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www.epa.gov/ttn/uatw/pulp/pulppg.html

Pulp and Paper NESHAP: A Plain English Description

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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 Source Category: Pulp and Paper Production* (April 15, 1998, 63 FR 18504) for purposes of application of the rule to any specific mill.

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Amendments to the Cluster Rule are being drafted and will be posted on the Technology Transfer Network (TTN) at **www.epa.gov/ttn/uatw/pulp/pulppg.html**. You should periodically check this website for amendments and/or other relevant information.

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Chapter 1 - Introduction

The U.S. Environmental Protection Agency (EPA) published the National Emission Standards for Hazardous Air Pollutants (NESHAP) for the Pulp and Paper Industry (40 CFR 63, Subpart S) on April 15, 1998 as part of the Pulp and Paper Cluster Rules. The NESHAP affects existing and new major sources that chemically and nonchemically pulp wood and non-wood fibers for pulp and paper production. The NESHAP requires these sources to control hazardous air pollutant (HAP) emissions using the maximum achievable control technology (MACT). The Cluster Rules also revised the effluent limitations guidelines and standards under the Clean Water Act for pulp mills that make bleached papergrade products.

1.1 What does this document do?

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

This document focuses on the NESHAP and describes:

- the pulping and bleaching processes
- the requirements of the NESHAP
- the scope of effluent limitations guidelines and standards revisions
- additional references and sources of information about pulp and paper mills

1.2 Why do I need this document?

You need this document because it will help you understand the NESHAP. Implementation of the pulp and paper NESHAP is complex for both affected mills and regulators because:

- There is a tremendous amount of variability in the pulp and paper industry with respect to processes, equipment, and products. For example, the task of turning wood into pulp is performed by different processes using different equipment and different chemicals at kraft mills, sulfite mills, and mechanical pulping mills. As a result, different emission points must be controlled at each type of mill.

- The NESHAP allows for a significant amount of flexibility in the control strategies used to reach compliance.

- The timelines for compliance vary for different parts of the mill.

- More stringent control requirements apply to some new sources.

- Technical requirements for some of the available control strategies will be specified on a mill-by-mill basis by the implementing agency.

1.3 How should I use this document?

If you are familiar with the pulping and bleaching processes, there is no need to read Chapter 2. You should skip ahead to Chapter 3. Everyone should read Chapter 3 as it provides the overview of the NESHAP. After reading Chapter 3, you should decide what other sections of the document you need.

If You Need the Following Information...	Then Read...
A description of the Cluster Rules	Chapter 1
A description of pulping and bleaching processes	Chapter 2
An overview of the NESHAP	Chapter 3
A description of how new source requirements apply	Chapter 3
NESHAP requirements for kraft mills	Chapter 4
NESHAP requirements for soda and semi-chemical mills	Chapter 5
NESHAP requirements for sulfite mills	Chapter 6
NESHAP requirements for mechanical, secondary fiber, and non-wood fiber pulp mills	Chapter 7
A description of other existing and upcoming Federal regulations affecting pulp and paper mills	Chapter 8
A list of pulp and paper mills	Appendix A
A copy of the NESHAP	Appendix B
Flowchart summary of the NESHAP	Appendix C
A list of EPA Regional Office contacts	Appendix D
Equipment diagrams	Appendix E
A list of equipment affected by the NESHAP	Appendix F
A summary of the NESHAP control requirements	Appendix G
A timeline of compliance milestones	Appendix H
Summary of effluent limitations guidelines and standards for bleached papergrade kraft mills	Appendix I

1.4 What are the Pulp and Paper "Cluster Rules"?

The Cluster Rules are a simultaneous publication of Federal air and water pollution control regulations. They are an example of the EPA's efforts to simplify compliance by coordinating the regulation of multimedia industrial pollution and will reduce both air and water pollutant discharges. You can get an electronic copy of the Cluster Rules from the Federal Register website at **http://www.access.gpo.gov/su_docs/aces/aces140.html** or the EPA Unified Air Toxics website at **http://www.epa.gov/ttn/uatw** on the Rules and Implementation Page.

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

http://es.epa.gov/oeca/wn2.html
and
http://www.epa.gov/ttn/uatw/uatwnew.html

The goals of this coordinated regulatory approach are to:

- provide greater protection of human health and the environment
- reduce the overall cost of complying with wastewater regulations and air emissions controls
- promote and facilitate coordinated compliance planning by the industry
- promote and facilitate pollution prevention
- emphasize the multimedia nature of pollution control

Figure 1 identifies the mill types covered under the Cluster Rules. Appendix A lists the mills potentially affected by the Cluster Rules by facility name and location.

Figure 1.

Types of Mills Covered Under the Cluster Rules

	Then it is Subject to These Parts of the Cluster Rules...	
If the Mill is this Type...	**NESHAP**	**Revised Effluent Limitations Guidelines and Standards**
Kraft	X	Bleached Papergrade only
Soda	X	Bleached Papergrade only
Sulfite	X	Papergrade only
Semi-Chemical	X	
Mechanical	X	
Non-Wood Fiber	X	
Secondary Fiber	X	

The Cluster Rules consist of the following two components:

The features of the NESHAP are:
- *Alternative emission limits*
- *Varying compliance periods (3-8 years)*
- *New and existing source controls*
- *Flexibility for evolving technologies*
- *Compliance dates coordinated with effluent limitations guidelines and standards*

(1) National Emission Standards for Hazardous Air Pollutants (NESHAP) from the Pulp and Paper Industry (40 CFR 63, Subpart S). The pulp and paper 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.

The air emissions control standards require mills to reduce hazardous air pollutant emissions through the use of thermal oxidizers, boilers, lime kilns, recovery furnaces, caustic scrubbers, or other control devices, or process modifications. In general, the NESHAP requires mills to:

- collect and incinerate pulping process vent emissions
- collect and control bleaching process vent emissions with a caustic scrubber
- eliminate the use of certain bleaching chemicals
- collect and treat process condensate streams to remove HAPs through biological treatment or stripping (kraft mills only)

The NESHAP is written to encourage pollution prevention techniques. See Appendix B for a copy of the NESHAP and Appendix C for a flowchart summary of the NESHAP.

This NESHAP does **NOT** address emissions from chemical recovery process combustion sources. Emissions from these sources will be covered by another NESHAP (Subpart MM) proposed on April 15, 1998 (63 FR 18754).

(2) ***Effluent Limitations Guidelines and Standards, Pretreatment Standards, and New Source Performance Standards for the Pulp, Paper, and Paperboard Category (40 CFR 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., Publicly Owned Treatment Works or POTW). The effluent limitations guidelines and standards are applied to the mills that directly discharge into receiving water via the National Pollution Discharge Elimination System (NPDES) permit program. In addition, the effluent limitations guidelines and standards portion of the Cluster Rules:

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/***

- Includes best management practices (BMP) regulations for a portion of the pulp, paper, and paperboard industry. The BMP rules are designed to prevent or contain leaks and spills of pulping liquor, soap, and turpentine, and to control any intentional diversions of these substances.

- Specifies new analytical methods for twelve chlorinated phenolic pollutants and for adsorbable organic halides (AOX).

- Revises the subcategorization scheme for existing effluent limitations guidelines and standards for the pulp and paper industry (shown in Figure 2) and revises the effluent limitations guidelines and standards for Bleached Papergrade Kraft and Soda subcategory (Subpart B) and the Papergrade Sulfite subcategory (Subpart E). The EPA revised the subcategorization scheme to better define the processes typically found in U.S. mills.

- Includes 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.

Figure 2.

Comparison of the Revised Final Subcategories with Previous Subcategories

Final Codified Subpart	Final Subcategorization Scheme	Previous Subcategorization Scheme with Previous 40 CFR 430 Subparts Noted in Parentheses
A	Dissolving Kraft	Dissolving Kraft (F)
B[a]	Bleached Papergrade Kraft and Soda	Market Bleached Kraft (G) BCT Bleached Kraft (H) Fine Bleached Kraft (I) Soda (P)
C	Unbleached Kraft	Unbleached Kraft (A) - Linerboard - Bag and Other Products Unbleached Kraft and Semi-Chemical (D, V)
D	Dissolving Sulfite	Dissolving Sulfite (K) - Nitration - Viscose - Cellophane - Acetate
E[a]	Papergrade Sulfite	Papergrade Sulfite (J,U) - Blow Pit Wash - Drum Wash
F	Semi-Chemical	Semi-Chemical (B) - Ammonia - Sodium
G	Mechanical Pulp	GW-Thermo-Mechanical (M) GW-Coarse, Molded, News (N) GW-Fine Papers (O) GW-Chemical-Mechanical (L)
H	Non-Wood Chemical Pulp	Miscellaneous mills not covered by a specific subpart
I	Secondary Fiber Deink	Deink Secondary Fiber (Q) - Fine Papers - Tissue Papers - Newsprint
J	Secondary Fiber Non-Deink	Tissue from Wastepaper (T) Paperboard from Wastepaper (E) - Corrugating Medium - Non-Corrugating Medium Wastepaper-Molded Products (W) Builders' Paper and Roofing Felt (40 CFR Part 431 Subpart A)
K	Fine and Lightweight Papers from Purchased Pulp	Non-Integrated Fine Papers (R) - Wood Fiber Furnish - Cotton Fiber Furnish Lightweight Papers (X) - Lightweight Papers - Lightweight Electrical Papers
L	Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp	Non-Integrated - Tissue Paper (S) - Filter and Non-Woven (Y) - Paperboard (Z)

[a] Revised under the Cluster Rules.

1.5 What is the purpose of the Pulp and Paper NESHAP?

The purpose of this NESHAP is to reduce HAP emissions from the pulp and paper industry, thus reducing public health hazards. The EPA regulated this industry because pulp and paper mills are major sources of HAP emissions listed in Section 112 of the Clean Air Act (CAA). Section 112(d) of the CAA directs EPA to set maximum achievable control technology (MACT) standards for major stationary sources. MACT standards are technology-based emission limitations that require the maximum degree of emission limitations that is achievable considering cost, human health, environmental, and energy impacts.

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 HAPs.

Pulp and paper mills emit 240,000 tons of HAPs annually that impact both air quality and public health. The pulp and paper NESHAP will reduce 1996 emissions of HAPs from pulp and paper facilities by 153,000 tons per year (a 64 percent reduction). Figure 3 lists the HAPs emitted in the largest quantities from pulp and paper mills.

Figure 3.

Highest Emitted Hazardous Air Pollutants from Pulp and Paper Mills

Hazardous Air Pollutants	
Acrolein	Methanol
Acetaldehyde	Methylene chloride
o-Cresol	Methyl ethyl ketone
Carbon tetrachloride	Phenol
Chloroform	Propionaldehyde
Cumene	1,2,4-Trichlorobenzene
Formaldehyde	o-Xylene

The control techniques used to reduce HAP emissions will also reduce emissions of other pollutants. For example, the NESHAP will reduce volatile organic compound (VOC) emissions by 450,000 tons per year. Volatile organic compounds cause a variety of adverse health effects and are precursors to the formation of tropospheric (ground level) ozone.

Emissions of total reduced sulfur (TRS) compounds cause the odors commonly associated with pulp and paper production. Exposure to TRS emissions has been linked to symptoms including headaches, watery eyes, nasal problems, and breathing difficulties. Total reduced sulfur emissions are regulated by new source performance standards (NSPS) under Section 111 of the CAA. Although not specifically regulated by the NESHAP, the NESHAP will result in a reduction of TRS emissions by 87,000 tons per year.

1.6 How many sources does the NESHAP affect?

Figure 4 shows the location of the pulp and paper facilities in the United States that are potentially affected by the pulp and paper NESHAP. Appendix A lists the pulp and paper mills (including facility name, and location by city and state) that were identified as potentially affected sources at the time the NESHAP was published.

The list of mills in Appendix A is provided for information only. The list is not necessarily complete, nor does it represent an EPA determination that any specific mill is subject to the rules.

Figure 4.

Location of Pulp and Paper Mills

State	Mills	State	Mills	State	Mills
Alabama	19	Kansas	2	New Mexico	1
Arkansas	8	Kentucky	5	New York	49
Arizona	2	Louisiana	13	Ohio	30
California	34	Massachusetts	38	Oklahoma	6
Colorado	1	Maryland	3	Oregon	12
Connecticut	10	Maine	18	Pennsylvania	31
Delaware	2	Michigan	33	South Carolina	9
Florida	11	Minnesota	9	Tennessee	13
Georgia	24	Missouri	3	Texas	11
Iowa	2	Mississippi	10	Virginia	12
Idaho	1	Montana	1	Vermont	6
Illinois	10	North Carolina	17	Washington	22
Indiana	12	New Hampshire	12	Wisconsin	46
		New Jersey	14	West Virginia	2
				Total	**564**

Source: Lockwood-Post Directory, 1996.

1.7 What if I have questions?

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

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 Technical Association of the Pulp & Paper Industry (TAPPI) at **http://www.tappi.org** or American Forest and Paper Association (AF&PA) at **http://www.afandpa.org**

STAPPA/ALAPCO = *State and Territorial Air Pollution Program Administrators/ Association of Local Air Pollution Control Officials*

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 D.

1.8 How do I get additional copies of this document?

You can get copies of this document from:

- EPA's Technology Transfer Network (TTN) on the world wide web at **http://www.epa.gov/ttn/uatw/pulp/pulppg.html**

Copies are available free of charge from the EPA library.

- 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
  Fax: (703) 321-8547

  Note: NTIS will charge a fee for each document requested.

1.9 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 and background information documents. The background information documents are:

- Pulp, Paper, Paperboard Industry - Background Information for Proposed Air Emissions Standards for Manufacturing Processes at Kraft, Sulfite, Soda, and Semi-chemical Mills. Publication No. EPA-453/R-93-050a. October 1993

An overview of this NESHAP is available on a 40 minute video tape. You can view this tape at your State or local air pollution control office.

- Pulp, Paper, Paperboard Industry - Background Information for Promulgated Air Emissions Standards for Manufacturing Processes at Kraft, Sulfite, Soda, and Semi-Chemical, Mechanical, and Secondary and Non-wood Fiber Mills. Publication No. EPA-453/R-93-050b. October 1997

Federal Register notices pertaining to the NESHAP are:

- Proposed NESHAP: published December 17, 1993 (58 FR 66078)
- Correction notice to the proposed NESHAP: published March 17, 1994 (59 FR 12567)

Check the UATW for correction notices and amendments.

- Notice of Data Availability (NODA): published February 22, 1995 (60 FR 9813)
- Supplemental Notice: published March 8, 1996 (61 FR 9383)
- Promulgated NESHAP: published April 15, 1998 (63 FR 18504)
- Correction of minor errors on the April 15, 1998 Notice: published August 7, 1998 (63 FR 42238)

- Interpretation and Technical Amendment regarding applicability to excess emission allowance for condensate treatment systems: published September 16, 1998 (63 FR 49455)

You can get these documents and other relevant documents from:

- EPA's Unified Air Toxics website (UATW) at **http://www.epa.gov/ttn/uatw** or **http://www.epa.gov/ttn/uatw/pulp/pulppg.html**. These sites contain background documents, preambles, regulations, guidance documents, and policy memos

- "What's New" page of the UATW at **http://www.epa.gov/ttn/uatw/uatwnew** for the most current information

- The Air Dockets (A-92-40 and A-95-31) which are available for public inspection between 8 a.m. and 4 p.m., Monday through Friday, except for Federal holidays, at:

  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

1.10 Where can I find additional information on the pulp and paper industry?

You can get additional information from:

- Biermann, C.J. 1993. Essentials of Pulping and Papermaking. San Diego, CA: Academic Press, Inc.
- Burgess, T. 1995. The Basics of Foul Condensate Stripping. 1995 Kraft Recovery Short Course. Atlanta, GA: TAPPI PRESS.
- EPA. 1998. Permit Guidance Document for Pulp, Paper and Paperboard Manufacturing Point Source Category, 40 CFR Part 430, draft. Office of Water, Washington, DC.
- 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.

The Kraft Pulp Mill Compliance Assessment Guide covers the Cluster Rules as well as NSPS and other rules affecting kraft mills.

- 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.
- Kocurek, M.J. and Stevens, C.F.B., eds. 1983. Pulp and Paper Manufacture. Third Edition. Joint Textbook Committee of the Paper Industry.
- Mimms, A., Kocurek, M., Pyatte, J. and Wright, E. eds. 1993. Kraft Pulping. Atlanta, GA: TAPPI PRESS.
- Smook, G.A. 1992. Handbook for Pulp and Paper Technologists. Second Edition. Bellingham, WA: Angus Wilde Publications.

Chapter 2 - Description of the Pulping and Bleaching Processes

Three major types of fibers are used to make pulp and paper products: wood; secondary fibers (recycled fibers); and non-wood fibers (e.g., cotton, flax, hemp). However, the majority of pulp and paper products are made from wood, and most wood mills use the kraft pulping process.

If you are already familiar with pulping and bleaching processes, you can move ahead to Chapter 3.

Because kraft mills represent the majority of the industry, this chapter describes the processes at kraft mills using wood. A general process overview for each of the other types of mills is also provided. This chapter does not explain each individual process, but rather focuses on the main activities affected by the NESHAP. For further information about the pulp and paper industry and process operations, please refer to the list of materials provided in Chapter 1.

2.1 What distinguishes the types of mills that manufacture pulp and paper?

The types of pulp mills are:
- *kraft*
- *soda*
- *sulfite*
- *semi-chemical*
- *mechanical*
- *secondary fiber*
- *non-wood fibers*

Kraft, soda, and sulfite mills all use chemicals in their pulping processes. These processes differ primarily in the chemicals used for digesting wood chips. Mechanical pulping involves shredding or grinding wood chips without the use of chemicals and semi-chemical pulping combines chemical and mechanical methods. Secondary fiber mills mechanically separate pulp from waste paper products. Non-wood fiber mills can use mechanical and chemical pulping processes. Figure 5 summarizes the characteristics of the different types of chemical pulping processes.

Figure 5.

