type="checkbox"/> No
33.	I am maintaining and operating continuous monitoring systems for scrubber pressure drop and scrubbing liquid flow rate for my sulfite combustion units, kraft or soda recovery furnaces, kraft or soda smelt dissolving tanks, and kraft or soda lime kilns equipped with wet scrubbers. <input type="checkbox"/> Yes <input type="checkbox"/> No
34.	I am maintaining and operating the continuous monitoring system for RTO operating temperature for my semichemical combustion units equipped with RTOs. <input type="checkbox"/> Yes <input type="checkbox"/> No
35.	If I decide to use alternative monitoring parameters to demonstrate compliance, I am maintaining and operating the continuous monitoring systems for the alternative parameters. <input type="checkbox"/> Yes <input type="checkbox"/> No
36.	If I decide to use an alternative control device to comply, I am maintaining and operating the continuous monitoring systems for the parameters for my alternative control device <input type="checkbox"/> Yes <input type="checkbox"/> No
37.	I am determining the opacity for my kraft or soda recovery furnaces or lime kilns equipped with ESPs at least once every successive 10-second period and calculating and recording each successive 6-minute average opacity using the specified procedures <input type="checkbox"/> Yes <input type="checkbox"/> No
38.	I am determining and recording the scrubber pressure drop and scrubbing liquid flow rate for my sulfite combustion units, kraft or soda recovery furnaces, kraft or soda smelt dissolving tanks, and kraft or soda lime kilns equipped with wet scrubbers at least once every 15-minute period using the specified procedures. <input type="checkbox"/> Yes <input type="checkbox"/> No
39.	I am determining and recording the RTO operating temperature for my semichemical combustion units equipped with RTOs at least once every 15-minute period using the specified procedures <input type="checkbox"/> Yes <input type="checkbox"/> No
40.	If I decide to use alternative monitoring parameters to demonstrate compliance, I am determining and recording the alternative parameters according to the frequency approved by the Administrator. <input type="checkbox"/> Yes <input type="checkbox"/> No



# Continuous Compliance Requirements

41. If I decide to use an alternative control device to comply, I am determining and recording the parameters for the control device according to the frequency approved by the Administrator. ☐ Yes ☐ No

---

42. I am implementing corrective action when the average of 10 consecutive 6-minute averages result in a measurement greater than 20 percent opacity for my kraft or soda recovery furnaces and lime kilns equipped with ESPs. ☐ Yes ☐ No

---

43. I am implementing corrective action when any 3-hour average scrubber parameter value (scrubber pressure drop or scrubbing liquid flow rate) is outside the range of values established in my performance test(s) for my sulfite combustion units, kraft or soda recovery furnaces, kraft or soda smelt dissolving tanks, and kraft or soda lime kilns equipped with wet scrubbers. ☐ Yes ☐ No

---

44. I am implementing corrective action when any 1-hour average RTO operating temperature falls below the temperature value established in my performance test(s) for my semichemical combustion units equipped with RTOs. ☐ Yes ☐ No

---

45. If I decide to use alternative monitoring parameters to demonstrate compliance, I am implementing corrective action when any 3-hour average value of the alternative parameters are outside the range of values established in my performance test(s). ☐ Yes ☐ No

---

46. If I decide to use an alternative control device to comply, I am implementing corrective action when any 3-hour average value for the parameters for my alternative control device are outside the range of values established in my performance test(s). ☐ Yes ☐ No

---

47. To avoid being in violation of the standard, I am preventing opacity from being greater than 35 percent for 6 percent or more of the operating time within any quarterly period for my existing kraft or soda recovery furnaces equipped with ESPs. ☐ Yes ☐ No

---

48. To avoid being in violation of the standard, I am preventing opacity from being greater than 20 percent for 6 percent or more of the operating time within any quarterly period for my new kraft or soda recovery furnaces and existing or new kraft or soda lime kilns equipped with ESPs. ☐ Yes ☐ No

