SECTION 6: ASSESSMENT MODULE FOR BLEACHING PROCESS OPERATIONS

6.1 Introduction

This section provides the necessary information for conducting a compliance assessment of the bleaching process at a kraft pulp mill. This section first describes the bleaching process. The section then outlines the regulatory requirements and available inspection procedures for pulp bleaching activities. In addition, Appendix E contains an example assessment form that combines the various elements discussed in this section.

CONTENTS

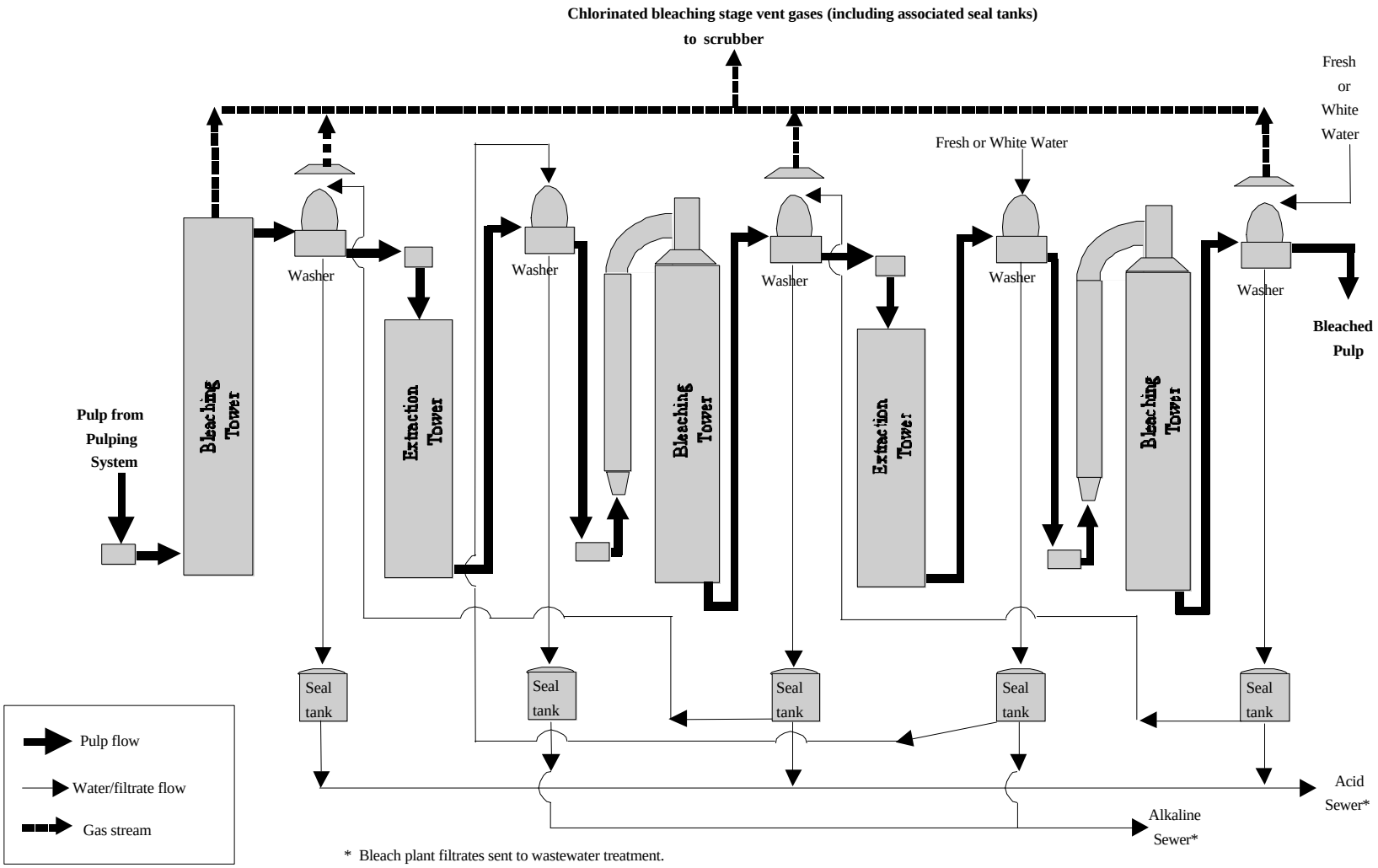
6.1 Introduction
6.2 Overview of Process and Discharges
6.3 Air Regulations and Inspection Techniques
6.4 Water Regulations and Inspection Techniques
6.5 EPRCA Issues and Inspection Considerations

6.2 Overview of Process and Discharges

6.2.1 Description of the Process

At some mills, the pulp produced by the kraft process is whitened and brightened in a series of chemical bleaching operations that are together called a *bleaching line*. All the bleaching lines at a mill, and all the equipment associated with those bleaching lines, are defined in the Cluster Rules MACT standards as the *bleaching system*. Similarly, the Cluster Rules wastewater regulations define the bleach plant as “all process equipment used for bleaching ...” and limit the discharge of pollutants in the bleach plant effluent. Figure 6-1 depicts the major equipment found in a typical five stage bleaching line. A brief description of these equipment systems and their function follows.

Figure 6-1
Diagram of Example Bleaching System



* Bleach plant filtrates sent to wastewater treatment.

The bleaching process. A bleaching line typically consists of a sequence of three to six bleaching stages. The number of stages varies depending on the furnish (softwood or hardwood) and on the brightness requirements of the pulp and the specific design of the mill. A typical bleaching line has 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 necessary 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.

NOTE! *Bleaching line* means a group of stages arranged in series; pulp flows from one stage to the next. *Bleaching system* refers to all of the bleaching lines and all of the process equipment associated with those bleaching lines.

For mills that use oxygen delignification (or "oxygen pre-bleaching"), the mills may consider this equipment as the first bleaching stage. However, oxygen delignification is defined by the MACT standards as a pulping area HVLC source and is discussed in Section 4.2.1. Oxygen delignification is also explicitly excluded from the effluent guidelines definition of "bleach plant," given in 40 CFR 430.01.

Chemical and steam 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. Mixing can be accomplished with the use of enclosed rotary high-shear mixers or static in-the-pipe mixers. Significant HAP emissions are not anticipated from mixers, because they are typically enclosed.

Retention towers. The bleaching reactions occur primarily in a bleaching or retention tower. To effectively manage the bleaching chemical reaction, it is necessary to maintain a certain temperature, retention time, consistency, pressure, and pH for each bleach stage. Conditions vary with the bleaching chemical used. Bleaching stages that use chlorine and/or chlorine dioxide are performed at acid (low) pH, while extraction and peroxide bleaching are performed at alkaline (high) pH.

There are two primary types of retention tower: 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, however, chlorinated bleach stages use an upflow tower design or a modification thereof.