Chemical Pulping Process Differences

Pulping Process Type	Typical Pulp Produced	Chemicals Used	Typical Pulp Yield Percent	Type of Wood Used	Typical Pulp Uses
Kraft	Kraft	NaOH, Na_2S	40-50	Softwood and hardwood	Writing paper; paper bags; cardboard; specialty products such as rayon, acetate, and cellophane
Soda	Soda	NaOH	45-55	Hardwood	Writing paper; specialty products such as rayon, acetate, and cellophane
Sulfite	Acid sulfite	H_2SO_3, $M(HSO_3)$ (M=Ca, Mg, Na, NH_4)	45-55	Softwood and hardwood	Writing paper; specialty products such as rayon, acetate, and cellophane
Semi-chemical	Neutral Sulfite Semi-chemical	Na_2SO_3 Na_2CO_3	65-80	Hardwood	Corrugated containers

Source: Smook, 1992.

2.2 What is the kraft pulping process?

The pulping process converts raw materials into a fibrous mass that can be formed into paper or cardboard. Wood contains both cellulose fibers and lignin; the objective of the kraft pulping process is to dissolve the lignin and leave most of the cellulose fibers intact.

The main operations performed in the kraft pulping process are:

- digestion of wood to form pulp
- pulp processing to recover spent cooking chemicals and to remove impurities and uncooked wood chips (deknotting, pulp washing, pulp screening)
- concentration of used pulping liquor for chemical recovery

Figure 6 depicts a typical overview of a kraft pulp and paper mill. More detailed diagrams for each equipment system in the pulping process are provided in Appendix E.

Kraft digesting process

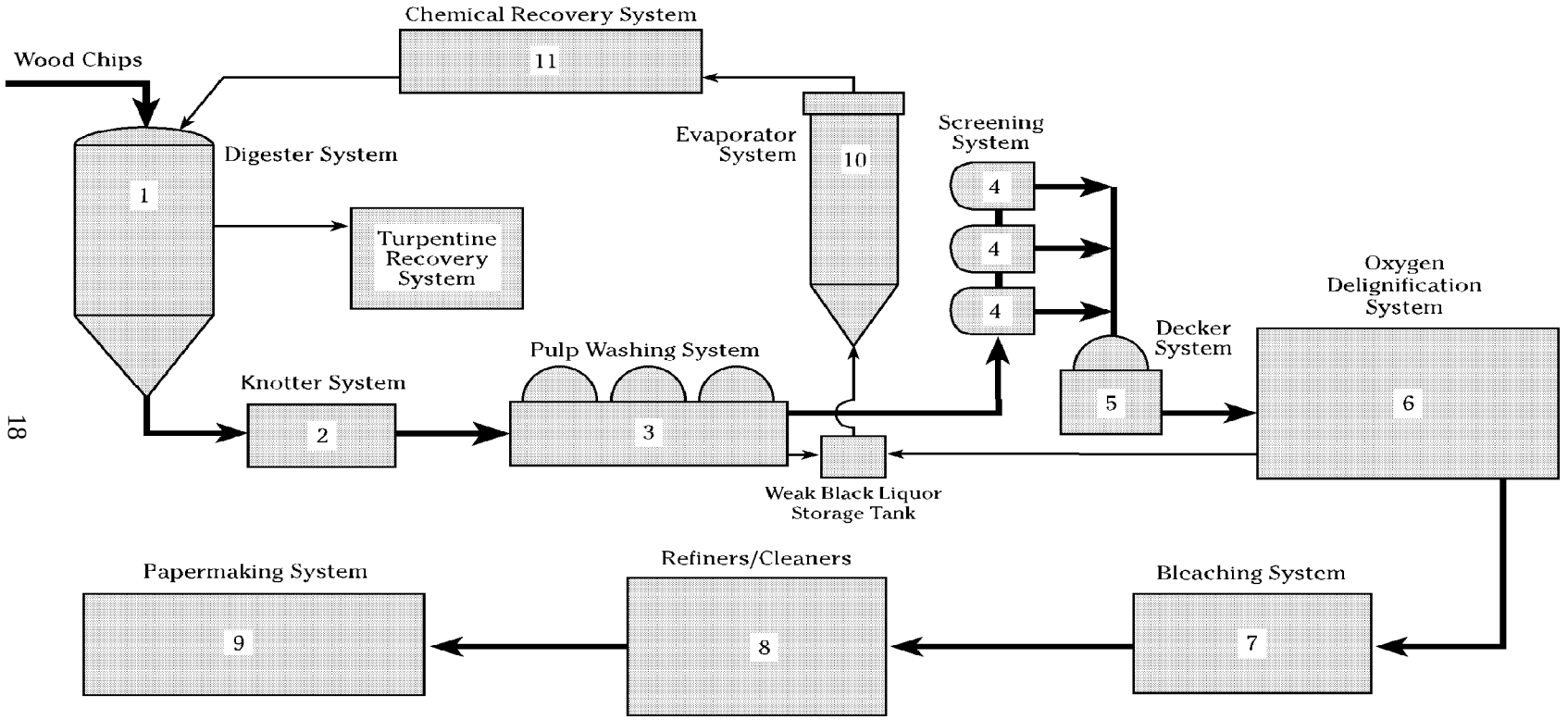
Kraft pulping entails cooking, or digesting, wood chips at elevated temperature and pressure in an alkaline pulping liquor that contains sodium sulfide (Na_2S) and sodium hydroxide (NaOH). Cooking may be performed in either batch digester or continuous digester systems. For mills that use softwood feedstock (e.g., pine), the digester system generally will include a turpentine recovery system. The turpentine is recovered from digester relief vent gases.

The pulping liquor and elevated temperature and pressure promote breakdown of the bonds in the lignin compounds. Depending on pulping conditions, as much as 90-95 percent of the lignin can be removed from wood in kraft pulping.

The NESHAP has the same emission limits for papergrade and dissolving grade pulp production.

Two types of pulp are produced:

- papergrade (for making paper, paperboard, tissue)
- dissolving grade (for making rayon, cellophane, acetate, food additives)



1–Cooking liquor added to wood chips to dissolve lignin.
2–Removal of uncooked chips and knots.
3–Weak black liquor washed from pulp.
4–Fiber bundles and contaminants screened from pulp.
5–Pulp thickened for oxygen delignification.
6–Oxygen Delignification System for further delignification.
7–Pulp bleached to increase whiteness.
8–Pulp is cleaned and prepared for papermaking.
9–Paper sheet formed through dewatering.
10–Evaporator System removes excess water from the weak black liquor.
11–Chemical recovery system converts the concentrated liquor into cooking liquor for use in the digester system.

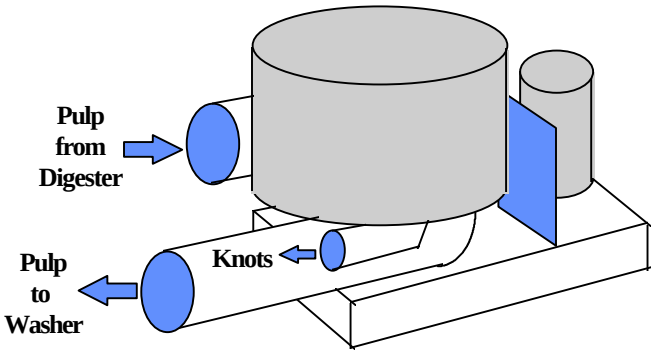
Figure 6.

Example Overview of a Kraft Pulping Mill with a Papermaking System

Kraft pulp processing steps

Kraft mills remove impurities from the raw pulp prior to bleaching or papermaking. The primary pulp cleaning operations include **deknotting** (in the knotter), **brown stock washing** (in the pulp washing system), and **pulp screening** (in the screening system).

Deknotting removes knots and other portions of uncooked wood from the pulp slurry. Kraft mills burn the knots and uncooked wood for energy recovery, dispose of them as waste, or recycle them for repulping. The diagram to the right shows a typical knotter.



Weak black liquor consists of dissolved wood compounds and spent cooking chemicals.

Brown stock washing recovers spent cooking liquor (weak black liquor) for reuse in the pulping process. Efficient washing is critical to maximize the return of cooking liquor to chemical recovery and to minimize carryover of cooking liquor (known as brown stock washing loss) into the bleach plant. A variety of brown stock washing technologies are used; the most common technology is a series of two to four rotary vacuum washers. In each washer, wash water is applied to displace cooking liquor in the pulp; countercurrent washing is generally used to reduce fresh water requirements. Other common washer types are diffusion washers, rotary pressure washers, horizontal belt filters, wash presses, and dilution/extraction washers. Figure 7 shows a typical rotary vacuum washer system.

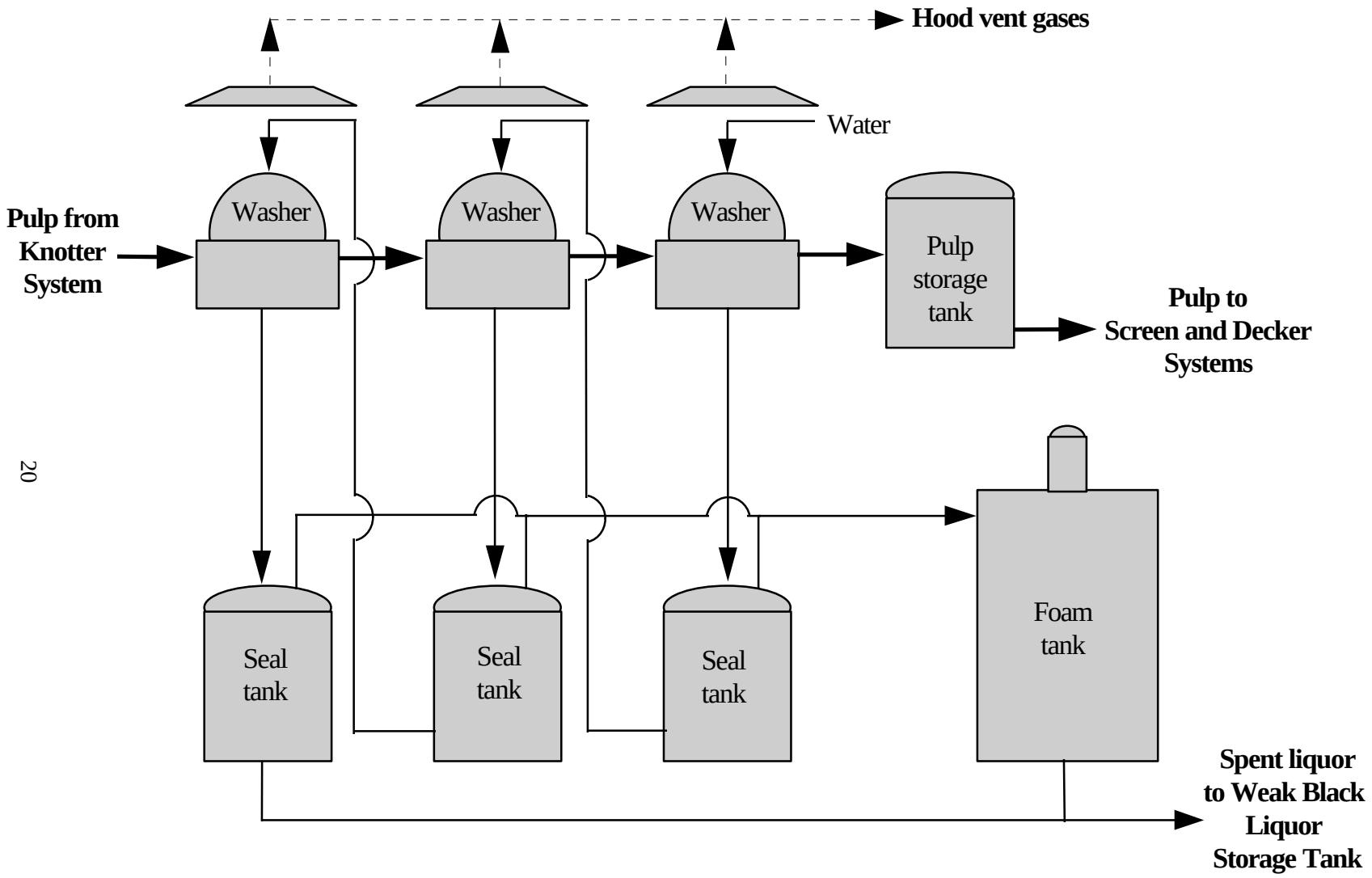


Figure 7.

Brown Stock Washing System (Rotary Vacuum)

*A **screen system** removes oversized particles from the pulp slurry prior to the bleaching or papermaking system.*

A decker is used to thicken the pulp for storage after screening or subsequent delignification steps.

Pulp screening removes the remaining oversized particles (fiber bundles and contaminants) from washed pulp. The pulp is diluted to low percent solids, then passed through a perforated screen, and rejects are continuously removed from the screen. Methods for removing rejects are shaking and vibration, hydraulic sweeping action, back-flushing, or pulsing the flow through the openings with various moving foils, paddles, and bumps. Mills may operate open, partially closed, or closed screen rooms. In open screen rooms, wastewater from the screening process is discharged to wastewater treatment. In closed screen rooms, wastewater is reused in brown stock washing or other pulping operations and ultimately enters the chemical recovery system.

A **decker system** is all of the equipment used to thicken the pulp slurry after the pulp washing system. It includes decker vents, filtrate tanks, and vacuum pumps.

Evaporator system

Weak black liquor collected from the pulp washers goes into a weak black liquor storage tank. The weak black liquor is sent to the multiple effect evaporator (MEE) to evaporate water and concentrate the weak black liquor in order to increase solids content. Typically, weak black liquor recovered from the brown stock washers contains between 13 and 17 percent solids. The weak black liquor is then concentrated to 60-80 percent solids, which is required for efficient combustion in the recovery boiler. An MEE will include four to seven effects, or bodies, arranged in series. At pulp mills using soft wood, a tall oil recovery system is generally incorporated into the evaporator system to recover tall oil from the black liquor. Tall oil is sold for use in manufacturing cosmetics.

Oxygen delignification system

Some mills that produce bleached pulp may also have an oxygen delignification stage either in the pulping area or as a prebleaching stage. The oxygen delignification process reduces the lignin content without reducing pulp strength or yield. High efficiency oxygen delignification minimizes the amount of bleaching chemicals needed to achieve adequate pulp brightness.

There are currently two types of oxygen delignification systems available: high consistency and medium consistency. Medium consistency systems are more popular due to safer operation and lower capital costs. Design and placement of these systems vary from mill to mill. Oxygen delignification systems of the two-stage design are most often employed in the U.S. for new installations. Figure 8 shows a typical oxygen delignification system.

Gas collection systems

Gas collection systems, or noncondensible gas (NCG) systems, are used to collect gases from the various pulping processes and transport them to an appropriate air pollution control device. There are two basic categories of NCGs: low volume, high concentration (LVHC); and high volume, low concentration (HVLC).

Low volume, high concentration (LVHC) systems typically collect gases from the following systems:

- digester system
- turpentine recovery system
- evaporator system
- steam stripper system
- any other system serving one of these functions

High volume, low concentration (HVLC) systems typically collect gases from the following systems:

- knotter system
- pulp washing system
- screen system
- oxygen delignification system
- weak liquor storage tanks
- any other equipment serving one of these functions

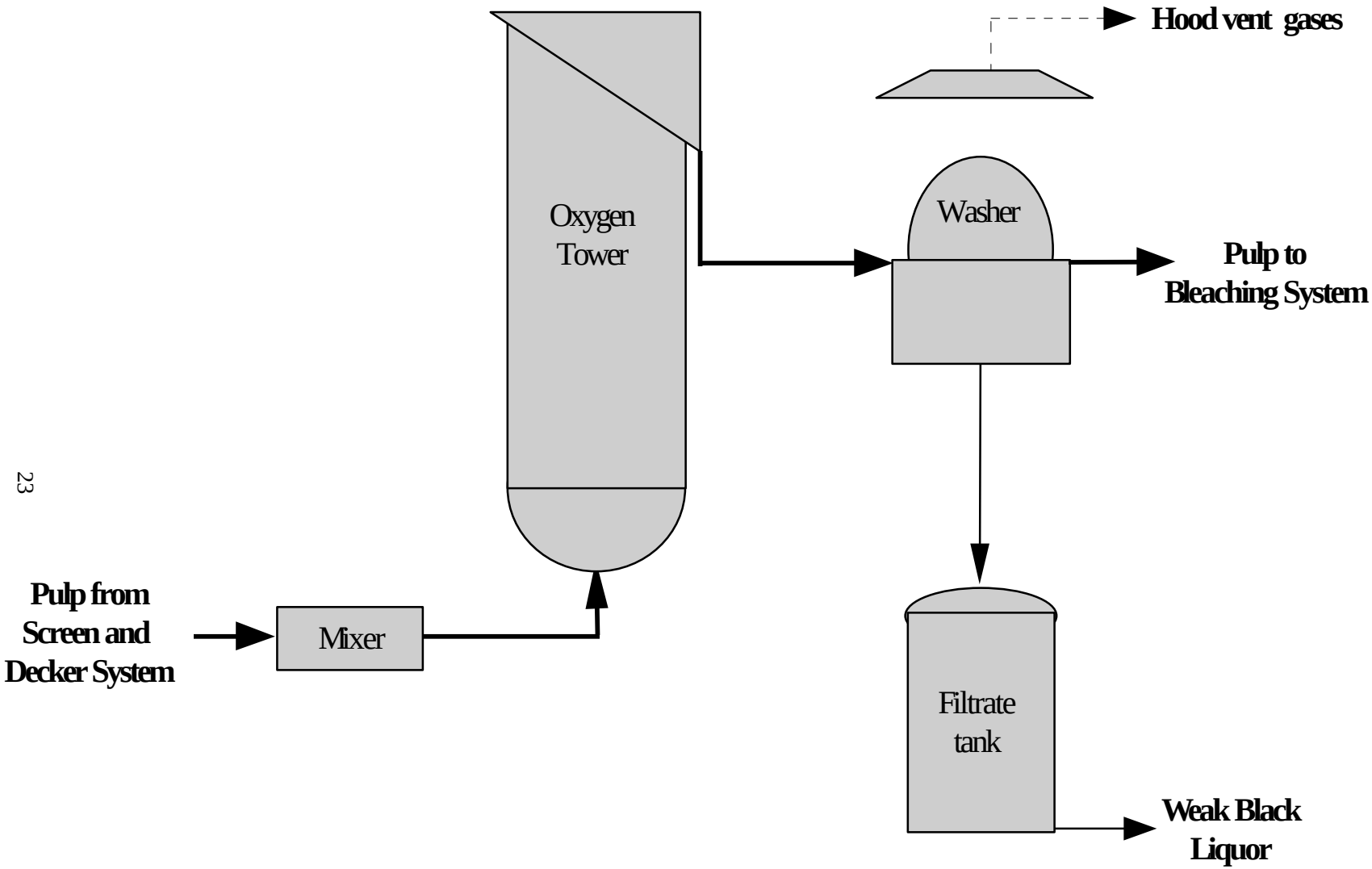


Figure 8.