---

49. To avoid being in violation of the standard, I am preventing six or more 3-hour average scrubber parameter values (scrubber pressure drop or scrubbing liquid flow rate) from being outside the range of values established in my performance test(s) for my sulfite combustion units, kraft or soda recovery furnaces, kraft or soda smelt dissolving tanks, and kraft or soda lime kilns equipped with wet scrubbers.<sup>a</sup> ☐ Yes ☐ No



Continuous	Comments
------------	----------

50. To avoid being in violation of the standard, I am preventing any 3-hour average RTO operating temperature from falling below the temperature established in my performance test(s) for my semichemical combustion units equipped with RTOs. ☐ Yes ☐ No

51. If I decide to use alternative monitoring parameters to demonstrate compliance, to avoid being in violation of the standard, I am preventing six or more 3-hour average values for the alternative parameters from being outside the range of values established in my performance test(s).<sup>a</sup> ☐ Yes ☐ No

52. If I decide to use an alternative control device to comply, to avoid being in violation of the standard, I am preventing six or more 3-hour average values for the parameters for my alternative control device from being outside the range of values established in my performance test(s).<sup>a</sup> ☐ Yes ☐ No

<sup>a</sup> For the purposes of determining the number of nonopacity monitoring exceedances, no more than one exceedance will be attributed in any given 24-hour period



## Recordkeeping Requirements

For each affected source or process unit, you are meeting the recordkeeping requirements if you answer YES to each of the following questions 53 through 61 which apply.

Question	Requirement	Yes	No
53.	I have developed and implemented a startup, shutdown, and malfunction plan that includes the information described in Table 11.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
54.	I am maintaining records of the relevant information listed in §63.10(b) and (c) of the NESHAP General Provisions (40 CFR part 63, subpart A).	<input type="checkbox"/> Yes	<input type="checkbox"/> No
55.	I am maintaining records of the parameter monitoring data described in Table 11.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
56.	I am maintaining records of occurrences when corrective action is required as described in Table 11.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
57.	I am maintaining records of occurrences when violation is noted as described in Table 11.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
58.	I am maintaining records of black liquor solids firing rates for my kraft or soda recovery furnaces and semichemical combustion units.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
59.	I am maintaining records of CaO production rates for my kraft or soda lime kilns.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
60.	I am maintaining records of monitoring parameter ranges established in my performance test(s).	<input type="checkbox"/> Yes	<input type="checkbox"/> No
61.	If I have an NDCE recovery furnace equipped with a dry ESP system, I am maintaining a certification that this equipment is used to comply with the gaseous organic HAP emission limit for new recovery furnaces.	<input type="checkbox"/> Yes	<input type="checkbox"/> No



## Reporting Requirements

For each affected source or process unit, you are meeting the reporting requirements if you answer YES to each of the following questions 62 through 70 which apply.

	Reporting Requirements		Yes	No
62.	I have submitted an initial notification containing the relevant information listed in §63.9(b) of the NESHAP General Provisions. <sup>a</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63.	If I need an extension of compliance, I have submitted an extension request containing the relevant information listed in §63.9(c) of the NESHAP General Provisions. <sup>a</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64.	If my source is subject to special compliance requirements, I have submitted a notification of this containing the relevant information listed in §63.9(d) of the NESHAP General Provisions. <sup>a</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65.	I have submitted a notification of performance test containing the relevant information listed in §63.9(e) of the NESHAP General Provisions. <sup>a</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
66.	I have submitted additional notifications related to CMS containing the relevant information listed in §63.9(g) of the NESHAP General Provisions. <sup>a</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67.	I have submitted a notification of compliance status containing the information described in Table 12.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
68.	If I decide to use the PM bubble compliance alternative, I have submitted a notification if I make any of the changes described in Table 12.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
69.	If my measured parameters meet any of the conditions requiring corrective action or indicating a violation, I have submitted a quarterly report of excess emissions containing the information described in Table 12.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
70.	If no exceedances of parameters have occurred, I have submitted a semiannual report of no excess emissions containing the information described in Table 12.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<sup>a</sup> The NESHAP General Provisions can be found in 40 CFR part 63, subpart A.