Washers. To minimize chemical usage and equipment corrosion, it is important to remove as much bleaching chemical as possible from the pulp prior to entering the next bleaching stage. Bleached pulp washing is performed in the same type of equipment used to wash brown stock pulp, and typically consists of a rotary drum washer with an associated seal tank. The washer consists of a hollow, mesh-covered cylinder through which a vacuum is pulled. The vacuum is typically produced by a sealed drop leg on the discharge line. In some cases, the vacuum may be created by vacuum pumps. Section 4.2.1 contains additional discussion of brown stock washers.

Seal tank. The seal tank holds washer filtrate and serves to keep the drop leg (barometric leg) submerged, maintaining vacuum on the washer. Washer filtrate is typically reused as wash water counter currently to the flow of the pulp. In other words, fresh water is used in the final bleaching stages. Then filtrates from chlorinated bleaching stages are reused in preceding chlorinated bleaching stages, and filtrates from non-chlorinated stages are used on preceding non-chlorinated stages. Filtrates in the first two seal tanks at the first chlorinated and non-chlorinated stages of a bleaching line are typically sewered. Consequently, there is an "acid sewer" from the first chlorinated filtrate tank and an "alkaline sewer" from the first non-chlorinated filtrate tank.

Vacuum pump. A vacuum pump may be used to pull the vacuum on a rotary vacuum washer. Vacuum pumps are not expected to be widely in use at bleaching systems since the majority of the mills utilize the barometric leg method of pulling a vacuum on the washer.

NOTE! The Cluster Rules wastewater regulations define *bleach plant effluent* as the total discharge of process wastewaters from the bleach plant bleaching system. This would include separate acid and alkaline filtrates or combined filtrates.

Bleaching chemicals. Many oxidants are used as bleaching agents, but chlorinated chemicals are the most common. Bleaching with chlorinated chemicals (chlorine gas, sodium hypochlorite, and chlorine dioxide) is common because they are powerful and inexpensive. Use of these compounds generates chlorinated HAP emissions from bleaching system vents and chlorinated pollutants in bleach plant effluents. In addition to chlorinated chemicals, some oxygen bleaching agents are commonly used, including oxygen, peroxide, and ozone. Oxygen and peroxide are frequently mixed with the pulp just prior to an extraction stage.

Stages in a bleaching line typically are named after the bleaching chemical used or the operation performed. For example, a bleaching stage using chlorine or chlorine dioxide may be called a C-stage or D-stage, respectively. An extraction stage would be called an E-stage. Figure 6-2 lists the chemicals and the bleaching stage abbreviations that are commonly used by the industry. Figure 6-2 also lists some examples of bleach plant sequences used by kraft mills.

Figure 6-2
Bleaching Stage Abbreviations and Bleaching Sequences[1]

Bleaching Stage	Name	Formula
C	Chlorine	Cl_2
D	Chlorine Dioxide	ClO_2
E	Sodium Hydroxide (extraction)	NaOH
H	Hypochlorite	NaOCl
P	Peroxide	H_2O_2
Z	Ozone	O_3
Bleaching Sequence	**Comment**	
CEH	Classical sequence for production of semi-bleached pulp	
C/DE_ODED	Classical market kraft pulp sequence of the 1980s	
$DE_{OP}DED$	Classical ECF (elemental chlorine-free) sequence for market kraft pulp, sometimes preceded by oxygen delignification	
ZE_OD	First sequence using ozone for commercial production of kraft pulp in North America (preceded by oxygen delignification)	

6.2.2 Air Pollutant Emissions

Emissions of HAPs from the bleaching process equipment systems are strongly influenced by the bleaching chemicals used. The primary pollutants generated from the bleaching system are chlorine, chloroform, and other chlorinated HAPs. These pollutants are generated in and emitted from stages that use chlorine or chlorinated bleaching chemicals. Hypochlorite use results in the largest emissions of HAP, particularly chloroform. Elimination of hypochlorite as a bleaching chemical significantly reduces chloroform emissions. For bleaching lines that do not use hypochlorite, the degree of substitution of chlorine dioxide for chlorine also affects chloroform and overall HAP emissions. The use of oxygen delignification also may act to decrease chloroform emissions. Although highly variable depending on the process used at a particular mill, typical emission rates for chloroform and total HAPs are shown in Figure 6-3. Uncontrolled chlorine emissions from the bleach plant can average approximately 0.70 lb/ADTP, and chlorine dioxide emissions can average approximately 0.50 lb/ADTP. Scrubbers can achieve up to 99 percent reduction efficiency for these pollutants.[2]

Figure 6-3
Typical Air Emissions from the Bleaching System at a 1000 Ton Per Day Kraft Mill*

Pulping System Components	Typical Emissions (Tons/yr)		
	Methanol	Total HAP	Chloroform
Bleach Plant with Hypochlorite	39	121	68
Bleach Plant with no Hypochlorite and Chlorine Dioxide Substitution <65%	39	72	23
Bleach Plant with no Hypochlorite and Chlorine Dioxide Substitution ≥ 65%	39	49	2

* Values are based on typical emission factors contained in the 1997 EPA Chemical Pulping Emission Factor Document,[3] with an assumption that the mill operates 350 days/year.

6.2.3 Water Pollutant Discharges

Because chlorine-containing compounds are the predominant bleaching agents used at kraft pulp mills, and because of the toxicity and persistence of chlorinated compounds, EPA regulates the discharge of chlorinated pollutants generated during pulp bleaching. Chlorinated pollutants regulated in the Cluster Rules, described in Section 7.2.3, include:

- AOX
- Chloroform
- 2,3,7,8-TCDD (Dioxin)
- 2,3,7,8-TCDF (Furan)
- 12 chlorinated phenolic compounds:
  - Trichlrosyringol
  - 3,4,5-Trichlorocatechol
  - 3,4,6-Trichlorocatechol
  - 3,4,5-Trichloroguaiacol
  - 3,4,6-Trichloroguaiacol
  - 4,5,6-Trichloroguaiacol
  - 2,4,5-Trichlorophenol
  - 2,4,6-Trichlorophenol
  - Tetrachlorocatechol
  - Tetrachloroguaiacol
  - 2,3,4,6-Tetrachlorophenol
  - Pentachlorophenol

6.2.4 Solid/Hazardous Waste Discharges

The solid waste discharges associated with the bleaching system are minimal. Most of the discharges are liquid wastes that are part of the NPDES-regulated wastewater sent to the treatment plant prior to discharge.

6.2.5 EPCRA Chemicals and Reportable Releases

Facilities will have to provide information on chemicals used in the bleach plant to meet EPCRA's emergency preparedness requirements. Appendix D contains a process-based list of the types of hazardous chemicals typically included in an EPCRA inventory for a kraft pulp mill.

On-site air, water, and land releases, including land disposals, of toxic chemicals from the bleach plant and off-site transfers of waste containing these toxic chemicals may have to be accounted for in TRI Form R reports. For TRI purposes, the bleach plant wastewaters will affect the quantity of releases for both water discharges and solid waste discharges (i.e., the amount of certain TRI chemicals estimated to remain in wastewater treatment plant sludges). For toxic chemicals in waste streams, the mill also must report in Form R the waste treatment or disposal method employed and an estimate of treatment efficiency.