Typical Oxygen Delignification System (Medium Consistency)

Historically, most LVHC gases have been controlled, while a smaller portion of the HVLC gases have been controlled.

A number of mills use a dedicated incinerator to control NCG emissions, but most mills use process combustion sources such as the lime kiln, power boilers, or a recovery boiler.

Condensate stripping

Steam stripper systems were historically installed to control TRS odor.

The pulping process equipment may include a steam stripper system to remove organics and total reduced sulfur (TRS) compounds from various liquid process condensate streams. Steam stripping is a multistage distillation separation process that uses direct steam as the heat source. The pulping process condensate streams most often stripped are the turpentine decanter underflow, blow steam condensates, and certain evaporator condensates. The stripped condensates may then be used as hot process water.

Kraft pulping process condensates originate from the following systems:

- digester system
- turpentine recovery system
- evaporator system

2.3 What is bleaching?

Each bleaching stage performs three functions:
- *mixing of pulp and bleaching chemicals*
- *reaction of bleaching chemicals with the pulp*
- *washing the chemicals out of the pulp*

Bleaching brightens the pulp in a series of chemical operations that are together called a bleaching line. A bleaching line typically consists of a sequence of three to six bleaching stages. The number of stages varies depending on the brightness requirements of the pulp and the specific design of the mill. Typically, the stages are sequenced as an alternating series of bleaching and extraction stages. In a bleaching stage, the pulp is treated with chemical bleaching agents. In an extraction stage, chemicals (usually sodium hydroxide) are added to neutralize the chemical reactions and the acidity of the pulp prior to the next bleaching stage. An extraction stage is not required in all cases.

Each bleaching stage consists of three steps: mixing of pulp and bleaching chemical (and in some cases steam); reaction of the chemical with the pulp in a retention tower; and washing the chemical out of the pulp. Thus, the equipment considered part of a stage includes chemical and steam mixers, retention (bleaching or extraction) towers, and the washers and their associated seal (filtrate) tanks and/or vacuum pumps.

Figure 9 depicts the major equipment found in a typical three-stage bleaching plant. The function of these equipment systems and a brief description follow.

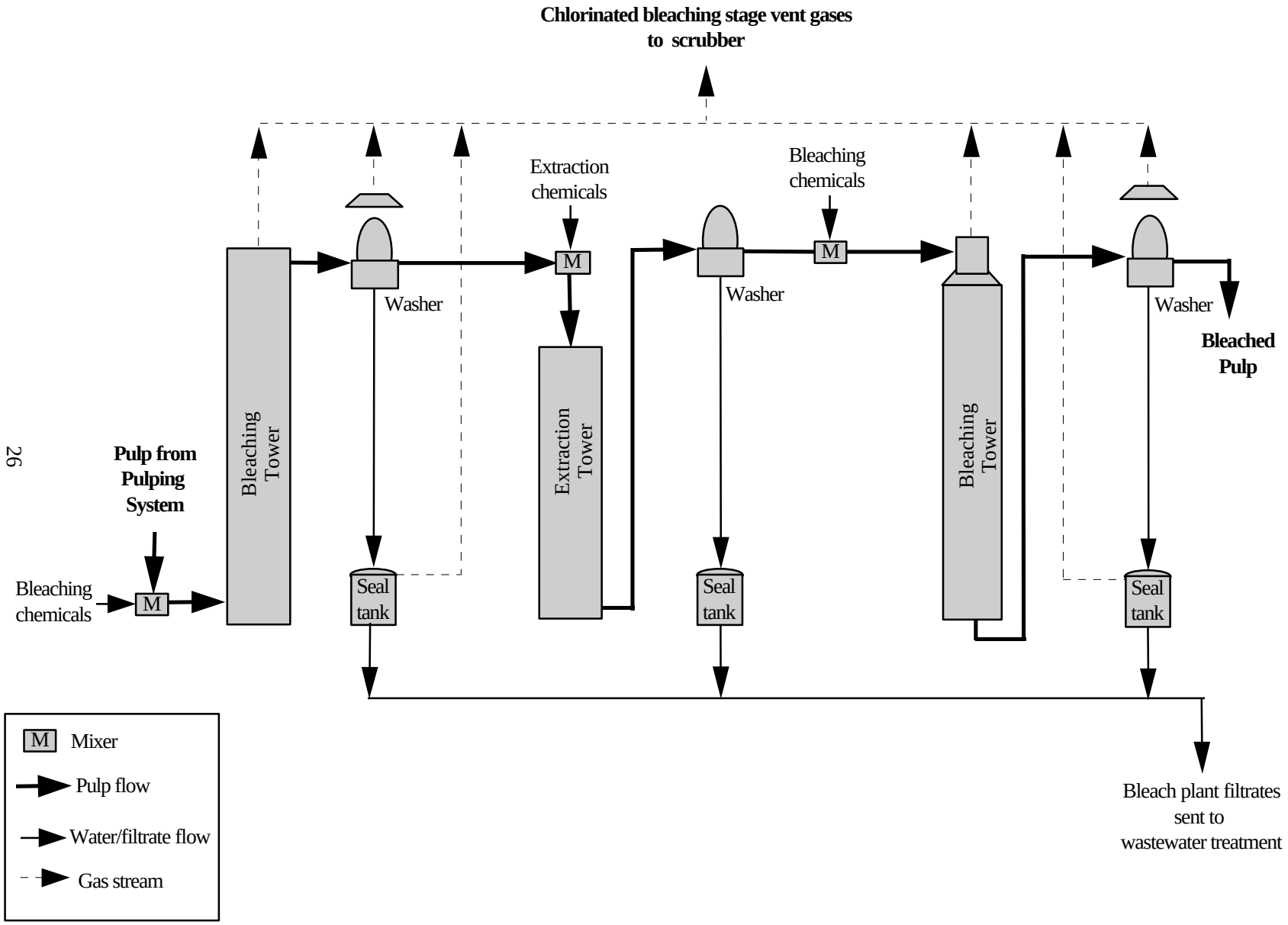


Figure 9.

Example Bleaching Line

Bleaching chemicals

Almost any oxidant could be used as a bleaching agent. However, for bleaching pulp, the chemical must be both powerful and inexpensive to produce or purchase. There are a variety of chemicals that meet these criteria. Both chlorinated and non-chlorinated chemicals are used for bleaching. The chemicals and their common bleaching stage abbreviations are shown below. These bleaching chemicals are grouped into two categories: chlorinated and non-chlorinated.

Bleaching stage *means all process equipment associated with a discrete step of a chemical application and removal in the bleaching process.*

Bleaching line *means a group of bleaching stages arranged in series such that bleaching of the pulp progresses as the pulp moves from one stage to the next.*

Chemicals	Abbreviation
Chlorinated Bleach Chemicals	
Elemental chlorine	C
Hypochlorite	H
Chlorine dioxide	D
Chlorine with chlorine dioxide substitution	(CD), (C+D)
Non-chlorinated Bleach Chemicals	
Oxygen	O
Peroxide	P
Ozone	Z

Chlorinated bleaching chemicals. There are three chlorinated chemicals commonly used for bleaching pulp: elemental chlorine (C), chlorine dioxide (D), and hypochlorite (H). Since elemental chlorine is a good delignifying agent, it performs best when used in the first bleaching stage.

Non-chlorinated bleach chemicals. Common examples of non-chlorinated bleaching chemicals include: oxygen (O); peroxide (P); and ozone (Z). Bleach stages that use various combinations of alkali, oxygen, and peroxide are common in many bleach plants.

The NESHAP requires collection and control of HAP emissions from the chlorinated bleaching stages only!

Bleaching mixers

Bleaching chemicals must be thoroughly mixed with the pulp to ensure pulp quality, to minimize chemical waste, and to minimize the generation of bleaching contaminants such as chlorinated dioxins and furans. Enclosed rotary high-shear mixers or static in-the-pipe mixers are used to mix the pulp and bleaching chemicals.

Bleaching retention towers

Retention towers are used to maintain bleaching conditions for the pulp as it passes through each bleaching stage. For complete bleaching chemical reaction, it is necessary to maintain a certain temperature, time, consistency, pressure, and pH for each bleach stage. Conditions vary with the bleaching chemical used (e.g., chlorine, chlorine dioxide, hydrogen peroxide). In many bleaching systems, the retention towers are named by the bleach chemical used or the function of that particular bleaching stage (e.g., chlorination tower).

There are two primary types of retention towers: the upflow tower; and the downflow tower. The choice of tower design depends on the particular conditions desired for the bleach stage. As a general rule, chlorinated bleaching stages use an upflow tower design or a similar design. See diagram number 29 in Appendix E.

Bleached pulp washers

To minimize chemical usage and equipment corrosion, it is important to remove as much bleaching chemical as possible from the pulp before it enters the next bleaching stage. Bleached pulp washing is performed in the same type of equipment that washes the brown stock. See discussion on brown stock washers on page 19.

More detailed diagrams on the air and water discharges of each system are provided in Appendix E.

What is pulp preparation and papermaking?

The final stages at a pulp and paper mill include the preparation of pulp for papermaking and the actual papermaking process. In the pulp preparation area, the pulp fibers are cleaned to remove unwanted particles (such as dirt and sand) from the pulp stock. The cleaned fibers will then undergo some level of refining. In the refining process, the pulp fibers are subjected to mechanical action to develop their optimal papermaking properties with respect to the product being made.

In the papermaking process, the pulp stock is converted into paper. This process begins when the pulp stock is distributed across the forming table. On the forming table, the paper sheet formation starts as the excess water contained in the pulp stock drains from the pulp fibers. The newly formed paper sheet is removed from the forming table and is conveyed through a series of presses to remove additional water and to continue the sheet forming process. The remaining water contained in the paper sheet is removed as the sheet travels around a series of steam-heated cylinders. After the paper sheet leaves the dryers, it may undergo several other processes, depending on the final paper product. These additional processes include; calendering (where the sheet is pressed to reduce thickness and smooth the surface), winding (where the sheet is wound onto a reel), and coating (where various chemical or dyes are applied to the paper sheet).

2.4 Soda mills

The soda pulping process was the first chemical pulping method and was the precursor to the kraft pulping process.

The soda pulping process utilizes an alkaline liquor with sodium hydroxide as the only active chemical. Except for the difference in chemicals used, this process is the same as that described for the kraft mill.

2.5 Sulfite mills

The sulfite pulping process uses acid solutions of sulfurous acid (H_2SO_3) and bisulfite ions (HSO_3^-).

The sulfite pulping process uses an acid solution of sulfurous acid (H_2SO_3) and bisulfite ion (HSO_3^-) to break the lignin bonds between wood fibers, while kraft mills use an alkaline solution. Because the sulfite cooking process is an oxidizing reaction, sulfur dioxide is generated instead of the reduced sulfur compounds generated by the kraft process (a reducing reaction). Thus, the chemical recovery processes at sulfite mills are different than at kraft mills. Otherwise, the process is similar to the kraft process.

Sulfite pulp has less color than kraft pulp and can be more easily bleached, although the sulfite pulp is not as strong as kraft pulp. Figure 10 depicts an overview of a typical sulfite pulping system.

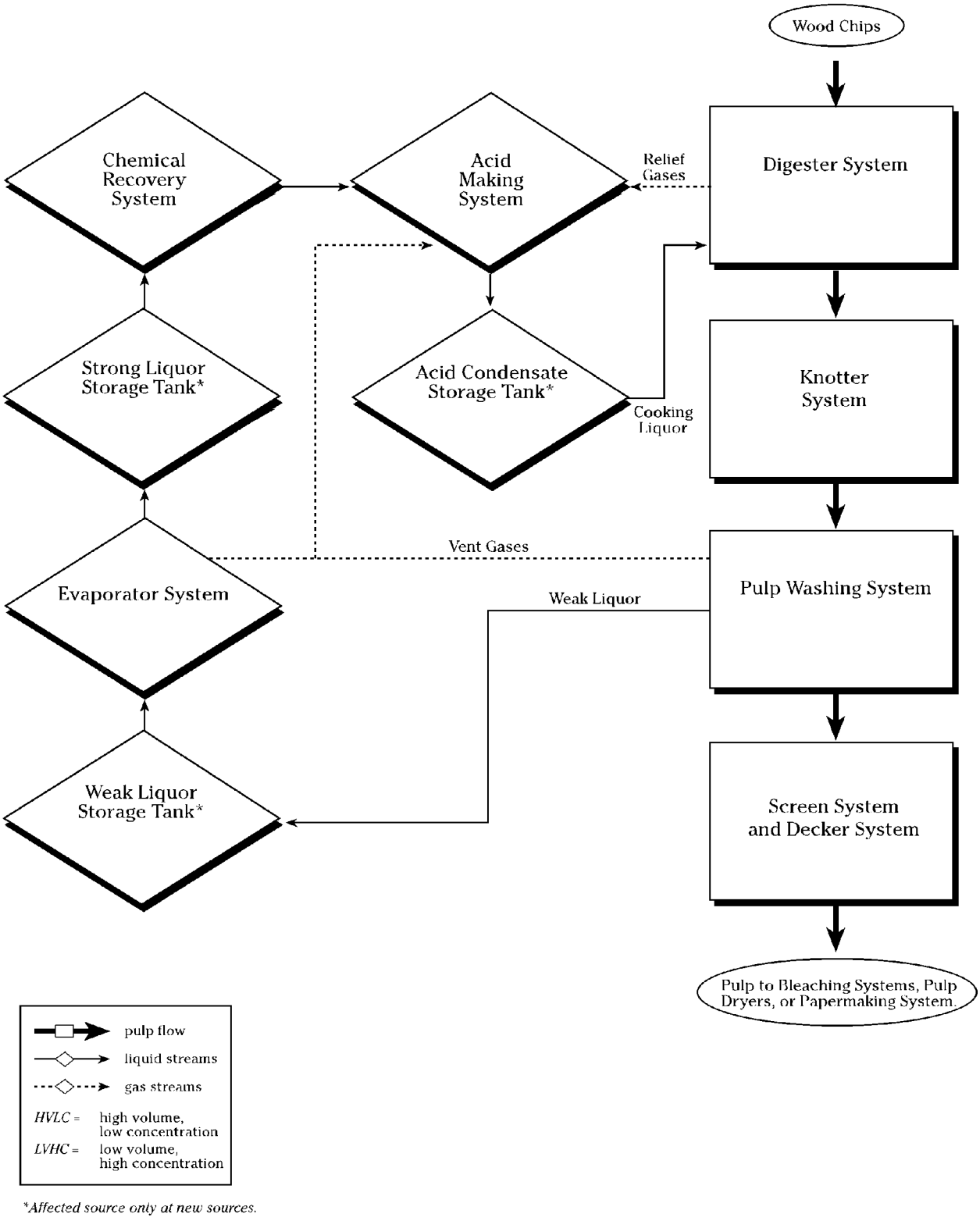


Figure 10.

Example Sulfite Pulping System

2.6 Semi-chemical mills

Semi-chemical pulp is generally not bleached.

Semi-chemical pulping involves partial digestion of wood chips in a weak chemical solution such as sodium sulfite (Na_2SO_3) and sodium carbonate (Na_2CO_3) followed by mechanical refining for fiber separation. Semi-chemical pulp is very stiff, making this process common in corrugated container manufacture. Figure 11 shows an overview of a typical semi-chemical pulping system.

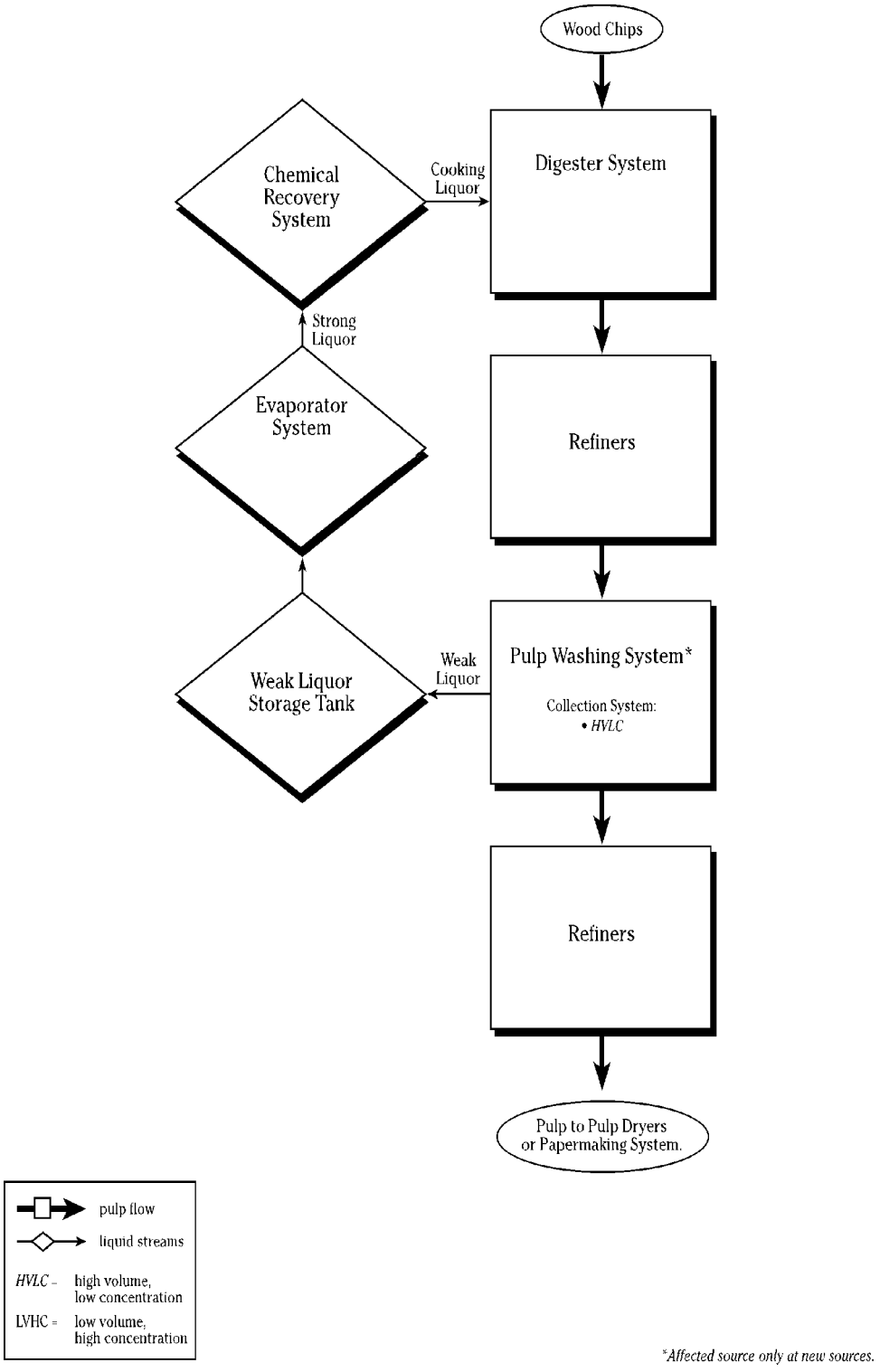


Figure 11.