## **Appendix K**

### **Example Notifications and Compliance Reports**



## Initial Notification

Applicable Rule: 40 CFR Part 63, Subpart MM - National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills

1. Print or type the following general information for each pulp mill in which chemical recovery operations are performed:

Owner/Operator/Title: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Plant Name: \_\_\_\_\_  
Plant Contact/Title: \_\_\_\_\_  
Plant Contact Phone Number (optional): \_\_\_\_\_  
Plant Address (if different than owner/operator's)  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

2. Provide the following information as appropriate:

- The affected source's compliance date: \_\_\_\_\_
- A brief description of the nature, size, design, and method of operation of the affected source, including its operating design capacity:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- An identification of each point of emission for each hazardous air pollutant:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- A statement of whether the affected source is a major source or an area source:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



## Application for Approval of Construction or Reconstruction

Applicable Rule: 40 CFR Part 63, Subpart MM - National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills

1. Print or type the following general information for each pulp mill in which chemical recovery operations are performed:

Owner/Operator/Title: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Plant Name: \_\_\_\_\_  
Plant Contact/Title: \_\_\_\_\_  
Plant Contact Phone Number (optional): \_\_\_\_\_  
Plant Address (if different than owner/operator's)  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

2. When do you plan to commence construction or reconstruction of the new major affected source?: \_\_\_\_\_
3. In addition to the information requested above, please include the following information in each application for approval of construction or reconstruction:
  - Notification that you intend to construct a new major affected source or make any physical change or operational change to a major affected source that may meet or has been determined to meet the criteria for a "reconstruction," as defined in §63.2 of the NESHAP General Provisions (40 CFR part 63, subpart A)
  - The expected completion date of the construction or reconstruction: \_\_\_\_\_
  - The anticipated date of initial start-up of the source: \_\_\_\_\_
  - The type and quantity of HAP emitted by the source, reported in units and averaging times, or, if actual emissions data are not yet available, an estimate of the type and quantity of HAP expected to be emitted by your source (in units and averaging times):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

4. In addition to the information requested above, please include the following information in each application for approval of construction:
  - Technical information describing the proposed nature, size, design, operating design capacity, and method of operation of the source:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



- An identification of each point of emission for each hazardous air pollutant that is emitted (or could be emitted):  


---

---

---
  - A description of the planned air pollution control equipment for each emission point, including each control device for each hazardous air pollutant and the estimated control efficiency (percent) for each control device:  


---

---

---
  - A description of the planned air pollution control method for each emission point, including an estimated control efficiency:  


---

---

---
  - Calculations of emission estimates:  


---

---

---
5. In addition to the information requested above, please include the following information in each application for approval of reconstruction:
- A brief description of the affected source and the components that are to be replaced:  


---

---

---
  - A description of present and proposed emission control systems, including each control device, its estimated control efficiency, and calculations of emission estimates in sufficient detail for the EPA to evaluate the control efficiency determination:  


---

---

---
  - An estimate of the fixed capital cost of the replacements: \_\_\_\_\_
  - An estimate of the cost of constructing a comparable entirely new source: \_\_\_\_\_
  - The estimated life of the affected source after the replacements: \_\_\_\_\_
  - Discuss any economic or technical problems that you may have in complying with these requirements after the proposed replacements:  


---

---

---



## Notification of Compliance Status

This is a sample form for Notification of Compliance Status that can be used by facilities at their discretion to meet the requirements in the Chemical Recovery Combustion Sources NESHAP.