In addition, EPCRA/CERCLA emergency release reporting could apply for off-site releases that are not federally permitted and exceed certain reportable quantities. Releases directly from the bleach plant most likely would involve air emissions chlorine or chloroform that exceed the applicable reportable quantity (10 pounds per 24-hour period for each of these chemicals) and are not federally permitted. Releases potentially could occur as a result of spills resulting from material storage and handling activities.

6.3 Air Regulations and Inspection Techniques

The air emissions from the bleaching system are subject to the new Cluster Rules requirements, as well as any applicable State regulations. The NSPS do not apply to bleaching systems.

Key Air Regulatory Considerations

- **Regulatory concerns are primarily Cluster Rules-related -- non-HAP requirements do not apply**
- **Control of emissions generally through gas scrubbers**
- **Voluntary Advanced Technology Incentives Program can be used to extend compliance deadline**
- **Oxygen delignification system considered part of pulping (HVLC) system for MACT purposes -- see Section 4.4**

6.3.1 Emission Points

The primary emission points from the bleaching process are the bleaching towers, washers, and seal

tanks. If steam and chemical mixers are vented to the atmosphere, the mixers would also emit HAPs. The emissions regulated by the MACT standard are chlorinated HAPs and chloroform.

The emission points of concern are those from bleaching stages where chlorine or other chlorinated compounds are applied. The washer systems remove the chlorinated bleaching chemicals from the pulp slurry at the end of the stage and prior to the application of the chemicals in the next bleaching stage. Therefore, there is not a significant carry over of chlorinated HAPs and associated emissions to bleaching stages in which non-chlorinated chemicals are used.

6.3.2 Applicable Regulations

Air emission regulations for criteria pollutants, such as NSPS Subpart BB, do not cover the bleach plant equipment systems at kraft pulp mills. However, the Cluster Rules MACT standards apply. In addition, state HAP requirements may also apply.

6.3.2.1 State HAP Standards

At least one state -- Maine -- has established specific emission limits for chlorine and chlorine dioxide emissions from bleach plant operations (see Figure 6-4 for a summary of the Maine requirements -- Chapter 122 of the Maine Administrative Code). In addition, some states may impose limits on these operations under other applicable authority. Based on a review of sample permits from a few states, both Wisconsin and Georgia appear to impose requirements on bleach plant operations. Wisconsin has established chlorine emission limits for both new or modified sources, and existing sources under its state air toxic regulations (See NR 445, Wis. Adm. Code). No monitoring requirements were established in the sample permit reviewed. Similarly, Georgia appears to impose similar requirements on the basis of a State air toxics program. In addition, the Georgia permit reviewed also contained scrubber control device parameter monitoring requirements.

Figure 6-4
Summary of Maine Bleach Plant Regulations

Emission Limits	Monitoring Provisions	Testing Provisions
! 3.0 lb/hr for Chlorine ! 3.0 lb/hr for Chlorine Dioxide ! Limits apply to combined bleach plant operations	! Total chlorine CEMS, but only after determination that equipment is available and reliable for determining compliance ! Scrubber recycle flow, Oxidation Reduction Potential (ORP), scrubber pressure drop, pH meters, and potentially other scrubber parameters ! Recycle flow, ORP, scrubber pressure drop, and pH must be recorded once per shift	! Annual testing required ! Use NCASI methods (Technical Bulletins #520 and #548, 4/87 and 6/88) or other approved method

6.3.2.2 Cluster Rules Standards

NOTE! MACT summary based on 4/15/98 Final Rule and subsequent regulatory notices published through 4/30/99. Check website for possible updates to this section for any subsequent regulatory notices.

Basic emission limits. At kraft mills, the MACT requirements apply only to bleaching lines that use chlorinated compounds, and only to the bleaching stages in which chlorinated compounds are introduced. The equipment covered is the bleaching tower, washer, and seal tank. Steam and chemical mixers are also covered if they vent to the atmosphere as well as any vacuum pumps. Extraction stages are not covered.

The rule has two emission limits, one for chloroform and one for chlorinated HAPs (excluding chloroform). Figure 6-5 presents the control options for the bleaching system emission limits. Each bleaching system must comply with both the chloroform and chlorinated HAP limits (chlorinated HAPs may be measured as chlorine). The rule has two limits because the technology used to control chlorinated HAPs will not control chloroform.

Figure 6-5
Control Options for Bleaching System Emission Limits

Bleaching System Emission Limit	Control Option
Chloroform	Comply with the revised effluent limitations guidelines and standards
	Use no chlorine or hypochlorite in any bleaching stage
Chlorinated HAP	Reduce total chlorinated HAP mass in the vent stream by 99 percent or more (measured as chlorine) using a control device
	Reduce the total chlorinated HAP emission concentration (excluding chloroform) to 10 ppmv or less exiting a treatment/control device
	Reduce the total chlorinated HAP mass emission rate to 0.001 kg total HAP (excluding chloroform) per Mg ODP

Chloroform emission limit. Process modifications are required to meet the chloroform limit since chloroform is not removed in the bleach plant gas scrubber. A mill can comply with the MACT requirements of eliminating chlorine and hypochlorite use or meet the limits set forth in the NPDES effluent limitations guidelines. However, if the compliance dates for the effluent limitations guidelines (which are based on the NPDES permit renewal cycle for each facility) are different than those for the MACT standards, the MACT compliance dates must still be met.

NOTE! The enclosures and closed-vent system must meet the same requirements as described in Section 4.3.2.2 for the pulping process.

Chlorinated HAP emission limit. As outlined in Figure 6-5, the MACT standards provide three optional emission limit formats (i.e., a limit based on percent reduction, pollutant concentration, or mass emissions per product). However, for each of these three options, the chlorinated HAP emission limit is based on the use of a gas scrubber; and, although not explicitly required, nearly all mills are expected to use or modify existing gas scrubbers to meet the emission limit. Some mills may be able to meet the concentration or mass emission limits through process modifications (i.e., 100% chlorine dioxide substitution). In addition to the ultimate control device, the Cluster Rules require -- for each bleaching stage in which chlorinated compounds are introduced -- that emission points be enclosed and vented to a closed-vent system which is routed to the control device. The enclosures and closed-vent system requirements are the same as for pulping process area emission points (see Section 4.3.2.2).

General exceptions and alternative standards. Under the Effluent Limitations Guidelines (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 bleaching system requirements for kraft mills in exchange for achieving greater HAP reductions than the regulatory baseline. Mills that elect to enter this program receive a 3-year extension for complying with MACT bleaching standards (i.e., they must comply by April 15, 2004). As part of the extension, mills must submit a control strategy report every two years under 40 CFR 63.455(b) until compliance is achieved. The report must contain milestones and status reports for achieving compliance. In addition, the mill must meet either one of the following two conditions:

- No increase in the application rates of chlorine and/or hypochlorite (in kg per Mg ODP) 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 emissions during the extended compliance period). **Or,**

- By no later than April 16, 2001, comply with enforceable effluent limitation guidelines for 2,3,7,8 TCDD and for AOX that are at least as stringent as the baseline BAT levels set out in the Cluster Rules effluent guidelines (40 CFR 430.24(a)(1)).