Example Semi-chemical Pulping System

2.7 Mechanical, secondary fiber, and non-wood fiber pulp mills

Mechanical pulping

Bleaching systems that use chlorine or chlorine dioxide *are the* ***only*** *emission sources at mechanical, secondary fiber, and non-wood fiber mills affected by the pulp and paper NESHAP.*

Mechanical pulping uses physical pressure instead of chemicals to separate wood fibers. Mechanical pulping processes have the advantage of converting up to 95 percent of the dry weight of the fiber source into pulp, but require an enormous amount of energy relative to chemical pulping. Mechanically produced pulp is of lower strength than chemically produced pulp and is used principally for newsprint and other non-permanent paper goods.

Mechanical pulps are brightened with hydrogen peroxide (H_2O_2) and/or sodium sulfite (Na_2SO_3). The brightening chemicals are applied during the pulp processing stage (e.g., in-line brightening), or in chemical application towers. These chemicals only brighten the pulp and do not permanently bleach the pulp. Typically, bleaching of mechanical pulps using chlorine or chlorine dioxide is not practiced because of the high cost of bleaching chemicals and negative impact on pulp yield.

Secondary fiber pulping

Secondary fiber mills make pulp from recycled paper and other products.

Secondary fibers include any fibrous material that has undergone a manufacturing process and is being recycled as the raw material for another manufactured product. Secondary fibers have less strength and bonding potential than virgin fibers. The fibrous material is dropped into a large tank, or pulper, and mixed by a rotor. The pulper may contain either hot water or pulping chemicals to promote dissolution of the paper matrix. Debris and impurities are removed by “raggers”(wires that are circulated in the secondary fiber slurry so that debris accumulates on the wire) and “junkers” (bucket elevators that collect heavy debris pulled to the side of the pulper by centrifugal force).

Non-wood fiber pulping

The NESHAP does not apply to mills that rewater purchased pulp (e.g., dried bales or sheets of pulp being made into a slurry).

Non-wood pulping is the production of pulp from fiber sources other than trees. Non-wood fibers used for papermaking include straws and grasses (e.g., flax, rice), bagasse (sugar cane), hemp, linen, ramie, kenaf, cotton, and leaf fibers. Pulping of these fibers may be performed by mechanical means at high temperatures or using a modified kraft or soda process. Non-wood fiber pulp production is not common in the U.S.

2.8 References for Chapter 2

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Chapter 3 - Overview of the Pulp and Paper NESHAP

3.1 Which mills are subject to the NESHAP?

The pulp and paper NESHAP applies to existing and new major sources that produce pulp, paper, or paperboard, **and** use any of these pulping processes:

- kraft using wood
- soda using wood
- sulfite using wood
- semi-chemical using wood
- mechanical using wood
- processes using secondary fibers or non-wood fibers

A major source is any mill that emits or has the potential to emit (considering Federally enforceable controls) 10 tons per year (tpy) or more of any HAP or 25 tpy or more of any combination of HAPs.

A copy of the April 15, 1998 NESHAP is in Appendix B. Refer to the UATW for correction notices and amendments.

*The NESHAP does **NOT** apply to paper mills unless they also produce pulp.*

*Find a list of HAPs at **http://www.epa.gov/ttn/uatw/pollsour.html***

3.2 What processes and equipment systems must be controlled?

The NESHAP has separate emission limits for pulping system vents, pulping process condensate streams, and bleaching systems. The applicability of these standards varies depending on the type of mill.

General Requirements of the NESHAP:
- *vent control on pulping systems*
- *treatment of condensates from kraft pulping systems only*
- *vent control on bleaching systems*
- *elimination of certain bleaching chemicals*
- *no control of papermaking systems*

	Then the NESHAP Covers These Processes...		
If the Mill is This Type...	**Pulping System Vents**	**Pulping Condensates**	**Bleaching Systems That Use the Following Compounds**
Kraft	X	X	Chlorine or any chlorinated compound
Sulfite	X		Chlorine or any chlorinated compound
Semi-chemical	X		Chlorine or any chlorinated compound
Soda	X		Chlorine or any chlorinated compound
Mechanical			Chlorine or chlorine dioxide
Secondary Fiber			Chlorine or chlorine dioxide
Non-Wood Fiber			Chlorine or chlorine dioxide

In addition, the specific pulping process vents covered by the standards vary depending on the type of mill and the classification of the pulping system as a new or existing source. See Figure 12. The applicability and control requirements of each type of mill are explained in detail in Chapters 4 through 7.

For purposes of this NESHAP, LVHC systems are:
- *digester system*
- *turpentine recovery system*
- *evaporator system*
- *steam stripper system*
- *any other system serving one of these functions*

Systems that are not regulated:
- *wood yards*
- *pulping systems at mechanical, non-wood, and secondary fiber pulp mills*
- *tall oil recovery systems*
- *causticizing systems*
- *papermaking systems*

Figure 12.

Equipment Systems Covered by the Pulping Vent Standards

If the Mill is This Type...	Then These Equipment Systems[a] are Covered at Existing Sources...	And These Equipment Systems are Covered at New Sources[b]...
Kraft	• LVHC systems • Pulp washing system • Oxygen delignification system • Decker systems that use any process water other than fresh water or paper machine white water or any process water with total HAPs concentration > 400 ppmw • Knotter systems with HAP emissions greater than 0.05 kg/Mg oven-dried pulp • Screen systems with HAP emissions greater than 0.1 kg/Mg oven-dried pulp • Combined knotter and screen systems with HAP emissions greater than 0.15 kg/Mg oven-dried pulp	Same as existing sources plus all... • Decker systems • Screen systems • Knotter systems • Weak liquor storage tanks
Soda	LVHC systems	Same as existing sources plus all... Pulp washing systems
Sulfite	• Digester system • Evaporator system • Pulp washing systems	Same as existing sources plus all... • Weak liquor storage tanks • Strong liquor storage tanks • Acid condensate storage tanks
Semi-chemical	LVHC systems	Same as existing sources plus all... Pulp washing systems

[a] See Appendix F for a list of specific equipment within each system.
[b] See page 49 for the definition of a new source.

3.3 What are the emission control requirements?

The NESHAP provides several alternative emission limits for the pulping vent standard, pulping condensates standard, and bleaching system standard. For each regulated emission point, a mill can choose the emission limit with which to comply and can use any emission control technology to achieve compliance.

The NESHAP has one alternative emission limit for pulping system vents, pulping condensates, and bleaching systems that does not require testing and monitoring.

The format (e.g., percent reduction or outlet concentration) of the alternative emission limits varies depending on the type of mill (Figure 13). For ease of explanation, Figure 13 provides only the formats of the alternative limits, since the actual emission limits vary depending on the type of mill. The emission limits for each type of mill are presented in Chapters 4 through 7 and are summarized in Appendix G.

Where two or more pulping processes share a piece of equipment, that piece of equipment is considered a part of the pulping process type with the more stringent NESHAP requirements for that piece of equipment.

Figure 13.

Alternative Emission Limits

For the Following Standards...	The Regulated Pollutant is...	And a Mill Can Choose One of the Following Emission Limits[a]...
Pulping system vents • Kraft • Soda • Semi-chemical	Total HAPs	• Percent reduction • Outlet concentration (parts per million by volume) for thermal oxidizer • Design specification for thermal oxidizer • Duct vents to a boiler, recovery furnace, or lime kiln
Pulping system vents • Sulfite	Total HAPs	• Percent reduction[b] • Mass emission limit (lb/ton oven-dried pulp)[b]
Pulping system condensates • Kraft	Total HAPs	• Recycling to equipment subject to pulping standards • Biological treatment • Percent reduction (HAP mass in the condensates) • Mass removal (lb/ton oven-dried pulp) • Outlet concentration (parts per million by weight)
Bleaching system • Kraft • Soda • Sulfite	Chlorinated HAPs (other than chloroform)	• Percent reduction • Outlet concentration (ppmv) from the treatment device • Mass emission limit (lb/ton oven-dried pulp)[c] • Eliminate use of chlorinated compounds
	Chloroform	• Eliminate use of hypochlorite and chlorine • Effluent (water) limitations

[a] Emission limits vary for different types of pulping systems and control devices. A mill will likely use several closed-vent systems and each one can comply with any of these alternative emission limits.

[b] Percent reduction and mass emission limits apply to sulfite pulping system vents, and any emissions from vents, wastewater, and condensate streams from the control device.

[c] Mass emission limit applies to total emission from all regulated bleaching stages in the bleaching system.

3.4 What control systems will mills typically use to meet the emission limits?

The control systems that most mills are likely to use to meet the emission limits shown in Figure 13 are listed below:

- Pulping system vents
  - thermal oxidizers
  - power boilers, lime kilns, recovery furnaces
- Pulping process condensates
  - steam strippers
  - biological treatment
  - recycling to pulping equipment that is controlled by the NESHAP
- Bleaching system vents
  - caustic scrubbers (for chlorinated HAPs, other than chloroform)
  - process modifications to eliminate the use of chlorine and hypochlorite

3.5 How do mills demonstrate initial and continuous compliance?

In general, mills must conduct an initial performance test and then continuously monitor a set of control device or process operating parameters. Exceeding a monitoring parameter will constitute a violation of the standard.

Figure 14 explains in general how mills must demonstrate compliance with the NESHAP.

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 (Figure 14 explains the pollutants that must be measured and the allowable surrogates that a mill may choose to measure as an alternative)

(2) To establish the process operating parameter values (e.g., fire box temperature for thermal oxidizers) that must be monitored to demonstrate continuous compliance with the standard

Administrator *means an authorized representative of the EPA (e.g., a State that has been delegated the authority to implement and enforce this NESHAP).*

The NESHAP specifies the required monitoring parameters for most control devices. If a mill uses a control device for which the monitoring parameters are not specified, then the mill must propose and demonstrate, to the satisfaction of the Administrator, a set of monitoring parameters that can prove 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 fire box temperature) that constitute continuous compliance.

*The NESHAP generally requires continuous monitoring of **operating parameters** (not emissions) to demonstrate 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 operating parameters and report all instances where the values deviate from the maximum or minimum values established during the initial performance test. As an alternative, mills may install a continuous emissions monitor.

Recordkeeping and reporting requirements. Mills must comply with the recordkeeping and reporting requirements of the NESHAP General Provisions (40 CFR 63) and those of the pulp and paper 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 Appendix B identifies which sections of the General Provision requirements apply and which are overridden by this NESHAP.

In addition, the pulp and paper NESHAP requires some mills to submit a control strategy report. The control strategy report must be submitted with the initial notification (by April 15, 1999) and updated every 2 years until compliance is achieved. The report must include the following:

- description of emission controls or process modifications selected for compliance
- compliance schedule
- a report on the progress of installing the emission controls or process modifications during the past 2-year period.

The control strategy report is required only if a mill uses one of the following strategies that provide either additional compliance time or compliance flexibility:

- Bleaching systems that comply with the Voluntary Technology Advanced Incentives Program (see page 70)
- HVLC system vents that comply after April 16, 2001
- HVLC system vents that comply with the Clean Condensate Alternative (see page 75)

Figure 14.

What Pollutants or Surrogates Must Be Measured?

If These Systems are Covered by the NESHAP...	Then the Regulated Pollutant is...	And a Performance Test is Required at this Frequency[a]...	And a Mill May Choose to Test[b] for this Surrogate Pollutant...	And These Parameters Must be Continuously Monitored
Pulping	Total HAPs	Initially	Methanol	Operating parameters or methanol outlet concentration
Bleaching	Chlorinated HAPs (excluding chloroform)	Initially	Chlorine	Operating parameters or chlorine outlet concentration
	Chloroform	None[c]	--	None[c]
Condensates				
Biological treatment	Total HAPs (in condensates)	Quarterly	Methanol[d]	Operating parameters (daily)
Steam stripping	Total HAPs (in condensates)	Initially	Methanol	Operating parameters or methanol outlet concentration

[a] 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 (40 CFR subsection 63.7(a)(3)).

[b] Compliance tests are conducted using the following methods:

Compound(s)	Test method
Total HAPs; methanol	M308
Chlorinated HAPs	Any method approved by the Administrator
Chlorine	M26A
Total HAPs; methanol in condensates	M305
Methanol in condensates	NCASI GC/FID[e]

[c] A mill can comply by eliminating the use of chlorine and hypochlorite or by complying with the numerical limits of the effluent limitations guidelines and standards for water in 40 CFR 430.

[d] The initial performance test and 1st quarter percent reduction tests must be performed for total HAPs. However, if a relationship between total HAPs and methanol destruction is established in the 1st quarter percent reduction tests, methanol can be used as a surrogate for total HAPs in the 2nd, 3rd, and 4th quarter tests.

[e] The National Council of the Paper Industry for Air and Stream Improvement (NCASI) direct injection gas chromatography/flame ionization (GC/FID) method may be used as an alternative to EPA Method 305.

3.6 When must mills comply?

The major compliance milestones for affected sources are shown below. This information presents only a portion of the requirements faced by owners and operators of pulp and paper mills. Appendix H provides the detailed milestone compliance timeline for existing sources.

Affected Sources Must Comply by April 16, 2001...	
Except for the Following...	**Which Must Comply...**
New sources	At startup or by June 15, 1998, whichever is later
HVLC system vents at kraft mills[a]	Within 8 years (April 17, 2006)
Dissolving grade bleaching systems at kraft or sulfite pulping mills[b]	Within 3 years of publication of the revised effluent limitations guidelines and standards
Bleaching system at any mill choosing to implement the Voluntary Advanced Technology Incentives Program[c] for effluent limitations guidelines and standards	Within 6 years (April 15, 2004)

For purposes of this NESHAP, HVLC systems are:
- *knotter system*
- *pulp washing system*
- *screen system*
- *oxygen delignification system*
- *weak liquor storage tanks*

[a] LVHC systems must still meet the April 16, 2001 compliance date (see page 55).
[b] Dissolving grade bleaching systems are similar to bleaching systems at bleached kraft or sulfite mills, but usually contain six to eight bleach stages for maximum delignification and pulp cleanliness. The April 15, 1998 Cluster Rules did not publish effluent limitations guidelines and standards for these subcategories. Development of these revised rules is underway.
[c] Refer to page 70.

Also, by April 15, 1999, the following is due:

- Initial notification
- Initial control strategy report

3.7 What additional requirements apply to new sources?

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

For new sources, the emission limits are the same as existing sources.

- ***More emission points must be controlled***. For pulping systems, the emission limits (see Figure 12) for new and existing processes are the same, but more emission points must be controlled at new sources. For bleaching systems and pulping condensates, the emission limits and emission points that must be controlled for new and existing sources are identical.

- ***Earlier compliance dates***. New sources must comply at the date of startup or on June 15, 1998, whichever is later.

- ***Preconstruction approval.*** The owner or operator of mills subject to the pulp and paper 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 two conditions are met:

  - if the construction or reconstruction involves pulping and/or bleaching system equipment as defined in Section 3.8

  - the new or reconstructed source in and of itself is a major source

See page 49 for the definition of a new 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 40 CFR 63.5 (e) and (f).

3.8 What is a new source?

The definition of a new source is different under the Clean Water Act. See 40 CFR 122.2 and 40 CFR 430.01(j) for the definition of a new source for effluent limitations guidelines and standards, and pretreatment standards.

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

A New Source at a ...	Using...	Is the Construction of Any One of the Following...	Or the Reconstruction[a] of Any One of the Following...	That Commences After...
Kraft mill, Soda mill, Semi-chemical mill, or Sulfite mill.	Wood	• A new mill • New pulping system • New bleaching system • Additional pulping line • Additional bleaching line	• Pulping system • Bleaching system	12/17/93
Mechanical pulping mill	Wood	• Bleaching system • Bleaching line	Bleaching system	03/08/96
Other mills	Secondary or non-wood fibers	• Bleaching system • Bleaching line	Bleaching system	03/08/96

[a] 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. (40 CFR 63.2 Subpart A).

What is an "Additional Line?" An additional line means a line that adds capacity to an existing pulping or bleaching system. For example, consider a mill with two existing pulping lines. The construction of a third line would constitute an additional line and would be subject to new source controls. On the other hand, a like-kind replacement of one of the lines would not be considered an additional line. However, the replacement of one of the lines with a new line that increases the capacity of the pulping system would be considered an additional line that is subject to the new source requirements.