Applicable Rule: 40 CFR Part 63, Subpart MM - National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills

1. Print or type the following general information for your pulp and paper mill:

Owner/Operator/Title: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Plant Name: \_\_\_\_\_  
Plant Contact/Title: \_\_\_\_\_  
Plant Contact Phone Number (optional): \_\_\_\_\_  
Plant Address (if different than owner/operator's)  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

2. Provide the following information, as appropriate:

- The methods that were used to determine compliance
- The results of all performance tests
- The results of all continuous monitoring system performance evaluations
- The methods that will be used for determining continuing compliance, including a description of monitoring and reporting requirements and test methods
- The type and quantity of hazardous air pollutants emitted by the source (or surrogate pollutants specified in subpart MM), reported in units and averaging times and in accordance with the test methods specified in subpart MM
- An analysis demonstrating whether the affected source is a major source or an area source (using the emissions data generated for this notification)
- A description of the air pollution control equipment (or method) for each emission point, including each control device (or method) for each hazardous air pollutant and the control efficiency (percent) for each control device (or method)
- A statement by the owner or operator of the affected existing, new, or reconstructed source as to whether the source has complied with the relevant standard or other requirements
- The PM emission limits determined in §63.865(a)(1)(ii) of subpart MM
- The calculations and supporting documentation for the PM emission limits determined in §63.865(a)(1)(ii) of subpart MM



## Excess Emissions Report

This is a sample form for Excess Emissions Report that can be used by facilities at their discretion to meet the requirements in the Chemical Recovery Combustion Sources NESHAP.

**Applicable Rule: 40 CFR Part 63, Subpart MM - National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills**

**1. Print or type the following general information for your pulp and paper mill:**

Owner/Operator/Title: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Plant Name: \_\_\_\_\_  
Plant Contact/Title: \_\_\_\_\_  
Plant Contact Phone Number (optional): \_\_\_\_\_  
Plant Address (if different than owner/operator's)  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

**2. Provide the following information, as appropriate:**

- Identification of each hazardous air pollutant monitored at the affected source
- The beginning and ending dates of the reporting period
- A brief description of the process units
- The emission and operating parameter limitations specified in subpart MM
- The monitoring equipment manufacturer(s) and model number(s)
- The date of the latest continuous monitoring system certification or audit
- The total process operating time of the affected source during the reporting period
- An emission data or control system parameter summary, including the following: (1) Specific identification of each period of excess emissions and parameter monitoring exceedances that occurs during startups, shutdowns, and malfunctions of affected source, (2) specific identification of each period of excess emissions and parameter monitoring exceedances that occurs during periods other than startups, shutdowns, and malfunctions of affected source, (3) number and duration of occurrences when the source met or exceeded the conditions in §63.864(c)(1) of subpart MM requiring corrective action, (4) number and duration of occurrences when the source met or exceeded the conditions in §63.864(c)(2) in subpart MM indicating a violation, (5) total duration of excess emissions during the reporting period, (6) total duration of excess emissions expressed as a percent of the total source operating time during that reporting period, and (7) a breakdown of the total duration of excess emissions during the reporting period into those that are due to startup/shutdown, control equipment problems, process problems, other known causes, and other unknown causes.
- A continuous monitoring system summary, including the following: (1) date and time identifying each period during which the continuous monitoring system was inoperative except for zero (low-level) and high-level checks, (2) date and time identifying each period during



which the continuous monitoring system was out of control, (3) nature and cause of any malfunction, (4) corrective actions taken or preventive measures adopted, (5) nature of the repairs or adjustments to continuous monitoring system that was inoperative or out of control, (6) total continuous monitoring system downtime during the reporting period, (7) total duration of continuous monitoring system downtime expressed as a percent of the total source operating time during that reporting period, and (8) a breakdown of the total continuous monitoring system downtime during the reporting period into those that are due to monitoring equipment malfunctions, nonmonitoring equipment malfunctions, quality assurance/quality control calibrations, other known causes, and other unknown causes.

- All information necessary to demonstrate conformance with the startup, shutdown, and malfunction plan when all actions taken during periods of startup, shutdown, and malfunction are consistent with the procedures specified in the startup, shutdown, and malfunction plan
- A description of any changes in continuous monitoring systems, processes, or controls since the last reporting period
- The name, title, and signature of the responsible official who is certifying the accuracy of the report
- The date of the report



## Summary Report

This is a sample form for Summary Report that can be used by facilities at their discretion to meet the requirements in the Chemical Recovery Combustion Sources NESHAP.