Any bleaching line that is modified to not use chlorine or any chlorinated HAP is exempt from all MACT requirements.

Back-up control requirements. There are no explicit back-up control MACT requirements for the bleaching system emission limits and the rule provides no allowances

for excess emissions. Therefore, the only excused excess emission periods would be those periods that are specifically designated in the startup, shutdown, or malfunction plan approved under 40 CFR 63.6(e)(3).

Monitoring, reporting, and recordkeeping (MRR). The MACT establishes MRR requirements to assure continuous compliance with the emission limits. In order to meet the chlorinated HAP emission limit, the majority of the mills will use gas scrubbers. The MACT requires that mills use a continuous monitoring system (CMS) to demonstrate compliance. Figure 6-6 summarizes the MACT MRR requirements for each control option. The specific parameter excursion levels used to determine ongoing compliance are determined during the initial performance test. If a mill uses a control device other than a gas scrubber, the mill must submit for approval proposed parameters to be monitored and the applicable excursion level for each proposed parameter. The mill may submit proposed revised excursion levels (or, if applicable, monitored parameters) on the basis of subsequent performance testing results.

Figure 6-6
MACT Monitoring, Reporting, and Recordkeeping Requirements for Bleaching Systems Chlorinated HAP Emission Limit

Control Option	Continuous Monitoring	Reporting	Recordkeeping
Gas scrubber used to meet: ! 99% chlorinated HAP reduction, or ! Mass emission rate of 0.001 kg chlorinate HAP per Mg ODP	! pH or oxidation-reduction potential of the effluent ! Vent gas inlet flow rate ! Scrubber liquid influent rate	Standard Part 63 reporting (i.e., quarterly EER and CMS performance report, except, if no excess emissions, then semiannual performance report with statement that no excess emissions occurred)	Standard Part 63 recordkeeping for monitored operating parameters (i.e., both monitor performance data and measured data averages)
Gas scrubber used to meet: ! 10 ppmv chlorinated HAP outlet concentration	! Same scrubber parameters as above, or ! Chlorine outlet concentration	Standard Part 63 reporting (i.e., quarterly EER and CMS performance report, except, if no excess emissions, then semiannual performance report with statement that no excess emissions occurred)	Standard Part 63 recordkeeping for monitored operating parameters (i.e., both monitor performance data and measured data averages)
Compliance with emission limits with a control device other than gas scrubber	Determine appropriate monitoring parameters during initial performance test	(Same as using a gas scrubber to comply with the emission limits)	(Same as using a gas scrubber to comply with the emission limits)
Process modification to meet mass or concentration emission limits	Determine appropriate monitoring parameters during initial performance test	(Same as using a gas scrubber to comply with the emission limits)	(Same as using a gas scrubber to comply with the emission limits)

As noted above in this section, the mill must also meet the enclosures and closed-vent system requirements for capturing and transporting the bleach vent gases to the scrubber or other control device. These requirements include independent MRR requirements, as summarized in Figure 6-7.

Figure 6-7
Enclosures and Closed-vent System MACT Monitoring and Recordkeeping Requirements

Control Option	Monitoring	Reporting	Recordkeeping
Enclosures and Closed-vent System requirements apply to all control options (See Figure 6-5)	! *Every 30 days*: Visual inspection of all bypass line valves or closure mechanisms ! *Initially and Annually*: Demonstrate no detectable leaks at positive pressure components. Demonstrate negative pressure at enclosure openings	! None required for 30-day visual inspections ! Initial and annual leak checks/negative pressure demonstrations are subject to general Part 63 performance test reporting requirements	! Prepare and maintain a site specific inspection plan ! Visual check records must be kept because relevant to documenting compliance (§ 63.10(b)(2)(vii)) ! Performance test records must be maintained (§ 63.10(b)(2)(viii))

The MRR requirements (see Figure 6-8) for the chloroform emission limit are limited because the mill will use process modifications rather than add-on control technology to comply.

Figure 6-8
MACT Monitoring, Reporting, and Recordkeeping Requirements for Bleaching Systems Chloroform Emission Limit

Control Option	Continuous Monitoring	Reporting	Recordkeeping
Eliminate use of hypochlorite or chlorine	None	Initial (one-time) compliance report only	General Part 63 requirements for initial compliance reports
Comply with effluent limitation guidelines (by MACT compliance date)	As required in NPDES permit (minimum weekly monitoring of bleach plant effluent)	As required in NPDES permit (minimum annual submission of discharge monitoring report)	Standard NPDES permit recordkeeping (3 years for all monitoring records)

Finally, Figure 6-9 summarizes the MRR requirements for mills that receive the 3-year compliance date extension. These requirements apply from June 1998 until the mill demonstrates compliance with all applicable bleaching system emission limits.

Figure 6-9
MACT Monitoring, Reporting, and Recordkeeping Requirements for Mills in the Voluntary Advanced Technology Incentives Program

Control Option	Continuous Monitoring	Reporting	Recordkeeping
Compliance date extension for Advanced Technology Incentives systems (no increase in chlorine or hypochlorite use)	Chlorine and hypochlorite application rates in kg/Mg ODP	! Daily application rates of chlorine and hypochlorite every 6 months; and ! Submit the initial control strategy report and update the control strategy report every 2 years	Daily application rates of chlorine and hypochlorite

6.3.3 Air Inspection Techniques

Because of the significant air emission sources outside of the bleach plant area (including the lime kiln, recovery boiler and power boilers) and the lack of applicable requirements, the bleaching systems in the past often have not been a high priority for committing on-site inspection resources. However, the bleach plant air emissions will require increased attention from inspectors to assure compliance with Cluster Rules requirements. For initial compliance, the appropriate steps to follow for coming into compliance with the Cluster Rules are outlined extensively in the document *Pulp and Paper NESHAP: A Plain English Description*,[4] including a discussion of applicability and timing issues, as well as initial compliance checklists. This document, therefore, focuses on on-site inspections that will be conducted after initial compliance has been demonstrated and the appropriate permit conditions have been included to address the Cluster Rules.

6.3.3.1 Pre-inspection Steps

As discussed in Chapter 3, there are a number of steps that should be taken routinely prior to conducting an actual on-site inspection, including file (especially permit) reviews. As part of conducting the file review and planning the on-site inspection, the inspector should consider at least the following items:

Process diagrams. Obtain a simplified diagram of the bleaching system(s) and note what control(s) are employed. This type of diagram may be available in the Part 70 operating permits file if submitted with the application.

Evaluation of periodic monitoring reports. If a scrubber is used for HAP control, scrubber parameter (or, in some cases, outlet chlorine concentration) data will be recorded and submitted in a semiannual (or quarterly) excess emission report (EER) of excursions from required parameter levels -- these levels should be specified in the mill's

operating permit. The inspector should review any reports submitted since the last inspection in order to prioritize the need for follow-up while on site. Note that under the Cluster Rules, there is no allowance for excess emission periods, although the MACT general provisions do allow for excess emissions that occur as a result of startup, shutdown or malfunction. The inspector will have to review on-site records to evaluate any claims of allowable excursions. This evaluation must also consider whether the claimed excursions are consistent with the startup, shutdown and malfunction plan required under 40 CFR 63.8.