What Does "Reconstruction" Mean? Reconstruction means the 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 emissions of HAPs. See 40 CFR 63.2 and 63.5.

Upon reconstruction, an existing source immediately becomes subject to the new source requirements!

The pulp and paper NESHAP defines either the entire pulping system or bleaching system as the equipment to which the 50 percent criterion is applied. For example, consider a mill that is refurbishing one of its two pulping lines by replacing worn out equipment or components. To determine if reconstruction occurs, the replacement costs would be compared to the construction costs for replacing the entire pulping system (e.g., both lines). If the replacement cost is less than 50 percent, the line is treated as an existing source. However, if the cost exceeds 50 percent, then the replacement/construction project would be deemed as a reconstruction of the pulping system, and **both** lines would become subject to the new source provisions, even if emissions after the reconstruction are the same or decrease.

Chapter 4 - NESHAP Requirements for Kraft Mills

Systems that are not regulated:
- *wood yards*
- *tall oil recovery systems*
- *causticizing systems*
- *papermaking systems*

For kraft mills, the NESHAP contains emission standards for pulping system vents, pulping process condensates, and bleaching system vents.

There are several alternative emission limits for each process covered. Compliance times will vary based on the process and emission limit selected, even within the same mill. This designed flexibility promotes and encourages new technologies, particularly joint air/water controls and pollution prevention technologies.

The CCA focuses on reducing HAP emissions throughout the mill by reducing the HAP mass in process water streams that are recycled to various process areas in the mill.

The NESHAP also includes an option called the Clean Condensate Alternative (CCA). The CCA applies only to kraft pulping system vent standards for the HVLC system and features both pollution prevention and emission averaging. The CCA is described on page 75.

If You Need the Following Information...	Then Read...
Standards for kraft pulping system vents	Section 4.1
Standards for kraft pulping process condensates	Section 4.2
Standards for kraft bleaching system vents	Section 4.3
Description of the clean condensate alternative	Section 4.4
Comparison of requirements for the NESHAP and the NSPS	Section 4.5

4.1 Standards for kraft pulping system vents

The NESHAP requires the pulping system emission points to be enclosed, collected in a closed-vent system, and then vented to a control device. This section describes the emission points that must be controlled, the four alternative emission limits, and the compliance requirements.

*For purposes of this NESHAP, the **LVHC system** includes all vents from:*
- *digester system*
- *turpentine recovery system*
- *evaporator system*
- *steam stripper system*

and

*The **HVLC system** includes all vents from:*
- *pulp washing system*
- *knotter system*
- *screen system*
- *decker system*
- *oxygen delignification system*
- *weak liquor storage tanks*

The combined knotter and screen system limit applies if the mill is unable to differentiate emissions between the two systems.

What kraft pulping system vents must be controlled?

The NESHAP specifies that vents from the mill systems must be controlled. All the vents from the LVHC system must be controlled. The HVLC vents requiring control vary based on the quantity of emissions and whether the source is new or existing.

The Following Pulping Systems Must be Controlled[a]...
Existing Sources
• LVHC system
• Pulp washing system
• Oxygen delignification system
• Decker systems that use any process water other than fresh water or paper machine white water, or process water with a concentration of HAPs greater than 400 parts per million by weight (ppmw)
• Knotter systems with HAP emissions equal to or greater than 0.1 pounds per ton oven-dried pulp
• Screen systems with HAP emissions equal to or greater than 0.2 pounds per ton oven-dried pulp
• Combined knotter and screen systems with HAP emissions equal to or greater than 0.3 pounds per ton oven-dried pulp
New Sources
• Same as existing sources plus...
• All decker systems
• All screen systems
• All knotter systems
• All weak liquor storage tank vents

[a] Each equipment system has multiple emission points. For example, the evaporator system comprises pre-evaporators, multi-effect evaporators, concentrators, vacuum systems, associated condensers, hot wells, and condensate streams. A complete list of the emission points in each equipment system is provided in Appendix F.

What are the emission limits for kraft pulping system vents?

The emissions from kraft pulping system vents must meet one of four alternative emission limits, as shown below. These emission limits apply to each control device used to control HAP emissions. A mill will likely use several closed-vent systems and control devices (including both add-on control devices and existing combustion devices) and each can comply with any of these four alternative emission limits. These emission limits apply to both new and existing sources.

*These emission limits apply to **each** control device.*

Pulping System Vent Gases Must be Collected in a Closed-vent System and Routed to One of These Four Control Devices...
1. A boiler, lime kiln, or recovery furnace in which the HAP gas stream is introduced with the primary fuel or into the flame zone
2. A thermal oxidizer operated at a minimum temperature of 1,600°F and a minimum residence time of 0.75 seconds
3. A thermal oxidizer that reduces the total HAP concentration at the outlet to 20 ppmv corrected to 10% O_2 on a dry basis, measured as total HAPs or methanol
4. Any control device that reduces total HAP emissions by 98% by weight, measured as total HAPs or methanol

A fifth alternative is available for kraft HVLC system vents only. See Section 4.4 for an explanation of the Clean Condensate Alternative.

What does the NESHAP require for enclosures and closed-vent systems?

*A **closed-vent system** means a system that is not open to the atmosphere and comprises piping, ductwork, connections, and if necessary, flow-inducing devices that transport gas or vapor from an emission point to a control device.*

All regulated equipment system vents must be enclosed and routed through a closed-vent system to the control device that is selected for compliance. The requirements for enclosures and closed-vent systems are presented below. The requirements are intended to prevent leaks and ensure that process openings (e.g., sampling ports on a brown stock washer enclosure) are closed while the mill is in operation.

This Equipment....	Must Meet These Requirements....
Enclosures, openings, and hoods	Maintain negative pressure **and** If closed during the initial performance test, must be closed during operation except for sampling, inspection, maintenance, or repairs
Components operated at positive pressure	Operate with no detectable leaks (500 parts per million by volume [ppmv] VOC above background)
Bypass lines that could divert vent stream containing HAPs to the atmosphere	Seal and secure the opening so that the valve or closure mechanism cannot be opened without breaking the seal **or** If computer controlled, monitor for presence of gas stream flow at least once every 15 minutes

When must mills comply with the kraft pulping vent standards?

Compliance Dates:

LVHC system: April 16, 2001

HVLC system: April 17, 2006

HVLC systems that comply before April 16, 2001 are not required to submit a compliance strategy report.

The LVHC system sources at kraft mills must comply with the NESHAP by April 16, 2001, while the HVLC system sources must comply by April 17, 2006.

For HVLC system vents complying after April 16, 2001, a non-binding compliance strategy report must be submitted initially and updated every 2 years until compliance is achieved. The compliance strategy report must contain, among other information, a description of the emission controls or process modifications selected for compliance and a compliance schedule indicating when each step toward compliance will be reached.

For safety purposes, kraft mills typically separate pulping vent streams into two groups: low volume, high concentration (LVHC) vent streams and high volume, low concentration (HVLC) vent streams. The NESHAP does not specify which vents must be routed to the LVHC and HVLC collection systems. Each mill makes this decision. However, compliance dates are based on EPA's definition of LVHC and HVLC system equipment, and these compliance dates do not change based on how a mill chooses to collect their system vents. For example, a mill could control an evaporator vent (LVHC source) along with a group of HVLC vents. In such cases, the emissions from this closed-vent system would have to comply by April 2001, because 2001 is the compliance date specified for the LVHC system source.

How does a mill demonstrate initial compliance with the kraft pulping system vent standards?

A mill must demonstrate compliance through an initial performance test for each closed-vent system and control device. However, the rule contains two alternative emissions limits for which an initial performance test of the control device is not required. If a mill complies with the pulping system vents standards by venting the gases to a boiler, lime kiln, or recovery furnace, the mill must demonstrate only that the gases are being introduced with the primary fuel or into the flame zone. Also, if a mill complies with the pulping system vents standards by venting the gases to a thermal oxidizer operating at the minimum design specifications, the mill must demonstrate only that the gases are being properly introduced into the thermal oxidizer.

The initial performance test has three objectives:

(1) **To demonstrate that each control device complies with the emission limit**. Refer to Figure 15.

(2) **To demonstrate that the closed-vent system captures and contains all HAP emissions**. Refer to Figure 16.

(3) **To establish the process operating parameter values that must be monitored to demonstrate continuous compliance**. For example, the test would establish the minimum fire box temperature of the thermal oxidizer that indicates 98 percent by weight reduction of total HAPs.

Figure 15.

How Does a Mill Demonstrate Initial Compliance with the Kraft Pulping System Vent Emission Limits?

The test method specified is used to determine pollutant concentration. Additional calculations or formulas are specified in the NESHAP to convert the concentration values into the appropriate format to demonstrate compliance with a particular emission limit.

To Demonstrate Initial Compliance With This Emission Limit...	Conduct an Initial Performance Test Following This Method...	To Measure These Parameters...
Introduce HAP emission stream with the primary fuel or into the flame zone	None required. Demonstrate that gases are properly introduced.	None required
Operate at a minimum temperature of 1,600 F and a minimum residence time of 0.75 seconds	None required	None required
Reduce the total HAP concentration at the outlet to 20 ppmv corrected to 10% O_2 on a dry basis	Method 308	Total HAP or methanol concentration at the outlet of the thermal oxidizer
Reduce total HAP emissions by 98% by weight	Method 308	Total HAP or methanol mass at the control device inlet and outlet

How does a mill demonstrate continuous compliance with the kraft pulping system vent standards?

Continuous monitors are required except for vent streams that are combusted in a lime kiln, recovery furnace, or boiler.

Mills must install a continuous monitoring system to measure either HAP concentration or control device operating parameters. Figure 17 presents the monitoring, reporting, and recordkeeping requirements for each alternative emission limit.

In addition, a mill must periodically inspect and maintain all enclosures and closed-vent systems. These requirements are explained in Figure 16. The mill must maintain a site-specific inspection plan for the enclosures and closed-vent system. Records of all inspection results and repairs must also be kept according to the specifications of 40 CFR 63.454.

Figure 16.

How Does a Mill Demonstrate Initial and Continuous Compliance with the Closed-Vent Systems Standard?

These same tests are required as part of the initial performance test.

If the System has...	Then Inspect...	And Report...	And Keep Records of...
Enclosure opening	Visually inspect every 30 days to ensure closed and sealed	Any exceedences of the closed-vent standard in quarterly reports. If no exceedences occur, submit semi-annual reports.	All visual checks and any repairs
	Annually demonstrate negative pressure	Same as above	All pressure tests
Closed-vent system	Visually inspect every 30 days for visible defects	Same as above	All visual checks and repairs
Positive pressure closed-vent system	Annually demonstrate no detectable leaks (less than 500 ppmv)	Same as above	All leak tests
Bypass line valve	Inspect every 30 days to ensure valve is in a closed position and vent stream is not diverted through bypass line	Same as above	All visual checks and repairs

Figure 17.

How Does a Mill Demonstrate Continuous Compliance with the Kraft Pulping System Vent Emission Limits?

If a Mill Chooses This Alternative Emission Limit...	Then Continuously Monitor These Parameters...	And Report This Information...	And Keep These Records for 5 Years...
Introduce HAP emission stream with the primary fuel or into the flame zone	None required	None required	None required
Operate at a minimum temperature of 1,600°F and a minimum residence time of 0.75 seconds	Fire box temperature	• Certify in the performance test report that the minimum residence time is achieved • Semi-annual emissions and continuous monitoring performance report • If exceedences occur, then quarterly reports are required (40 CFR 63.10(e))	Fire box temperature
Reduce the total HAP[a] concentration at the outlet to 20 ppmv corrected to 10% O_2 on a dry basis	Fire box temperature **or**	• Semi-annual emissions and continuous monitoring performance report • If exceedences occur, then quarterly reports are required (40 CFR 63.10(e))	Fire box temperature
	Total HAP concentration[a]	Same as above	Total HAP concentration[a]
Reduce total HAP[a] emissions by 98% by weight	When using a thermal oxidizer, monitor fire box temperature	Same as above	Fire box temperature
	When using a control device other than a thermal oxidizer or incineration, operating parameters must be established during the initial performance test and approved by the Administrator[b]	Same as above	Parameters approved by the Administrator

[a] Methanol may be used as a surrogate for total HAPs.

[b] Administrator means an authorized representative of the EPA (e.g., a State that has been delegated the authority to implement and enforce this NESHAP).

Must a mill comply at all times?

For pulping system vents, the NESHAP establishes an allowable percent of operating time during which HAP emission levels in excess of the established limit shall not be considered to be a violation of the standard. Periods of excess emissions include when the control device is inoperable and when the 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, and is calculated by dividing the time of excess emissions by the total process operating time in a semi-annual reporting period.

The excess emissions allowances are:

- 1 percent of operating time for control devices used for LVHC system vents
- 4 percent of operating time for control devices used for HVLC system vents
- 4 percent of operating time for control devices used for combined LVHC and HVLC system vents (i.e., controlled by the same device)

Even though periods of excess HAP emissions may be exempt under the MACT requirements, these periods of excess emissions must still comply with NSPS total reduced sulfur (TRS) requirements, and any applicable State requirements.

The NESHAP does not specify rigid averaging times, but rather allows State permitting authorities flexibility in establishing mill-specific times. Check the UATW periodically for additional information concerning averaging times.

To calculate the percent of periods of excess emissions in a semi-annual period, divide the number of hours in the reporting period during which the control device was not operating or parameter deviations occurred by the total number of process operating hours and multiply by 100 percent. For example, to calculate the semi-annual excess emissions for an LVHC system control device where the device down time was 25 hours and the total process operating time was 4,250 hours:

$$\frac{\text{Control device down time}}{\text{Total process operating time}} \times 100\%$$

$$\frac{25 \text{ hours}}{4{,}250 \text{ hours}} \times 100\% = 0.59\%$$

4.2 Standards for kraft pulping process condensates

The condensate streams subject to control and the alternative emission limits are the same for new and existing sources.

The NESHAP requires condensate streams from the pulping system to be collected in a closed collection system and treated. The NESHAP provides five alternative emission limits (shown on page 61). This section describes the condensates that must be controlled and the alternative emission limits.

What is a condensate and why control it?

Kraft pulping condensates are HAP-containing liquids that are condensed from pulping system vent streams. These HAP-containing liquids result from the contact of water with organic compounds in the pulping process. In absence of these Cluster Rules, most condensates would be discharged into open collection systems and transported to either the wastewater treatment plant or a publicly owned wastewater treatment plant. The emissions of concern are the HAPs that volatilize as the condensates travel through these open systems.

What kraft pulping condensates must be controlled?

*Liquid streams intended for byproduct recovery, such as the combined turpentine/water streams prior to the turpentine decanter or concentrated black liquor, are **not** considered process condensate streams subject to the control requirements of this regulation.*

The NESHAP requires control of condensates from all of the equipment in the following systems:

- digester system
- turpentine recovery system
- evaporator system (condensates from weak liquor feed stage vapors and vacuum systems only).
- LVHC collection system
- HVLC collection system

The LVHC and HVLC collection system condensates means those condensates generated by the condensation of moisture in the closed-vent collection systems that convey the LVHC and HVLC system vent gases to a control device.

Does the mill have to collect all those streams?

No. A mill may choose to collect and control all the condensate streams from the equipment systems listed on page 60. Alternatively, the NESHAP contains two options for minimizing the volume of condensate that must be treated (referred to as volume reduction options). These options are summarized below.

A Mill Must Collect and Control One of the Following Combinations of Streams...
• All condensate streams
• Volume reduction option 1: Treat all LVHC and HVLC collection system streams plus streams that contain 65% of the total HAP mass from the digester system, turpentine recovery system, and evaporator system (only condensates from weak liquor feed stage vapors and vacuum systems)
• Volume reduction option 2: Treat any subset of the regulated streams that contain in total 7.2 lbs HAP per ton of oven-dried pulp at mills that do not perform bleaching or 11.1 lbs HAP per ton of oven-dried pulp at mills that perform bleaching

By segregating condensate streams containing the greatest amount of HAP and treating only these streams, an equivalent emission reduction can be achieved at a lower cost.

What are the control requirements?

The NESHAP provides five alternative emission limits for condensate streams as shown below. The three strategies expected to be used by most mills are: recycling, biological treatment, and steam stripping.

Kraft Pulping Process Condensates Must be Collected in a Closed-collection System and Treated to Meet One of These Five Alternative Emission Limits...	
1.	Recycle the condensate to a piece of equipment that meets the control standards for pulping system vents (see page 53)
2.	Use a biological treatment system to reduce or destroy the total HAPs[a] by 92% by weight
3.	Treat the condensates to reduce or destroy the total HAPs[b] by 92% by weight
4.	Treat the condensates to remove 10.2 pounds HAPs[b] per ton of oven-dried pulp at mills performing bleaching or 3.3 pounds HAPs[b] per ton of oven-dried pulp at mills that do not perform bleaching
5.	Treat the condensates to achieve a total HAP[b] concentration of 330 ppmw at the outlet of the control device at mills that perform bleaching or 210 ppmw at the outlet of the control device at mills that do not perform bleaching

Most mills are expected to use steam stripping for alternative emission limits 4 and 5.

[a] Measured as total HAPs only.
[b] Measured as total HAPs or methanol.

What does the NESHAP require for condensate closed collection systems?

Regardless of the emission limit selected, the condensates subject to control must be transported in a closed collection system such that no emissions occur. The NESHAP requirements for closed collection systems are presented below.

This Equipment....	Must Meet ALL of These Requirements....
Closed collection systems used to transport pulping process condensates containing HAPs	All of the individual drain system requirements specified in §63.960, 63.961, and 63.962 of Subpart RR[a] except that any air vents in the collection system must meet standards of §63.443 (c) and (d) for the closed-vent systems and HAP reductions for kraft pulping system vent emissions
Condensate tanks used in the closed collection system	Operate with no detectable leaks (500 ppmv VOC above background) **and** Vent emissions to a closed-vent system (see page 54) and route to a control device (see page 53) **and** When the tank contains pulping process condensates or any HAP removed from the pulping condensate stream, all openings must be kept in a closed, sealed position - except during sampling, inspection, maintenance, or repair operations

*The condensate tank requirement applies only to tanks used to store or handle the regulated condensates, **not** tanks used to store weak liquor.*

[a] Subpart RR of 40 CFR 63 (National Emission Standards for Individual Drain Systems) establishes design, operating, inspection, and monitoring requirement standards for controlling air emissions from individual drain systems. The standards control emissions from individual drain systems using covers or seals, or hard-piping. Subpart RR also requires inspections of water seals and closure devices for defects or damage initially and establishes repair requirements for individual drain systems. The NESHAP requires inspection every 30 days.