**Applicable Rule: 40 CFR Part 63, Subpart MM - National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills**

1. Print or type the following general information for your pulp and paper mill:

Owner/Operator/Title: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Plant Name: \_\_\_\_\_  
Plant Contact/Title: \_\_\_\_\_  
Plant Contact Phone Number (optional): \_\_\_\_\_  
Plant Address (if different than owner/operator's)  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

2. Provide the following information, as appropriate:

- Identification of each hazardous air pollutant monitored at the affected source
- The beginning and ending dates of the reporting period
- A brief description of the process units
- The emission and operating parameter limitations specified in subpart MM
- The monitoring equipment manufacturer(s) and model number(s)
- The date of the latest continuous monitoring system certification or audit
- The total process operating time of the affected source during the reporting period
- Statement that no excess emissions occurred during the reporting period
- A description of any changes in continuous monitoring systems, processes, or controls since the last reporting period
- The name, title, and signature of the responsible official who is certifying the accuracy of the report
- The date of the report



## **Appendix L**

### **Technical Report Data Sheet**



<b>TECHNICAL REPORT DATA</b> <i>(Please read Instructions on reverse before completing)</i>			
1. REPORT NO <b>EPA-456/R-01-003</b>		2	
4. TITLE AND SUBTITLE <b>Pulp and Paper Combustion Sources NESHAP: A Plain English Description</b>		3. RECIPIENT'S ACCESSION NO	
		5. REPORT DATE <b>September 2001</b>	
7. AUTHOR(S)		6. PERFORMING ORGANIZATION CODE	
9. PERFORMING ORGANIZATION NAME AND ADDRESS <b>Midwest Research Institute 5520 Dillard Road, Suite 100 Cary, NC 27511</b>		8. PERFORMING ORGANIZATION REPORT NO	
12. SPONSORING AGENCY NAME AND ADDRESS <b>Office of Air Quality Planning and Standards U.S. Environmental Protection Agency Research Triangle Park, NC 27711</b>		10. PROGRAM ELEMENT NO <b>10203A</b>	
		11. CONTRACT/GRANT NO <b>68-D6-0012</b>	
15. SUPPLEMENTARY NOTES		13. TYPE OF REPORT AND PERIOD COVERED <b>Final (1991-2001)</b>	
		14. SPONSORING AGENCY CODE	
16. ABSTRACT National emission standards for hazardous air pollutants (NESHAP) were promulgated on January 12, 2001 for chemical recovery combustion sources in the pulp and paper industry under authority of Section 112(d) of the Clean Air Act as amended in 1990. This implementation document contains an overview of the NESHAP and its requirements, other Federal regulations affecting pulp and paper mills, and other information. Appendices to this document contain a list of affected pulp and paper mills, the final NESHAP and technical corrections, a flowchart summary of the NESHAP, compliance timelines, a list of EPA Regional Office contacts, equipment diagrams, inspection checklists, responses to commonly asked questions, a glossary of commonly used terms, example notifications and compliance reports, and example calculations.			
17. KEY WORDS AND DOCUMENT ANALYSIS			
a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
black liquor black liquor gasification black liquor oxidation chemical recovery combustion source fluidized-bed reactor kraft pulp mill lime kiln particulate matter		recovery furnace red liquor rotary liquor kiln smelt dissolving tank smelter soda pulp mill stand-alone semichemical pulp mill sulfite pulp mill	air pollution control hazardous air pollutants MACT NESHAP pulp and paper mills
18. DISTRIBUTION STATEMENT <b>Release Unlimited</b>		19. SECURITY CLASS (Report) <b>Unclassified</b>	21. NO. OF PAGES <b>220</b>
		20. SECURITY CLASS (Page) <b>Unclassified</b>	22. PRICE