Evaluation of episodic malfunction reports. The inspector should review malfunction/upset reports since the last inspection, if available. If the reports identify corrective actions to be taken by the source, note the need to verify during the on-site inspection that the corrective steps were actually taken and that they resolved the problem.

Also, the inspector can compare claims of malfunction periods on EERs with the duration and timing of malfunction periods indicated on malfunction reports. If a malfunction report is required for all or some specified subset(s) of malfunctions, note any discrepancies between the malfunction reports submitted and the claimed excess emissions in an EER. Significant discrepancies signify either errors in the EER or malfunction reporting that should be addressed with the facility either as part of the inspection or by agency compliance staff responsible for processing periodic and episodic reports.

6.3.3.2 On-site Inspection Steps

The appropriate on-site inspection steps must be tailored to the objectives of the inspection and the priority given to the bleaching area in a particular inspection. The possible steps for a routine Level 2 inspection include:

Permit verification. One objective of a standard Level 2 air inspection will be to verify that the permit includes all the appropriate equipment. As noted above, the *Plain English Description* document [4] contains a detailed discussion of the applicability of the Cluster Rules requirements. Prior to the inspection, review the permit to determine what conditions apply to the bleaching process. Depending on the nature of the specific permit conditions, the inspector then should evaluate a number of potential issues to verify that bleaching operations remain consistent with permit requirements, including:

- Are all emissions units properly identified in the permit?
- Have any modifications (including production increases that required a physical or operational change) occurred that could trigger NSR? Note that bleach plant modifications, even if they do not constitute a major modification that triggers PSD or major NSR review, could debottleneck production in other areas of the mill that result in significant emission increases from other processes.
- Are HAP control methods properly identified?

- Compare the basic process/design information with conditions in the permit to verify the accuracy of the information in the permit and to support subsequent assessment activities.

Evaluation of proper operation of control equipment. A Level 2 inspection will focus on assuring that the control equipment is being properly operated and maintained so that the facility continues to achieve compliance with the applicable emission limits. Although the proper steps for this phase of the inspection will depend on the control measures used for HAP control, all mills will have to comply with the enclosures and closed-vent system requirements and nearly all mills are expected to use gas scrubbers to reduce emissions.

Enclosures and closed-vent system. As part of the Cluster Rules, facilities will have to enclose bleach plant emission points and convey the gases through a closed-vent system if a control device is used. The Cluster Rules require the facility to develop a self-inspection plan, including a series of periodic checks, to assure that this system continues to operate properly. The inspector should review the records of these activities to assure that the required checks are occurring and that the source has taken any corrective action steps necessary to remain in compliance. If a problem is detected or suspected, the inspector may want to consider conducting the types of checks that the facility is supposed to undertake as part of its self-inspection program.

Checks of Enclosures/Closed-vent Systems for Suspected Problems with Facility Self-Inspections

- **Visual inspections (ductwork, piping, valves, etc.)**
- **Leak checks using Method 21 analyzer (positive pressure components)**
- **Pressure checks using portable pressure gauge, etc. (negative pressure enclosure/hood openings)**

Scrubber systems. Most mills will use scrubbers to control chlorinated HAP emissions from bleaching systems. The Cluster Rules provide for a set of scrubber parameters (or the use of an outlet chlorine CMS) that are used to determine direct ongoing compliance with the applicable emission limits. The on-site inspection should confirm that:

- The required monitors are in good working order. Interview plant personnel to determine what type of routine maintenance and quality assurance is conducted as part of the mill's monitoring program.
- The monitored readings at the time of the inspection are within permit limits. To the extent that the monitoring data are handled and stored by a distributed control system (DCS), the inspector can evaluate recent historical data and data trends for direct compliance, as well as shifts in emissions that indicate a loss of control

efficiency that could lead to future compliance problems if corrective measures are not taken.

If the initial review of scrubber performance data indicates potential problems, then the inspector may want to consider conducting follow-up checks of the system. See the discussion of scrubber follow-up assessment steps in Section 5.3.3.2.

6.4 Water Regulations and Inspection Techniques

Kraft mills that manufacture bleached papergrade pulp are subject to 40 CFR Part 430 (Subpart B). EPA did not promulgate revised regulations for mills that manufacture dissolving grade kraft pulp (Subpart A) in 1998, but expects to do so in the future. Also, note that the Subpart B requirements apply to soda mills, of which there are only a limited number of U.S. facilities.

Key Water Considerations

- **Cluster Rules impose new requirements applicable to bleach plant effluent prior to entering WWTP**
- **Voluntary incentives program applies under Cluster Rules**
- **Sampling needs to be performed at bleach plant locations -- important to verify that sampling done under representative conditions**

The new Cluster Rules regulations are based on technologies that reduce pollutant generation during bleaching. However, the regulations do not require use of specific technologies, but instead limit the discharge of specific pollutants. This section focuses on:

- Wastewater discharge points
- Applicable regulations
- CWA inspection procedures
- Water-related EPCRA issues