The mill can meet the closed collection system requirements in two ways:

- Hardpiping
- Use existing drains, but cover all openings and route all open vents through a closed-vent collection system to a control device meeting the NESHAP requirements for pulping system vents.

If there are air vents off the closed collection system, these vents must be routed to a closed-vent system. These air vents must comply with the kraft pulping system standards for closed-vent systems and HAP emissions (see pages 53 and 54).

When must a mill be in compliance?

Mills must achieve compliance with the pulping process condensate requirements by April 16, 2001.

How does a mill demonstrate initial compliance for kraft pulping process condensate standards?

Mills must conduct a performance test to demonstrate initial compliance. A performance test is required for each closed collection system and treatment option.

With respect to pulping condensates, the performance test serves four purposes:

(1) **To demonstrate that the appropriate condensate streams are being collected and treated**. The options for determining the streams to be collected and controlled are presented on page 61. If a mill uses one of the volume reduction options, the NESHAP requires documentation to support the choice. For example, if a mill opts to control condensate streams based on mass of total HAPs, the mill must present test results to support that a complying mass of the total HAPs is collected. Even in the case where a mill chooses to collect and treat all pulping condensate streams, the mill must demonstrate that **all** of the condensate streams have been identified and collected.

(2) **To demonstrate that the closed collection system does not allow any emissions to occur**. Refer to page 62.

(3) **To demonstrate that the control device complies with the emission limit**. For all alternative emission limits except biological treatment, the mill can measure either total HAPs or methanol concentration to document compliance with the emission limits. For biological treatment, total HAPs concentration must be measured. See Figure 18.

(4) **To establish the process operating parameter values that must be continuously monitored**. During the performance test, the mill must measure the parameter values that the mill will monitor to indicate continuous compliance. For example, the values of steam feed rate, condensate feed rate, and temperature are specified as the monitoring parameters for steam strippers.

Figure 18.

How Does a Mill Demonstrate Initial Compliance with Kraft Pulping Condensate Emission Limits?

To Demonstrate Initial Compliance With This Emission Limit...	Conduct an Initial Performance Test Following This Method...	To Measure These Parameters...
Recycle the condensate to controlled equipment	None required	None required
Use a biological treatment system to meet 92% reduction	Method 305	Total HAP concentration
	and	**and**
	Part 63, Appendix C (e.g., WATER8)	Fraction of total HAPs removed (f_{bio})
Treat condensates to meet 92% reduction	Method 305	Total HAP or methanol mass at the control device inlet and outlet
Treat the condensates to meet mass limits	Method 305	Total HAP or methanol mass at the control device inlet and outlet
Treat the condensates to meet concentration limits	Method 305	Total HAP or methanol concentration at the control device outlet

For the recycle treatment option, the performance test would consist only of verifying that no leaks were present in the closed collection system and confirming closed-vent system and control device requirements.

The test method specified is used to determine liquid stream pollutant concentration. Additional calculations or formulas are specified in the NESHAP to convert the concentration values into the format appropriate to demonstrate compliance with a particular emission limit.

How does a mill demonstrate continuous compliance with pulping process condensate standards?

Mills must install continuous monitors to measure control device operating parameters, except when recycling condensates to controlled process equipment. In addition, quarterly percent reduction testing is required if a mill chooses to comply using biological treatment. The monitoring requirements depend on the alternative emission limit selected. Figure 19 summarizes the monitoring, reporting, and recordkeeping requirements for each alternative emission limit.

The closed collection system must be visually inspected every 30 days according to the following requirements:

- National Emission Standards for Individual Drain Systems (63.964 subpart RR) requires inspection and monitoring
- Subpart S requires reporting and recordkeeping of all visual inspection results. Semi-annual reports must be submitted. If exceedences occur, then quarterly reports are required.

Figure 19.

How Does a Mill Demonstrate Continuous Compliance with Kraft Pulping Process Condensate Emission Limits?

If a Mill Chooses to Comply With Alternative Emission Limits Using This Technique...	Then Continuously Monitor All of These Parameters...	And Report This Information...	And Keep These Records for 5 Years...
Recycle the condensate to controlled equipment	None required	None required	None required
Steam stripper (percent reduction, concentration, or mass limits)	Process wastewater feed rate	• Semi-annual emissions and continuous monitoring performance report • If exceedences occur, then quarterly reports are required (40 CFR 63.10(e))	Process wastewater feed rate
	Steam feed rate	Same as above	Steam feed rate
	Process wastewater column feed temperature	Same as above	Process wastewater column feed temperature
Steam stripper (concentration)	Steam stripper outlet concentration	Same as above	Steam stripper outlet concentration
Use a biological treatment system	Quarterly test of percent HAP reduction[a]	Same as above	Percent HAP reduction
	Outlet soluble BOD_5	Same as above	Outlet soluble BOD_5
	Mixed liquor volatile suspended solids	Same as above	Mixed liquor volatile suspended solids
	Horsepower of aerator units	Same as above	Horsepower of aerator units
	Inlet liquid flow	Same as above	Inlet liquid flow
	Liquid temperature	Same as above	Liquid temperature
Other device	Operating parameters demonstrated to the Administrator's satisfaction	Same as above	Parameters approved by the Administrator
Volume reduction options	Same as above	Same as above	Same as above

[a] The initial performance test and 1st quarter percent reduction tests must be performed for total HAPs. However, if a relationship between total HAPs and methanol destruction is established in the 1st quarter percent reduction tests, methanol can be used as a surrogate for total HAPs in the 2nd, 3rd, and 4th quarter tests.

Must a mill comply at all times?

Although there are no explicit back-up control requirements as part of the NESHAP, back-up controls may be necessary for mills that are concerned that the excess emission allowance is inconsistent with expected control device operating experience.

The NESHAP provides a 10 percent excess emissions allowance for all control devices other than biological treatment systems (63 FR 49455). For example, the allowance accounts for steam stripper tray damage or plugging, efficiency losses in the stripper due to contamination of condensate with fiber or black liquor, steam supply downtime, and combustion control device downtime.

Unlike the pulping standard, the 10 percent allowance for condensates includes excused periods of excess emissions associated with the startup, shutdown, and malfunction.

4.3 Standards for the kraft bleaching system vents

***Bleaching** is the brightening of pulp by the addition of oxidizing or reducing chemicals.*

At kraft mills, the emission limits apply to bleaching systems that use chlorine or chlorinated compounds. The rules have emission limits for both chloroform and chlorinated HAP. Kraft mills must comply with both of these requirements. This section describes the emission points that must be controlled, the alternative emission limits, and compliance requirements.

What bleaching emission points must be controlled?

*A **bleaching line** is a group of bleaching stages arranged in a series such that bleaching of the pulp progresses as the pulp moves from one stage to the next. Typically a bleaching line contains 3-5 stages.*

The NESHAP applies only to bleaching lines that use chlorinated compounds and only to the bleaching stages where chlorine or chlorinated compounds are introduced. Extraction stages are not covered. All vents in a regulated stage must be controlled. A stage consists of the following equipment:

- retention towers
- washers
- seal tanks
- chemical and steam mixers (if vented to the atmosphere)
- vacuum pumps (if present)

Are there any exemptions to the bleaching requirements?

Yes. Any bleaching system that does **not** use chlorine or any chlorinated HAP is exempt from **all** NESHAP requirements for bleaching.

What are the control requirements for chlorinated HAPs?

The equipment at each bleaching stage where chlorinated compounds are introduced must be enclosed and routed via a closed-vent collection system to a control device. The rules provide three alternative emission limits for demonstrating compliance, as shown below. Most mills are expected to use caustic scrubbers to comply.

The requirements for enclosures and closed-vent systems are the same as for the pulping system vent standards (page 54).

Bleaching System Gases Must be Collected in a Closed-vent System and Meet One of These Three Alternative Emission Limits[a]...	
1.	Reduce chlorinated HAP [b] emissions by 99% by weight
2.	Achieve a total outlet mass emission rate 0.002 pounds chlorinated HAPs[b] per ton oven-dried pulp for all subject stages
3.	Achieve an outlet concentration of chlorinated HAPs[b] 10 ppmv

[a] Some mills may be able to meet the outlet concentration or mass limits through use of process modifications (i.e., 100 percent chlorine dioxide substitution). In these cases, enclosures and closed-vent systems are not required.

[b] Chlorinated HAPs (excluding chloroform) may be measured as total chlorinated HAP or as chlorine.

What are the control requirements for chloroform?

The rules provide two alternative emission limits for chloroform control. Both of these options (shown below) require process modifications. A mill can comply by eliminating the use of chlorine and hypochlorite or by complying with the numerical limits of the effluent limitations guidelines and standards for water. If the compliance date for the effluent limitations guidelines and standards is different than for the NESHAP, the NESHAP compliance dates must be met.

To Reduce Chloroform Emissions From the Bleaching Process, Use One of These Two Options...	
1.	Eliminate the use of chlorine and hypochlorite
2.	Comply with applicable Effluent Limitations Guidelines and Standards (40 CFR 430)[a]

[a] Refer to Appendix I for a summary of the wastewater regulations for bleached papergrade kraft mills.

When must bleaching systems comply?

Bleaching Systems Compliance Dates:

Most mills: April 16, 2001

Mills enrolled in VATIP: April 15, 2004

Bleaching systems must comply by April 16, 2001 with two exceptions.

- Mills enrolled in the Voluntary Advanced Technology Incentives Program (VATIP)
- Dissolving grade kraft mills

Voluntary Advanced Technology Incentives Program (VATIP). Under the Effluent Limitations Guidelines and Standards (40 CFR Part 430.24), a mill may choose to enroll one or more of its bleach lines in the Voluntary Advanced Technology Incentives Program. The program provides extended compliance with the water pollution control requirements for bleached papergrade kraft and soda mills in exchange for achieving greater water pollutant reductions than the regulatory baseline. Mills electing this program receive a 3-year extension for complying with the NESHAP bleaching standards (i.e., must comply by April 15, 2004). Three conditions must be met to qualify for the extension.

VATIP is available only to papergrade kraft and papergrade soda mills that discharge directly to receiving waters.

- No increase in the application rates of either chlorine or hypochlorite (in kg per Mg oven-dried pulp) in the bleaching system beyond current levels. The current application rate is defined as the average daily rates used over the three months prior to June 15, 1998. The application rate limitation is provided to prevent a bleaching system from "backsliding" (i.e., increasing chlorinated bleaching chemical use during the extended compliance period). **EPA is considering guidance and rule changes pertaining to "backsliding." Check the TTN at www.epa.gov/ttn/uatw/uatwnew.html for updates**.
- Submit a control strategy report by April 1999.
- Submit an updated control strategy report every two years under 63.455(b) until compliance is achieved. The report must contain milestones and status reports for achieving compliance.

The compliance date for dissolving grade kraft mills is not specified in the NESHAP, but is anticipated between 2003-2005.

Dissolving grade kraft mills must comply within 3 years after publication of revised effluent limitations guidelines and standards under 40 CFR 430.14 through 430.17 and 40 CFR 430.44 through 430.47. These rules are scheduled to be revised sometime between 2000 and 2002.

How does a mill demonstrate initial compliance with the bleaching standards?

Chlorinated HAPs. Mills must demonstrate initial compliance with chlorinated HAP standards by conducting an initial performance test for each bleaching stage where chlorine or chlorinated compounds are introduced.

The initial performance test has two objectives:

(1) **To demonstrate that the control device complies with the emission limit**.

(2) **To demonstrate that the closed-vent system captures and contains all HAP emissions**. Refer to Figure 16.

(3) **To establish the process operating parameter values that must be monitored to demonstrate continuous compliance**.

At the option of the mill, compliance may be demonstrated by measuring either total chlorinated HAPs (including chloroform) or chlorine concentration. The following methods must be used:

Chlorinated HAPs	-	Any method that has been demonstrated to the Administrator's satisfaction.
Chlorine	-	Method 26A, as modified by 63.457(b)(5) of the rules.

Chloroform. No initial performance test is required if the mill chooses to eliminate use of chlorine and chlorinated HAPs. The mill must demonstrate in the initial notification that is not using these chemicals. Alternatively, if a mill chooses to comply with the Effluent Limitations Guidelines and Standards, then all compliance demonstration requirements of 40 CFR 430 apply.

How does a kraft mill demonstrate continuous compliance with the bleaching standards?

Continuous monitoring is required unless a mill complies by eliminating all use of chlorine or chlorinated compounds as bleaching agents.

For chlorinated HAPs, a continuous monitoring system must measure either emissions, or control device or process operating parameters. The monitoring, reporting, and recordkeeping requirements are summarized in Figure 20.

In addition, the mill must conduct periodic inspection and maintenance of all enclosures and closed-vent systems. These requirements are explained below. The mill must maintain a site-specific inspection plan for the enclosures and closed-vent system. Records of repairs based on the inspections must also be kept.

These same tests are required as part of the initial performance test.

If the System has...	Then Inspect...	And Report...	And Keep Records of...
Enclosure opening	Visually inspect every 30 days to ensure closed and sealed	Any exceedences of the closed-vent standard in quarterly reports. If no exceedences occur, submit semi-annual reports.	All visual checks and any repairs
	Annually demonstrate negative pressure	Same as above	All pressure tests
Closed-vent system	Visually inspect every 30 days for visible defects	Same as above	All visual checks and repairs
Positive pressure closed-vent system	Annually demonstrate no detectable leaks (less than 500 ppmv)	Same as above	All leak tests
Bypass line valve	Inspect every 30 days to ensure valve is in a closed position and vent stream is not diverted through bypass line	Same as above	All visual checks and repairs

Note: This is the same table as the one presented on page 57.

For chloroform, if the mill chooses to eliminate the use of hypochlorite and chlorine, then no parametric monitoring is required to show continuous compliance. If the mill chooses not to eliminate the use of hypochlorite and chlorine, then the mill must comply with the effluent limitations guidelines and standards.

Figure 20.

How Does a Kraft Mill Demonstrate Continuous Compliance with Emission Limits for Chlorinated HAPs?

If a Mill Chooses This Technique to Comply With This Alternative Emission Limit...	Continuously Monitor These Parameters...	Report This Information...	And Keep These Records for 5 Years...
Gas scrubber to reduce chlorinated HAP emissions by 99% by weight or to achieve an outlet mass emission rate 0.002 pounds chlorinated HAPs per ton oven-dried pulp	pH or oxidation/reduction potential of effluent	• Semi-annual emissions and continuous monitoring performance report • If exceedences occur, then quarterly reports are required (40 CFR 63.10(e))	pH or oxidation/reduction potential of effluent
	Vent gas inlet flow rate	Same as above	Vent gas inlet flow rate
	Scrubber liquid influent flow rate	Same as above	Scrubber liquid influent flow rate
Gas scrubber to achieve an outlet concentration of chlorinated HAPs 10 ppmv	Chlorine concentration at the outlet **or** measure **all** three of the following parameters	Same as above	Chlorine concentration or **all** of the following
	pH or oxidation/reduction potential of effluent	Same as above	pH or oxidation/reduction potential of effluent
	Vent gas inlet flow rate	Same as above	Vent gas inlet flow
	Scrubber liquid influent flow rate	Same as above	Scrubber liquid influent flow rate
Any control device other than a gas scrubber or process modifications	Determine appropriate monitoring parameter values during the initial performance test[a]	Same as above	Parameters approved by the Administrator

[a] As specified in 40 CFR Part 63.453(n)

Mills in the voluntary advanced technology incentives program must monitor compliance in the interim!

The figure below summarizes the monitoring, reporting, and recordkeeping requirements for mills enrolled in the VATIP that receive the 3-year compliance date extension. These requirements apply from June 1998 up to the time that the mill demonstrates compliance with all the applicable bleaching system emission limits.

If a Mill Chooses This Alternative Emission Limit...	Then Continuously Monitor These Parameters...	And Report This Information...	And Keep These Records for 5 Years...
No increase in the use of hypochlorite and chlorine	Chlorine and hypochlorite application rates in lb/ton oven-dried pulp (daily average)	An initial control strategy report by April 1999 meets the requirements of 63.455. Updated control strategy report every 2 years, **and** Daily application rates of chlorine and hypochlorite must be reported every six months	Daily application rates

Check the UATW at www.epa.gov/ttn/uatw/uatwnew.html for updates.

EPA is considering guidance and rule changes pertaining to "backsliding" from existing controls during the initial period when a mill is working toward meeting its voluntary advanced technology best available technology (BAT). The change would make the restriction on the daily application rates apply from April 2001 up to the time that the mill demonstrates compliance with all the applicable bleaching system emission limits.

4.4 Clean condensate alternative for HVLC vents

The CCA applies only to the kraft HVLC system:
- *washers*
- *knotters and screens*
- *deckers*
- *oxygen delignification*

The clean condensate alternative (CCA) is a pollution prevention alternative emission limit for pulping vents that is available only to kraft HVLC systems. The CCA allows mills to meet the HVLC emission limits by reducing the HAP concentration in the process waters that are recycled to other pieces of process equipment. This approach allows mills to control HAP emissions by reducing the amount of HAPs that are volatilized from selected process equipment instead of using combustion devices to control HVLC system vent streams. By reducing the HAP concentration in process water, the amounts of volatilized HAPs are also reduced.

To achieve compliance, the facility must demonstrate that the HAP emission reductions using the CCA technology are equal to or greater than those emission reductions that would have been achieved through compliance with the HVLC system requirements.

For example, a mill could use a stand-alone biological treatment device to reduce the total HAP concentration in pulping process condensates. The effluent from the stand-alone biological treatment device could be used as process water in the pulping washing system and causticizing system. In this scenario, initial compliance using the CCA would be demonstrated by showing that the reduction of emissions from both the pulping washing system and causticizing system is equal to or greater than the reductions that would have been achieved by applying the pulping vent standards to the pulp washing system vent emissions.