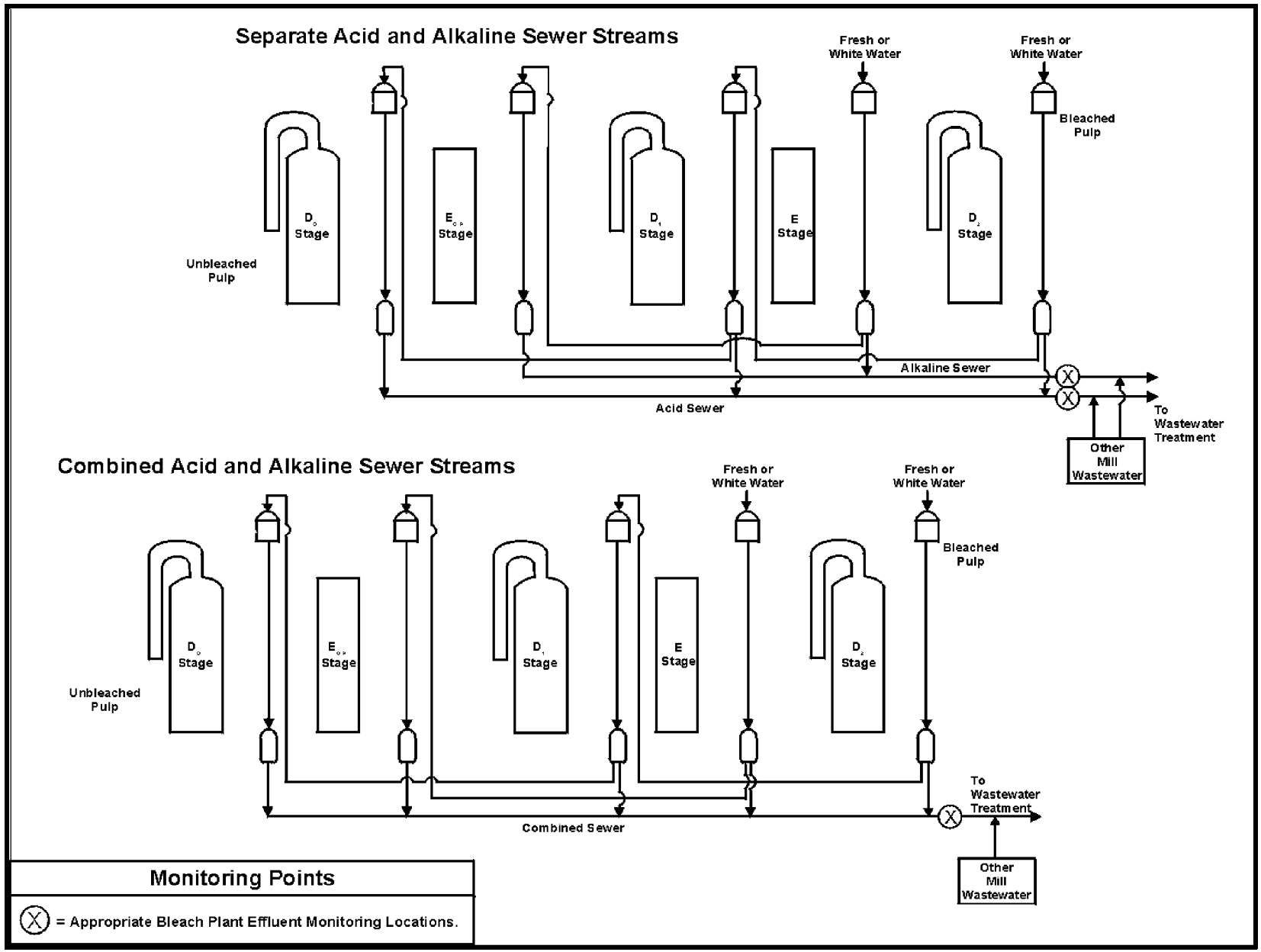
6.4.1 Discharge Points

Some wash water from each bleaching stage is reused in a preceding bleaching stage, while the rest is sewered. In general, kraft mills discharge wash water (collectively known as bleach plant effluent) either in:

- Two sewer lines, one that contains acid wastewater from the chlorinated bleaching stages and one that contains alkaline wastewater from the extraction stages, or
- One combined sewer line that contains wash water from all bleaching stages

Figure 6-10 shows the two configurations. Most mills have separate acid and alkaline sewers, which convey bleach plant effluent to the wastewater treatment plant.

Figure 6-10
Bleach Plant Sewer Stream Configurations



6.4.2 Applicable Regulations

The Cluster Rules regulations require all bleached kraft mills, both direct and indirect dischargers, to demonstrate compliance with limitations for 15 chlorinated compounds at the bleach plant. In addition, indirect discharge mills must demonstrate compliance with AOX limits at the bleach plant. See Section 7.3 for a more detailed discussion of the effluent limitations guidelines and standards established for mills subject to 40 CFR Part 430 (Subpart B).

NOTE! The EPA established a voluntary incentives program to encourage bleached kraft mills to achieve greater pollutant reductions than baseline regulatory requirements.

Voluntary Advanced Technology Incentives Program. In addition to the baseline wastewater regulations, as part of the Cluster Rules, EPA established the Voluntary Advanced Technology Incentives Program (VATIP) under 40 CFR Part 430 (Subpart B). This incentives program is intended to encourage bleached papergrade kraft mills to voluntarily implement pollution prevention controls beyond the baseline regulatory requirements. The program contains three tiers that reflect increasingly more effective levels of environmental protection. This increased environmental protection can be achieved with advanced pollution prevention technologies, such as oxygen delignification, ozone bleaching, and totally chlorine free (TCF) bleaching process operations. The incentives program includes more stringent limitations on the discharge of AOX than do the baseline Cluster Rules requirements. In addition, the incentives program imposes bleach plant flow reduction requirements. Tier 1 also requires participating mills to limit the lignin content of the pulp they bleach.

Mills that enter the program may do so on a line-by-line basis, so that the more stringent limitations are only applicable to those lines enrolled. In return for voluntarily accepting more stringent effluent limits, participating mills have additional time to achieve compliance and are subject to reduced monitoring requirements. (For more details see *Technical Support Document for the Voluntary Advanced Technology Incentives Program,* October, 1997.)

6.4.3 CWA Inspection Techniques

Because the Cluster Rules require mills to demonstrate compliance by monitoring bleach plant effluent, NPDES and pretreatment compliance assessments must focus on the bleach plant as well as the wastewater treatment plant. This section discusses the steps required to perform an inspection of the bleaching process and will:

- Assist inspectors in assessing kraft pulp mill compliance with NPDES permit limits applied at the mill's bleach plant effluent; and
- Assist POTWs as they assess the compliance of kraft pulp mills with pretreatment permits

6.4.3.1 Record Reviews

To demonstrate compliance with the bleach plant effluent permit limits, mills must monitor their bleach plant effluent discharges and maintain records of the monitoring. Discharge Monitoring Reports (DMRs) must be submitted to the mill's permitting authority annually, or more frequently if required by permit.

Permit review. The inspector should review permit requirements for bleach plant effluent, noting the required monitoring locations and frequency. Although the mill must monitor at the frequency specified in its permit, the Cluster Rules specify minimum monitoring frequencies for all pollutants monitored at the bleach plant, as indicated in Figure 6-11.

NOTE! The inspector should determine if mill operations are consistent with the permit. If an inconsistency is found, the inspector should determine if the facility is making an unauthorized discharge or if a permit modification is required.

Figure 6-11
Pollutant Monitoring Frequencies for Bleach Plants

Pollutant	Minimum Monitoring Frequency
Chloroform	Weekly
TCDD and TCDF	Monthly
Chlorinated phenolic compounds	Monthly
AOX (for indirect discharge mills)	Daily

DMR review. The inspector should review DMRs (and any other available monitoring data) to determine whether there has been a violation of permit limits and to identify any excursions from typical performance which may not have been violations. Events occurring at the mill at the time of the excursions should be reviewed with mill operators.

Bleaching process operations. Typically, kraft mills monitor and record information about certain parameters in order to control the bleaching process. The operation and control of pulping and bleaching processes determines, to a large extent, the quantity of chlorinated pollutants generated. The inspector should review bleach plant records to determine if operations at the time that compliance samples were collected were

NOTE! The inspector should review bleach plant operating records to determine if compliance samples were collected during normal operations.

representative of the normal operation of the bleach plant, or if bleaching operations were inappropriately manipulated in order to achieve compliance. In addition, the inspector should identify any excursions from typical performance to understand how well controlled bleach plant operations are. Records of the following parameters may provide such information:

- *Bleach plant discharge flow*. Bleach plant limits for TCDD, TCDF, and the chlorinated phenolic compounds are expressed as concentrations (31.9 picograms/liter for TCDF; <Minimum Level (ML) for the others). The inspector should review records of the bleach plant discharge flow to determine if samples were collected during normal operations with representative discharge flows. Samples collected during periods of abnormally high flow may enable the mill to comply with concentration permit limits through dilution.

- *Chemical application rates*. Effluent limitations guidelines are based on complete (100 percent) substitution of chlorine dioxide for chlorine and hypochlorite. Compared to chlorine dioxide bleaching, chlorine and hypochlorite generate greater quantities of chlorinated pollutants. Mills are not required to eliminate the use of chlorine and hypochlorite, but only to demonstrate compliance with their permit limits. Inspectors should review the records to determine:

  - Whether these chemicals are still in use. If so,
  - That samples were collected under the bleaching conditions specified in the permit. For example, mills that continue to use chlorine and hypochlorite may agree to sample when these chemicals are used to represent "worst case" conditions with respect to the generation of chlorinated organic pollutants. Alternatively, the permit may require collection of samples on a more frequent basis than specified in the regulation. The inspector should verify that permit conditions were met.

- *Kappa number and kappa factor*. The *kappa number* indicates the lignin content of the pulp. The pulping process removes much of the lignin and mills generally measure the kappa number after pulping to properly adjust chemical application rates and otherwise optimize bleaching control parameters. The lower the kappa number, the lower the required chemical application rate to produce a given pulp quality. *Kappa factor* is the ratio of chlorine bleaching chemicals applied to the lignin content of the pulp. Use of a lower kappa factor reduces the potential for formation of TCDD/F and other chlorinated pollutants. Inspectors should review bleach records to understand the kappa factor variability. High kappa factors may led to excessive discharges of chlorinated pollutants. Note that mills may consider those values to be confidential business information (CBI). Although this does not affect the inspector's ability to review the information, special handling procedures for the data may apply (see Section 3 for a general discussion of CBI issues).

- *Temperature and pH in and across bleach stages*. Mills control the temperature and pH of each bleaching and extraction stage to control pulp quality. Any inconsistency

in temperature and pH may indicate a disruption in bleaching operations that may have led to increased pollutant discharges.

- *Production data*. Chloroform permit limits are mass-based. The inspector should compare bleach plant production records to the permit file to verify that an appropriate production value was used as the basis of chloroform permit limits. (For a more detailed discussion of mass-based permit limits, see Section 7.3.1.) If an inconsistency is found, the inspector should refer the matter to the permit writer to determine if the facility is making an unauthorized discharge or if a permit modification is appropriate.

6.4.3.2 Physical Inspection of the Bleach Plant (Facility Site Review)

The bleach plant should be inspected following the general procedures described in the *NPDES Compliance Inspection Manual*. The inspection should include interviews of bleach plant personnel. By examining the bleach plant equipment and by interviewing mill staff, the inspector may uncover bleach plant conditions which could lead to problems in compliance with bleach plant effluent limitations (see Figure 6-12).

Figure 6-12
Conditions that May Lead to Problems in Compliance with Bleach Plant Effluent Limitations

If ...	Then...
Bleaching towers and extraction stages show signs of corrosion	Inefficient bleaching operations may persist, leading to excessive pollutant discharge
Bleach plant washers and savealls leak	Pollutant discharges may be escaping detection
Sewer line(s) contain excessive entrained air	Monitoring results may be inaccurate
Sampling procedures are not documented	Invalid laboratory results may persist
Monitoring points are incorrectly placed	Monitoring results do not reflect accurate pollutant discharge
Bleach plant schematic is inconsistent with bleach plant layout	Incorrect monitoring locations may be in use; wastewater flows used to calculate mass discharges may be inaccurate

6.4.3.3 Flow Monitoring Evaluations

Prior to the Cluster Rules, few mills regularly monitored bleach plant effluent flow or pollutant loadings. The Cluster Rules' wastewater regulations require mills to collect compliance samples for all chlorinated pollutants (except AOX from direct discharging mills) from the point where the wastewater containing such pollutants leaves the bleach plant. The appropriate location(s) should be specified in the permit. Because limits for dioxins and chlorinated phenolic compounds are expressed as concentrations, EPA strongly recommends that permit writers require mills to continuously measure bleach plant effluent flow. Flow measurement will help verify that samples are representative of normal operations. Inspectors must examine the monitoring locations and determine whether:

- Monitoring location(s) captures all bleach plant effluent streams; and
- Flow monitor(s) functions properly (i.e., is properly installed, calibrated, and maintained)

Inspectors should refer to the *NPDES Compliance Inspection Manual* (EPA 300-B-94-014) for more discussion of flow monitoring evaluations.

6.4.3.4 Sampling Evaluations

Demonstration of compliance with limits for 2,3,7,8-TCDD, 2,3,7,8-TCDF, chloroform and chlorinated phenolic compounds at the bleach plant effluent requires that mills use appropriate sampling procedures.

NOTE! Each mill is required to follow any specific sampling procedures specified in its permit.

Collection methods. Appropriate sample collection procedures are determined by the physical and chemical properties of the pollutants of concern.

2,3,7,8-TCDD; 2,3,7,8-TCDF; and the chlorinated phenolic compounds (and AOX for indirect dischargers). Samples analyzed for these pollutants may be collected as grab composite samples collected from both the acid sewer and the alkaline sewer. Typically, the composite is collected every four hours, for 24 hours. Mills may collect samples by using a continuous automated sampling device, if appropriate for the sampling location specified in the permit. For these pollutants, the mills may demonstrate compliance by preparing a flow proportioned composite of the acid and alkaline sewer samples, resulting in one sample of bleach plant effluent for analysis. (If necessary to achieve the applicable method's minimum level, EPA recommends that mills test the effluents separately for reliable determination of chlorophenolic compounds, 2,3,7,8-TCDD and 2,3,7,8-TCDF.)

Chloroform. For chloroform, however, separate samples and analyses of all bleach plant filtrates discharged

NOTE! Samples to be analyzed for chloroform require special handling because of chloroform's volatility.

separately are required to prevent the loss of chloroform through air stripping as the samples are collected and measured, or through chemical reaction when the acid and alkaline samples are combined. If separate acid and alkaline sewers do not exist, compliance samples must be collected from the point closest to the bleach plant that is or can be made physically accessible.

Samples to be analyzed for chloroform will typically be collected every four hours for 24 hours. However, because chloroform is volatile, samples must never be collected using a continuous automated sampling device (unless such a device has been demonstrated to be suitable for sampling volatile compounds). In addition, the following special sampling procedures apply:

- Samples should be cooled during collection because the bleach plant effluent streams are hot
- Samples should not contain air bubbles

Figure 6-13 summarizes sampling procedures for each pollutant.