Which equipment systems can be used to generate the emission reductions?

The CCA is similar to emission averaging.

Process condensates are recycled throughout the mill. The CCA allows mills to take credit for emission reductions achieved in several systems through the use of CCA technologies.

Sources From Which Emission Reductions Can be Credited...
• Pulping systems (HVLC) • Bleaching systems • Causticizing systems • Papermaking systems

What emission reductions are creditable?

A CCA technology must achieve the emission reductions by removing HAPs from condensate streams. The CCA emission reductions are generated by:

The concept of the CCA is the reduction of HAP emissions through reduction of HAP concentration in process water.

- control of condensates that are not regulated under the kraft pulping condensate standard
- control beyond the levels required by the condensate standard

Emission reductions from add-on controls on vent streams do not count.

Can a mill use the CCA for only part of the emission reduction requirement for the HVLC system?

The CCA can be used by both new and existing sources.

Yes. The HAP emission reductions resulting from the CCA can be used as partial or complete fulfilment of the emission reductions required for the HVLC pulping standard. For example, a mill may elect to use the CCA in lieu of vent controls for the washer system, but comply by using vent controls for the rest of the HVLC system.

How does a mill use the CCA?

A mill must follow these steps to implement the CCA:

All CCA emission reductions must be based on actual test data.

(1) Determine baseline emissions. Baseline emissions are to be measured after compliance has been achieved with all of the following:

- Kraft pulping process condensate standards
- All effluent limitations guidelines and standards in 40 CFR subpart B
- Emission reductions attributable to control technology required by local, State, or Federal agencies

Furthermore, baseline emissions must include any control equipment installed and operated before December 17, 1993.

(2) Calculate emission reductions that would have been achieved through compliance with the kraft pulping HVLC system standards.

(3) Measure emissions reductions achieved by the CCA.

$$\text{Emission reductions achieved by the CCA} = \text{Baseline emissions} - \text{Emission levels after the CCA has been implemented}$$

(4) Demonstrate compliance through the CCA by documenting that emission reductions achieved through the CCA are greater than or equal to emission reductions that would have been achieved through compliance with the kraft pulping HVLC system standards.

How does a mill demonstrate initial compliance?

A mill must conduct a performance test before and after CCA implementation. Baseline emission levels and all CCA emission reductions must be based on actual test data.

How does a mill demonstrate continuous compliance?

The control strategy using the CCA will vary between mills, depending on mill configuration and emission points selected. Thus, the monitoring and reporting requirements for the CCA are not specified in the rules. Each mill must propose monitoring, reporting, and recordkeeping requirements for the Administrator's approval.

What approvals are required to use the CCA?

The compliance date for existing CCA sources is April 17, 2006.

Mills that opt to use the CCA must submit a CCA control strategy report along with the initial notification. Updates are required every 2 years. The requirements of the control strategy report are specified at 40 CFR 63.455(b) and 40 CFR 63.447(g).

The mill must report to the Administrator by the final compliance date the rationale, calculations, test procedures, and data used to demonstrate compliance. The Administrator will make the final compliance determination.

4.5 How do the requirements for the NSPS and the NESHAP compare?

Figure 21 compares NSPS and NESHAP for kraft pulping emission sources. Note that demonstrating compliance with a NESHAP alternative emission limit(s) does not necessarily mean that NSPS requirements are automatically met. In fact, the only alternative emission limit(s) of the NESHAP that also satisfies the NSPS requirement is the thermal oxidizer design requirement (1600 F for 0.75 seconds).

The MACT control technologies can be used to comply with the NSPS, but mills still must demonstrate that the NSPS emission limits for TRS are being met.

A thermal oxidizer is the only option where meeting the NESHAP automatically meets the NSPS.

Figure 21.

Comparison of NESHAP and NSPS Alternative Emission Limit(s) Requirements

If a Mill Uses This Control Option...	The NSPS Requires...	And the NESHAP Requires...	Does NESHAP Compliance Ensure NSPS Compliance?
Lime Kiln	less than 8 ppmv TRS at 10% oxygen	Introduce vent stream with primary fuel into flame zone.	No
Recovery Furnace	Straight recovery: 5 ppmv TRS at 8% oxygen	Introduce vent stream with primary fuel into flame zone.	No
	Cross recovery: 25 ppmv TRS at 8% oxygen	Same as above	No
Power Boiler	1200 F for 0.5 second	Introduce vent stream with primary fuel into flame zone.	No
Thermal Oxidizer	1200 F for 0.5 second	1600 F for 0.75 second **or**	Yes
		20 ppmv total HAPs or methanol at 10% oxygen **or**	No
		98% reduction by weight of total HAPs or methanol	No
Other means	5 ppmv TRS at actual oxygen content of untreated stream	98% reduction by weight of total HAPs or methanol	No
Uncontrolled digester system	0.005 g TRS/kg air-dried pulp (ADP)	Vent gases must be routed to a closed-vent collection system.	No

Chapter 5 - NESHAP Requirements for Semi-Chemical and Soda Mills

For semi-chemical and soda mills, the NESHAP contains emission standards for pulping system vents and bleaching system vents. There are several alternative emission limits for both processes, and mills can choose the emission limits with which to comply.

The NESHAP requirements for semi-chemical and soda mills are similar to the requirements for kraft mills except that pulping process condensates are not regulated at semi-chemical and soda mills.

The requirements in the NESHAP for semi-chemical and soda mills are described in this chapter.

If You Need the Following Information...	Then Read...
Standards for semi-chemical and soda pulping system vents	Section 5.1
Standards for semi-chemical and soda bleaching system vents	Section 5.2

5.1 Standards for semi-chemical and soda pulping system vent standards

What pulping system vents must be controlled?

For purposes of this NESHAP, the LVHC system includes all vents from:
- *digester system*
- *turpentine recovery system*
- *evaporator system*

*For semi-chemical and soda mills, the NESHAP does not apply to **existing** HVLC systems.*

The NESHAP requires certain equipment in the pulping systems at semi-chemical and soda mills to be enclosed, collected in a closed-vent system, and then vented to a control device.

The Following Pulping System Vents Must be Controlled...
Existing Sources
• LVHC system
New Sources
• LVHC system
• Pulp washing system

Each equipment system has multiple emission points. For example, the pulp washing system can include vacuum drum washers, diffusion washers, rotary pressure washers, horizontal belt filters, intermediate stock chests, associated vacuum pumps, filtrate tanks, and foam breakers. A complete list of the emission points in each equipment system is provided in Appendix F.

What are the emission limits for semi-chemical and soda pulping system vents?

The NESHAP does not provide the Clean Condensate Alternative to semi-chemical and soda pulping systems because the Clean Condensate Alternative was provided to kraft mills as an option for meeting the HVLC system emission limits.

HVLC systems at existing semi-chemical and soda mills are not regulated by the NESHAP.

The emissions from semi-chemical and soda pulping system vents must meet one of four alternative emission limits, as shown below. These emission limits apply to each control device used to control HAP emissions. A mill will likely use several closed-vent systems and control devices (including both add-on control devices and existing combustion devices) and each can comply with any of these four alternative emission limits. These emission limits apply to both new and existing sources.

Pulping System Vent Gases Must be Collected in a Closed-vent System and Routed to One of These Four Control Devices...
1. Any control device that reduces total HAP emissions by 98% by weight, measured as total HAPs or methanol
2. A boiler, lime kiln, or recovery furnace in which the HAP gas stream is introduced with the primary fuel or into the flame zone
3. A thermal oxidizer operated at a minimum temperature of 1,600°F and a minimum residence time of 0.75 seconds
4. A thermal oxidizer that reduces the total HAP concentration at the outlet to 20 ppmv corrected to 10% O_2 on a dry basis, measured as total HAPs or methanol

Note: These emission limits are the same as for kraft mills (presented on page 53).

What does the NESHAP require for enclosures and closed-vent systems at semi-chemical and soda mills?

All regulated equipment system vents must be enclosed and routed through a closed-vent system to the control device that is selected for compliance. The requirements for enclosures and closed-vent systems are presented below. The requirements are intended to prevent leaks and ensure that process openings (e.g., sampling ports on a brown stock washer enclosure) are closed while the mill is in operation.

*A **closed-vent system** means a system that is not open to the atmosphere and comprises piping, ductwork, connections, and if necessary, flow-inducing devices that transport gas or vapor from an emission point to a control device.*

This Equipment....	Must Meet These Requirements....
Enclosures, openings, and hoods	Maintain negative pressure **and** If closed during the initial performance test, must be closed during operation except for sampling, inspection, maintenance, or repairs
Components operated at positive pressure	Operate with no detectable leaks (500 ppmv VOC above background)
Bypass lines that could divert vent stream containing HAPs to the atmosphere	Seal and secure the opening so that the valve or closure mechanism cannot be opened without breaking the seal **or** If computer controlled, monitor for presence of gas stream flow at least once every 15 minutes

Note: These requirements are the same as for kraft mills (presented on page 54).

When must mills comply with the semi-chemical and soda pulping process standards?

Because semi-chemical and soda mills are not affected by the Effluent Limitations Guidelines and Standards, the NESHAP does not allow these mills any extended compliance times.

Pulping systems at semi-chemical and soda mills must comply with the MACT standards by April 16, 2001.

How does a mill demonstrate initial and continuous compliance with the pulping system vent standards?

A mill must demonstrate compliance through an initial performance test and then continuously monitor a set of control device operating parameters for each closed-vent system and control device. When complying by venting gases to a boiler, lime kiln, or recovery furnace, the initial performance test must demonstrate that the gases are being introduced with the primary fuel or into the flame zone.

The initial and continuous compliance requirements for semi-chemical and soda mills are identical to those for kraft mills. Please read pages 56 through 59 of this document.

Must a mill comply at all times?

For pulping system vents, the NESHAP establishes an allowable percent of operating time during which HAP emission levels in excess of the established limit shall not be considered to be a violation of the standard.

For soda and semi-chemical mills, the excess emission allowances are:

- 1 percent of operating time for control devices used for LVHC system vents
- 4 percent of operating time for control devices used for pulp washing systems (HVLC)
- 4 percent of operating time for control devices used for combined LVHC and pulp washing system vents (i.e., controlled by the same device)

The excess emission allowances are the same for kraft, semi-chemical, and soda mills. Refer to page 59 for additional details.

5.2 Standards for bleaching system vents at semi-chemical and soda mills

Semi-chemical mills

Generally, semi-chemical mills in the United States do not have bleaching systems and therefore are not subject to bleaching standards. Technically, the rule would apply if a semi-chemical mill installed a bleaching system using chlorine. While this is not expected to occur, such a mill would have to comply with the emission standards for chlorinated HAPs (excluding chloroform) from bleaching vents. The rule would not apply to bleaching systems using chlorinated compounds other than chlorine. Refer to Section 4.3 for information about bleaching standards, excluding the chloroform standard.

Soda mills

Currently, there is only one soda mill operating in the U.S.

At soda mills, emission limits apply to bleaching systems that use chlorine or chlorinated compounds. The emission standards and compliance demonstration requirements for soda mills are the same as for kraft mills (presented in Section 4.3) and are not repeated in this chapter. Refer to the following pages for specific information.

- Emission points to be controlled—page 68
- Control requirements for chlorinated HAPs and chloroform—page 69
- How to demonstrate initial compliance—page 71
- How to demonstrate continuous compliance—page 72.

Chapter 6 - NESHAP Requirements for Sulfite Mills

For sulfite mills, the NESHAP contains emission standards for pulping system vents and bleaching system vents.

The NESHAP contains two alternative emission limits for pulping system vents. Each mill can choose to comply with either limit. Different numerical emission limits are specified for calcium- and sodium-based pulping systems than for magnesium- and ammonium-based pulping systems.

The NESHAP also contains several alternative emission limits for bleaching process system vents. The NESHAP does not regulate pulping process condensates at sulfite mills.

If You Need the Following Information...	Then Read...
Standards for sulfite pulping system vents	Section 6.1
Standards for sulfite bleaching system vents	Section 6.2

6.1 Standards for sulfite pulping system vents

The NESHAP requires the pulping systems to be enclosed, collected in a closed-vent system, and then vented to a control device. This section describes the emission points that must be controlled, the two alternative emission limits, and the compliance requirements.

What sulfite pulping system vents must be controlled?

The emission limits are the same for existing and new sources.

The NESHAP specifies that all the vents from the digester system, evaporator system, and pulp washing systems must be controlled. Additional equipment must be controlled at new sources. These pulping system vents are identified below.

The Following Pulping System Vents Must be Controlled...
Existing Sources
• Digester system
• Evaporator system
• Pulp washing system
New Sources
• Same as existing sources plus...
• All weak liquor storage tanks
• All strong liquor storage tanks
• All acid condensate storage tanks

Appendix C contains a flowchart summary of the NESHAP.

Each equipment system has multiple emission points. For example, the evaporator system comprises pre-evaporators, multi-effect evaporators, concentrators, vacuum systems, associated condensers, hot wells, and condensate streams. A complete list of the emission points in each equipment system is provided in Appendix F.

What are the emission limits for sulfite pulping system vents?

These emission limits apply to the entire source, not to individual pieces of equipment as do the emission limits for pulping system vents at other mills.

The sulfite pulping system vents must meet either a percent reduction or mass emission limit identified for the specific type of sulfite pulping process (i.e., calcium- and sodium-based or magnesium- and ammonium-based pulping processes). The emission limits apply to the combined emissions from both the regulated equipment and any vents, wastewater, and condensate streams generated from any control device used to reduce the HAP emissions. Therefore, a mill must choose either the percent reduction or the mass emission format and demonstrate compliance with the emission limit using the combined emissions from the entire pool of regulated equipment. Compliance may not be demonstrated at individual pieces of equipment or individual closed-vent systems.

Outlet emission level and percent reduction requirements must account for HAP releases from vents, condensates, and wastewater from control devices used to reduce HAP emissions.

If the Sulfite Pulping System is This Type...	Then Choose One of the Following Emission Limits...
Calcium-based and Sodium-based	Reduce total HAP concentration to 0.89 lb/ton oven-dried pulp, measured as total HAPs or methanol **or** Reduce total HAP emissions by 92% by weight, measured as total HAPs or methanol
Ammonium-based and Magnesium-based	Reduce total HAP concentration to 2.2 lb/ton oven-dried pulp, measured as total HAPs or methanol **or** Reduce total HAP emissions by 87% by weight, measured as total HAPs or methanol

What does the NESHAP require for enclosures and closed-vent systems?

All regulated equipment systems must be enclosed and routed through a closed-vent system to the control device that is selected for compliance. The requirements for enclosures and closed-vent systems are presented below. The requirements are intended to prevent leaks and ensure that process openings (e.g., sampling ports on a brown stock washer enclosure) are closed while the mill is in operation.

This Equipment....	Must Meet These Requirements....
Enclosures, openings, and hoods	Maintain negative pressure **and** If closed during the initial performance test, must be closed during operation except for sampling, inspection, maintenance, or repairs
Components operated at positive pressure	Operate with no detectable leaks (500 ppmv VOC above background)
Bypass lines that could divert vent stream containing HAPs to the atmosphere	Seal and secure the opening so that the valve or closure mechanism cannot be opened without breaking the seal **or** If computer controlled, monitor for presence of gas stream flow at least once every 15 minutes

*A **closed-vent system** means a system that is not open to the atmosphere and comprises piping, ductwork, connections, and if necessary, flow-inducing devices that transport gas or vapor from an emission point to a control device.*

Note: These requirements are the same as for kraft mills (presented on page 54).

When must mills comply with the sulfite pulping process requirements?

Affected sources at sulfite mills must comply with the NESHAP by April 16, 2001.

How does a mill demonstrate initial compliance with the sulfite pulping system vent standards?

A mill must demonstrate compliance through an initial performance test. Total HAP may be measured as methanol using Method 308.

The initial performance test has three objectives:

(1) **To demonstrate that the control device complies with the emission limit**.

(2) **To demonstrate that the closed-vent system captures and contains all HAP emissions**. Refer to Figure 23.

(3) **To establish the process operating parameter values that must be monitored to demonstrate continuous compliance**. For example, at a calcium-based and sodium-based sulfite mill, the vent gas flow rate, scrubbing media flow rate, and pH of the scrubber effluent that indicate 92 percent reduction by weight of total HAPs or methanol using Method 308.

How does a mill demonstrate continuous compliance with the sulfite pulping system vent standards?

*The excess emissions allowance (for kraft, semi-chemical, and soda mills) does **NOT** apply to sulfite mills.*

Mills must install a continuous monitoring system to measure either control device or process operating parameters. Control device (other than gas scrubbers) or process parameters to be monitored are determined by the facility (i.e., site-specific). Continuous monitors for the selected parameters are required to demonstrate continuous compliance. Figure 24 presents the continuous compliance monitoring requirements.

In addition, the mill must comply with the requirements for periodic inspection and maintenance of all enclosures and closed-vent systems. These requirements are explained in Figure 23. The mill must maintain a site-specific inspection plan for the enclosures and closed-vent system. Records of repairs based on the inspections must also be kept.

Figure 23.

How Does a Mill Demonstrate Initial and Continuous Compliance with the Closed-Vent Systems Standard?

These same tests are required as part of the initial performance test.

If the System has...	Then Inspect...	And Report...	And Keep Records of...
Enclosure opening	Visually inspect every 30 days to ensure closed and sealed	Any exceedences of the closed-vent standard in quarterly reports. If no exceedences occur, submit semi-annual reports.	All visual checks and any repairs
	Annually demonstrate negative pressure	Same as above	All pressure tests
Closed-vent system	Visually inspect every 30 days for visible defects	Same as above	All visual checks and repairs
Positive pressure closed-vent system	Annually demonstrate no detectable leaks (less than 500 ppmv)	Same as above	All leak tests
Bypass line valve	Inspect every 30 days to ensure valve is in a closed position and vent stream is not diverted through bypass line	Same as above	All visual checks and repairs

Note: These are the same requirements as for kraft mills (presented on page 57).

Figure 24.

How Does a Mill Demonstrate Continuous Compliance with the Sulfite Pulping System Vent Standards?

If the Sulfite Pulping System is This Type...	And the Mill Chooses This Alternative Emission Limit...	And the Mill Chooses This Technique...	Continuously Monitor These Parameters...	And Report This Information...	And Keep These Records for 5 Years...
Calcium-based and Sodium-based	Reduce total HAP[a] concentration at the outlet to 0.89 lb/ton or reduce total HAP[a] emissions by 92% by weight	Gas scrubber	pH or oxidation/reduction potential of effluent Vent gas inlet flow rate Scrubber liquid influent flow rate	• Semi-annual emissions and continuous monitoring performance report • If exceedences occur, then quarterly reports are required (40 CFR 63.10(e))	pH or oxidation/ reduction potential of effluent Vent gas inlet flow rate Scrubber liquid influent flow rate
		Site-specific parameters	Determine appropriate monitoring parameter values during the initial performance test[b]	Same as above	Parameters approved by the Administrator
Ammonium-based and Magnesium-based	Reduce total HAP[a] concentration at the outlet to 2.2 lb/ton or reduce total HAP[a] emissions by 87% by weight	Same as above	Same as above	Same as above	Same as above

[a] Methanol may be used as a surrogate for total HAPs.
[b] As specified in 40 CFR Part 63.453(a).

6.2 Standards for sulfite bleaching system vents

At sulfite mills the emission limits apply to bleaching systems that use chlorine or chlorinated compounds. The NESHAP has emission limits for both chloroform and chlorinated HAP. Sulfite mills must comply with both of these requirements. The emission standards and compliance demonstration requirements for sulfite mills are the same as for kraft mills (presented in Section 4.3) and are not repeated in this chapter. Refer to the following pages for specific information.

- Emission points to be controlled—page 68
- Control requirements for chlorinated HAPs and chloroform—page 69
- How to demonstrate initial compliance—page 71
- How to demonstrate continuous compliance—page 72.

When must sulfite bleaching systems comply?

Bleaching systems must comply by April 16, 2001 with one exception.

- **Dissolving grade sulfite mills** must comply within 3 years after publication of revised effluent limitations guidelines and standards under 40 CFR 430.14 through 430.17 and 40 CFR 430.44 through 430.47. These rules are scheduled to be revised sometime between 2000 and 2002.

The compliance date for dissolving grade sulfite mills is not specified in the NESHAP, but is anticipated between 2003-2005.

Chapter 7 - NESHAP Requirements for Mechanical, Secondary Fiber, and Non-wood Fiber Pulp Mills

Secondary fiber *means recycled fiber.*

The NESHAP regulates bleaching system vents for mechanical pulping, secondary fiber, and non-wood fiber pulp mills. The NESHAP applies to bleaching systems that use chlorine or chlorine dioxide, and has identical requirements for mechanical, secondary fiber, and non-wood fiber processes.

The pulping process system vents and condensates are not regulated at these mills.

7.1 Standards for bleaching system vents

The chloroform control requirements of the NESHAP do not apply to bleaching systems at these types of mills.

At mechanical, secondary fiber, and non-wood fiber pulp mills the NESHAP regulates chlorinated HAPs (excluding chloroform). The emission limits apply to bleaching systems that use chlorine or chlorine dioxide. However, if a bleaching system for one of these processes also accepts pulp from processes at a kraft, semi-chemical, soda, or sulfite mill, then the more stringent bleaching system requirements will apply (i.e., the bleaching system also must meet the chloroform control requirements).

What mechanical, secondary fiber, and non-wood fiber bleaching system emission points must be controlled?

Typically, a bleaching line contains 3-5 stages.

The NESHAP applies only to bleaching stages that use chlorine or chlorine dioxide. Extraction stages are not covered. All vents in a regulated stage must be controlled. A stage consists of the following equipment:

- retention towers
- washers
- seal tanks
- chemical and steam mixers (if vented to the atmosphere)
- vacuum pumps (if present)

Are there any exemptions to the bleaching requirements?

Yes. Any bleaching system that does **not** use chlorine or chlorine dioxide is exempt from **all** NESHAP requirements for bleaching.

What are the control requirements for chlorinated HAPs?

There are no control requirements for chloroform at these other types of mills.

The equipment at each bleaching stage where chlorinated compounds are introduced must be enclosed and routed via a closed-vent collection system to a control device. The rule provides three alternative emission limits for demonstrating compliance, as shown below. Most mills are expected to use caustic scrubbers to comply.

The requirements for enclosures and closed-vent systems are the same as for the pulping system vent standards (page 54).

Bleaching System Gases Must be Collected in a Closed-vent System and Meet One of These Three Alternative Emission Limits[a] ...
1. Reduce chlorinated HAP[b] emissions by 99% by weight
2. Achieve a total outlet mass emission rate 0.002 pounds chlorinated HAPs[b] per ton oven-dried pulp for all subject stages
3. Achieve an outlet concentration of chlorinated HAPs[b] 10 ppmv

[a] Some mills may be able to meet the outlet concentration or mass limits through use of process modifications (i.e., 100 percent chlorine dioxide substitution). In these cases, enclosures and closed-vent systems are not required.

[b] Chlorinated HAPs (excluding chloroform) may be measured as total chlorinated HAP or as chlorine.

Note: These emission limits are the same for kraft mills (presented on page 69).

When must mechanical, secondary fiber, and non-wood fiber bleaching systems comply?

All mechanical, secondary fiber, and non-wood fiber processes must comply with the chlorinated HAP control requirements by April 16, 2001.

How does a mill demonstrate initial compliance with the bleaching standards?

Chlorinated HAPs. The mill must demonstrate initial compliance with chlorinated HAP standards by conducting an initial performance test for each bleaching stage where chlorine or chlorinated compounds are introduced.

The initial performance test has three objectives:

(1) **To demonstrate that the control device complies with the emission limit**.

(2) **To demonstrate that the closed-vent system captures and contains all HAP emissions**. Refer to Figure 16.

(3) **To establish the process operating parameters that must be monitored to demonstrate continuous compliance**.

At the option of the mill, compliance may be demonstrated by measuring either total chlorinated HAPs or chlorine concentration. The following methods must be used:

Chlorinated HAPs	-	Any method that has been demonstrated to the Administrator's satisfaction.
Chlorine	-	Method 26A, as modified by 63.457(b)(5) of the rule.

How does a mill demonstrate continuous compliance with the bleaching standards?

Continuous monitoring is required unless a mill complies by eliminating all use of chlorine or chlorinated compounds as bleaching agents.

For chlorinated HAPs, a continuous monitoring system must measure either emissions, or control device or process operating parameters. The monitoring, reporting, and recordkeeping requirements are summarized in Figure 25.

In addition, the mill must conduct periodic inspection and maintenance of all enclosures and closed-vent systems. These requirements are explained below. The mill must maintain a site-specific inspection plan for the enclosures and closed-vent system. Records of repairs based on the inspections must also be kept.

These same tests are required as part of the initial performance test.

If the System has...	Then Inspect...	And Report...	And Keep Records of...
Enclosure opening	Visually inspect every 30 days to ensure closed and sealed	Any exceedences of the closed-vent standard in quarterly reports. If no exceedences occur, submit semi-annual reports.	All visual checks and any repairs
	Annually demonstrate negative pressure	Same as above	All pressure tests
Closed-vent system	Visually inspect every 30 days for visible defects	Same as above	All visual checks and repairs
Positive pressure closed-vent system	Annually demonstrate no detectable leaks (less than 500 ppmv)	Same as above	All leak tests
Bypass line valve	Inspect every 30 days to ensure valve is in a closed position and vent stream is not diverted through bypass line	Same as above	All visual checks and repairs

Note: These are the same requirements as for kraft mills (presented on page 57).

Figure 25.

How Does a Kraft Mill Demonstrate Continuous Compliance with Emission Limits for Chlorinated HAPs?

If a Mill Chooses This Technique to Comply With This Alternative Emission Limit...	Continuously Monitor These Parameters...	Report This Information...	And Keep These Records for 5 Years...
Gas scrubber to reduce chlorinated HAP emissions by 99% by weight or to achieve an outlet mass emission rate 0.002 pounds chlorinated HAPs per ton oven-dried pulp	pH or oxidation/reduction potential of effluent	• Semi-annual emissions and continuous monitoring performance report • If exceedences occur, then quarterly reports are required (40 CFR 63.10(e))	pH or oxidation/reduction potential of effluent
	Vent gas inlet flow rate	Same as above	Vent gas inlet flow rate
	Scrubber liquid influent flow rate	Same as above	Scrubber liquid influent flow rate
Gas scrubber to achieve an outlet concentration of chlorinated HAPs 10 ppmv	Chlorine concentration at the outlet **or** measure **all** three of the following parameters	Same as above	Chlorine concentration or **all** of the following
	pH or oxidation/reduction potential of effluent	Same as above	pH or oxidation/reduction potential of effluent
	Vent gas inlet flow rate	Same as above	Vent gas inlet flow
	Scrubber liquid influent flow rate	Same as above	Scrubber liquid influent flow rate
Any control device other than a gas scrubber or process modifications	Determine appropriate monitoring parameter values during the initial performance test[a]	Same as above	Parameters approved by the Administrator

[a] As specified in 40 CFR Part 63.453(n)

Note: This is the same figure as the one presented on page 73.

Chapter 8 - Other Federal Regulations Affecting Pulp and Paper Mills

The Cluster Rules do not represent all of the air and water pollution regulation of the pulp and paper industry. Pulp and paper mills are subject to additional air requirements under the CAA; additional water requirements under the Clean Water Act; and other Federal, State and local laws not associated in any way with the Cluster Rules.

Federal regulations affecting the pulp and paper industry include:

- National Ambient Air Quality Standards (NAAQS)
- Kraft Mill New Source Performance Standards (NSPS) (40 CFR 60, Subparts B and BB)
- Industrial Boilers NSPS (40 CFR 60, Subparts D, Db, and Dc)
- Gas-Fired Turbines NSPS (40 CFR 60, Subpart GG)
- Prevention of Significant Deterioration (PSD)/New Source Review (NSR)
- National Pollutant Discharge Elimination System (NPDES) Related Statutes and Regulations
- Spill Prevention Control and Countermeasure (SPCC) Plans (40 CFR 112)
- Notice of Discharge of Reportable Quantities of Hazardous Substances (40 CFR 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)

*The Cluster Rules do **NOT** represent all of the air and water pollution regulation of the pulp and paper industry.*

8.1 What other Federal air regulations affect the pulp and paper industry?

Federal air regulations affecting the pulp and paper industry are shown below.

The Following Air Regulation...	Affects...	By...
NAAQS	Energy generation at pulp and paper mills	Controlling NO_x, PM, VOC,[a] and SO_2 as part of the state implementation plans
NSPS		
40 CFR 60, Subpart B	Kraft pulp mills	Controlling PM and TRS at existing sources under state regulations. State regulations are based on EPA guidelines.
40 CFR 60, Subpart BB	Kraft pulp mills	Controlling PM and TRS
40 CFR 60, Subpart D, Db, and Dc	Industrial boilers	Controlling PM, NO_x, SO_2
40 CFR 60, Subpart GG	Gas-fired turbines	Controlling PM, SO_2, NO_x
PSD/NSR	Pulp and paper mills installing new or modified equipment	Requiring a pre-construction permit that imposes emission limitations based on BACT or LAER for criteria pollutants for which there is a significant increase

BACT = best available control technology

LAER = lowest achievable emissions rate

National Ambient Air Quality Standards (NAAQS) have been established for six criteria pollutants. Pulp and paper mills are potential sources of particulate matter (PM), ozone precursors (volatile organic compounds [VOCs] and nitrogen oxides [NO_x]), and sulfur dioxide (SO_2). 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 pre-construction permitting requirements (e.g., New Source Review [NSR], Prevention of Significant Deterioration [PSD]).

Kraft Mill New Source Performance Standards (NSPS) (40 CFR 60, Subpart BB). The majority of 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 particulate matter and TRS for recovery furnaces, smelt dissolving tanks, lime kilns, digester systems, brown stock washer systems, multiple effect evaporators, black liquor oxidation systems, and condensate stripper systems. See page 79 for a more detailed discussion of the kraft mill NSPS, as this regulation applies to kraft mills only.

Industrial Boilers NSPS (40 CFR 60, Subparts D, Db, and Dc) and Gas-Fired Turbines NSPS (40 CFR 60, Subpart GG). Almost all pulp and paper facilities 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 particulate matter, nitrogen oxides, and sulfur dioxide.

8.2 What other Federal water regulations affect the pulp and paper industry?

Federal water regulations affecting the pulp and paper industry are shown below:

The Following Water Regulation...	Affects...	By...
NPDES: Technology and water quality-based limitations	Direct-discharging of pollutants into navigable waters	Setting effluent limitations on pollutants based on available technology and intended use of receiving waterbody; also sets monitoring and reporting requirements
Pretreatment program	Indirect-discharging of pollutants to publicly-owned treatment works (POTWs)	Setting pollutant discharge limits to POTWs
Storm water permit application	Any facility	Establishing pollution prevention plans and best management practices (BMP)
Section 110 of CWA (40 CFR 110)	Any facility	Prohibiting oil discharges
Spill Prevention Control and Countermeasure (SPCC) (40 CFR 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 116 and 117)	Any facility	Requiring reporting of designated hazardous substance discharges to U.S. government following the Department of Transportation regulations

NPDES = National Pollutant Discharge Elimination System

National Pollutant Discharge Elimination System (NPDES) Program (Clean Water Act, 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. The effluent limitations guidelines and standards and requirements for direct discharging mills are presented in the table below. The applicability of these standards is more fully explained in Figure 27.

The acronyms are defined on the next page in Figure 26.

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The applicability of these standards is explained on page 106 in Figure 27.

For These Mill Types or Production Operations...	These Clean Water Act Standards Apply...		
	BAT, PSES, and PSNS	**BPT, BCT, NSPS**	**BMP**
Dissolving Kraft	X	X	X
Bleached Papergrade Kraft and Soda[a]	X	X	X
Unbleached Kraft	X	X	X
Dissolving Sulfite	X	X	X
Papergrade Sulfite[a]	X	X	X
Semi-chemical	X	X	X
Mechanical		X	
Non-wood Chemical		X	X
Secondary Fiber Deink		X	
Fine and Lightweight Papers from Purchased Pulp		X	
Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp		X	

[a] The effluent limitations guidelines and standards for these subcategories were revised in the Cluster Rules.

Figure 26.

A Guide to the Acronyms for Technology-Based Water Standards

Acronym	Definition	Description of Standard
PSES[a]	Pretreatment Standards for Existing Sources	Industry-by-industry pretreatment standards for existing sources that discharge their wastewater indirectly (i.e., to a POTW).
PSNS[a]	Pretreatment Standards for New Sources	Industry-by-industry pretreatment standards for new sources that discharge their wastewater indirectly (i.e., to a POTW).
BPT	Best Practical Control Technology Currently Available	A baseline standard, applicable in all circumstances
BCT	Best Conventional Pollutant Control Technology	More stringent than BPT. Only applies if certain cost tests are met. Must be "cost-reasonable." See 51 FR 24,974-24,976 (July 9, 1986), for EPA's BCT methodology.
BAT	Best Available Technology Economically Achievable	A standard similar to BPT/BCT, but with cost concerns playing a lesser role. A "best of the best" standard.
BMP	Best Management Practices	Designed to prevent or contain leaks and spills of pulping liquor, soap, and turpentine, and to control any intentional diversions of these substances.
NSPS	New Source Performance Standards	Applicable to new direct discharge sources, as defined in 40 CFR 122.2.

[a] Although the categorical standards in 40 CFR Part 430 cover kraft pulp mills, most kraft pulp mills are direct dischargers subject to NPDES permit requirements and not the pretreatment standards.

Figure 27.

Applicability of Technology-Based Standards

If a Mill Discharges These Pollutants...	To These Direct Receivers	And the Mill is Classified as an...	Then the Required Standards That Apply are...
Conventional pollutants	Surface waters	Existing source	BPT or BCT
Toxic and conventional pollutants	Surface waters	Existing source	BAT
Any pollutants	Surface waters	New source	NSPS
Any pollutants	POTWs	Existing source	PSES
Any pollutants	POTWs	New Source	PSNS

Source: 40 CFR 125.3

Spill Prevention Control and Countermeasure (SPCC) Plans (40 CFR 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 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.

8.3 What Federal hazardous wastes regulations affect the pulp and paper industry?

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

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)

TRI = Toxic Release Inventory

Resource Conservation and Recovery Act (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 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.

Emergency Planning and Community Right-to-Know Act (EPCRA)/ Comprehensive Environmental Response, Compensation, and Liability Act (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 Toxic Release Inventory (TRI) database.

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.

8.4 What upcoming regulations will affect pulp and paper mills?

More regulations are coming!

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

Upcoming pulp mill combustion sources NESHAP scheduled for 1999.

- ***Chemical Recovery Combustion Sources and Kraft, Soda, Sulfite, and Stand-Alone Semi-chemical Pulp Mills NESHAP*** *(63 FR 18754, proposed standards, April 15, 1998)*. EPA plans to finalize and publish emission standards that will affect recovery furnaces, lime kilns, and smelt dissolving tanks.

Five NESHAP for combustion sources are scheduled for 2000.

- ***NESHAP for Combustion Sources.*** EPA plans to publish five NESHAP that will affect power boilers, process heaters, gas turbines, reciprocating internal combustion engines, and incinerators.

Effluent limitations guidelines and standards scheduled for 2000-2002.

- ***Effluent Limitations Guidelines and Standards***. EPA plans to publish revised effluent limitations guidelines and standards for additional subcategories in the near future. These include: dissolving kraft; dissolving sulfite; unbleached kraft; semi-chemical; mechanical pulp; non-wood chemical pulp; secondary fiber deink; secondary fiber non-deink; fine and lightweight fibers from purchased pulp; and tissue, filter, non-woven, and paperboard from purchased pulp.

Pending water regulations consist of EPA proposing effluent limitations guidelines and standards for the pulp and paper industry subparts that were not included in the Cluster Rules. And finally, EPA is 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.