Figure 6-13
Recommended Bleach Plant Effluent Sampling Evaluation Collection Procedures

Pollutant Monitored	Container	Preservative*	Minimum Sample Volume	Collection Method
Chloroform	Glass vial with Teflon septum	3 granules (10 mg) $Na_2S_2O_3$ per vial, 2 drops HCl per vial, 4 ºC	12 x 40 mL each grab	! Grab (1 every 4 hours) ! 24-hour composite prepared by lab
2,3,7,8-TCDD and 2,3,7,8-TCDF	Amber glass bottle with Teflon lid liner	$Na_2S_2O_3$, for samples > pH 11, add H_2SO_4 to pH 7-9, 4 ºC	2 x 1,000 mL	! Grab (1 every 4 hours) or continuous automatic composite ! 24-hour composite
Chlorinated phenolic compounds	Amber glass bottle with Teflon lid liner	$Na_2S_2O_3$, H_2SO_4 to pH 2-3, 4 ºC	3 x 1,000 mL	
AOX (for indirect dischargers)	Amber glass bottle with Teflon lid liner	$Na_2S_2O_3$, HNO_3 to pH 2-3, 4 ºC	500 mL	

* Note: sodium thiosulfate ($Na_2S_2O_3$) is required only if free chlorine is present in the wastewater

6.4.3.5 Laboratory/QA Evaluations

As discussed in Section 7.4.5, many kraft mills operate on-site laboratories to analyze BOD_5 and TSS. Unlike the test procedures for BOD_5 and TSS, the test procedures for chloroform, 2,3,7,8-TCDD, and 2,3,7,8-TCDF are complex and require specialized laboratory equipment. As a result, many mills contract laboratories to perform bleach plant effluent testing. Inspectors should examine sample handling procedures to ensure QC procedures are followed. Each mill should have written QC procedures for mill staff. Inspectors should review these procedures and determine whether they are followed.

Inspectors should review documentation to determine if contract laboratories use the test methods specified in the NPDES permit. Figure 6-14 lists the test method that must be used for each pollutant limited in bleach plant effluent.

Figure 6-14
Test Method for Each Pollutant Limited in Bleach Plant Effluent

Pollutant	Method
Chloroform	601, 624, 1624B and standard methods 6210B, 6230B
12 Chlorinated Phenolic Compounds	1653
2,3,7,8-TCDD and 2,3,7,8-TCDF	1613

6.5 EPCRA Issues and Inspection Considerations

General concerns. The basic regulatory requirements for EPCRA are not process-specific but rather apply on a facility-wide basis. Thus the basic requirements of EPCRA are discussed in Appendix D.

NOTE! See Appendix D for overview of EPCRA regulations and basic assessment procedures.

For the bleach plant operations, key EPCRA issues will be to quantify releases of applicable toxic chemicals in the annual Toxic Release Inventory (TRI) report (known as the "Form R" report), and to comply with emergency reporting requirements. The emergency reporting requirements apply under both EPCRA and CERCLA. The releases subject to these emergency reporting requirements are releases that are not federally permitted and that exceed certain reportable quantities. For certain releases that are "continuous" and "stable in quantity and rate," the mill may be able to use special reporting

options so that a notice is not required after each such release. See the discussion of continuous releases in Appendix D for further detail on the differences between standard emergency reporting and reporting of continuous releases.

For this process area, air emissions of chlorine or chloroform from bleach plant emission points are one potential source of releases that could be subject to EPCRA and CERCLA emergency reporting (the reportable quantity for each of these compounds is 10 pounds per 24-hour period). In addition, raw material spills could result in releases that are not federally permitted and exceed applicable reportable quantities. See Appendix D for a non-exclusive list of hazardous substances associated with kraft pulp mills and the corresponding reportable quantity values for each substance.

The determination of what constitutes a "federally permitted release" can be complex. However, it is important to note that if the mill as a matter of normal operations emits an applicable pollutant in amounts that exceed the reportable quantity **and** there is no emission limit established for the pollutant, then the emergency reporting provisions likely apply. For instance, a mill should file appropriate emergency reports if no chloroform emission limit applies to a bleaching system, and the bleaching system normally emits more than 10 pounds of chloroform in a 24-hour period. In this circumstance, the reduced continuous release reporting options likely are available, as discussed in Appendix D.

Inspection considerations. The EPCRA compliance assessment generally will focus initially on a records review. The inspector should review the following materials:

- *Emergency preparedness information*. These obligations are not process-specific, and thus the basic assessment considerations are covered for all facility operations in Appendix D to this manual.

- *TRI Form R*. Check to ensure that the form is on file, and that the source has adequately considered: (1) on-site air, water, and land releases, including land disposals of toxic chemicals, associated with the bleach plant operations and (2) transfers of waste containing those toxic chemicals. For wastewater discharge from the bleach plant, verify that the mill accounted for the residual TRI compounds found in wastewater treatment plant sludges that are associated with bleach plant effluent. Also, ask to see the estimation technique being used for air and water releases associated with bleach plant operations. If the estimation technique involves an assumed reduction efficiency for control methods (either for air or water control measures), make sure that the assumed efficiency is consistent with the overall efficiency that the mill is achieving. The overall assumed efficiency should account for any excess air or water releases in a manner consistent with the actual percent of operating time air control device or wastewater treatment upsets occur. Uncontrolled emission episodes or periods of reduced control efficiency can have a significant impact on the estimate of total releases.

- *Emergency notifications*. Request documentation that the mill has filed all required notices.

If an air or water inspector plans to screen for EPCRA compliance, the inspector should confirm the necessary information with the facility contact during the opening conference or just in advance of the closing conference. For an announced inspection, the inspector should ask the source to have ready EPCRA-related documentation so that this screening check can be performed without interrupting the main focus of the inspection. A screening checklist is included as part of the example assessment form in Appendix E.

In addition to a screening-type records review inspection, an EPCRA inspector may want to conduct further assessments to identify potential compliance concerns with emergency notification requirements. As one technique, the inspector first can check material storage and handling spill records, and citizen complaints since the previous inspection. The inspector should then cross-check those incidents with notification records identified in EPA's ERNS database, records on file with state/local emergency officials, or records requested from the mill. If this type of investigation identifies episodes of abnormal discharges for which no notification was provided, the inspector should consider a follow-up investigation to determine if reportable quantity thresholds were exceeded.

References:

1. Dence, C.W. and D.W. Reeve, *Pulp Bleaching Principles and Practices*. TAPPI Press, 1996.

2. Buonicore, A.J and Davis, W.T., eds., *Air Pollution Engineering Manual*, Air and Waste Management Association, 1992.

3. Chemical Pulping Emission Factor Development Document (Revised Draft), U.S. Environmental Protection Agency, July 8, 1997.

4. U.S. Environmental Protection Agency, Pulp and Paper NESHAP: A Plain English Description, EPA-456/R-98-008, November 1998.

SECTION 7: ASSESSMENT MODULE FOR THE WASTEWATER TREATMENT PLANT

7.1 Introduction

This section provides the information for conducting a compliance assessment of the wastewater treatment plant, including a general description of typical wastewater treatment plant operations at kraft pulp mills. The section also describes kraft mill pollutants and outlines the regulatory requirements for this area of kraft pulp mills.

CONTENTS

7.1 Introduction
7.2 Overview of Process and Discharges
7.3 CWA Regulatory Requirements
7.4 CWA Inspection Techniques
7.5 RCRA Issues
7.6 EPCRA Issues and Inspection Considerations

7.2 Overview of Process and Discharges

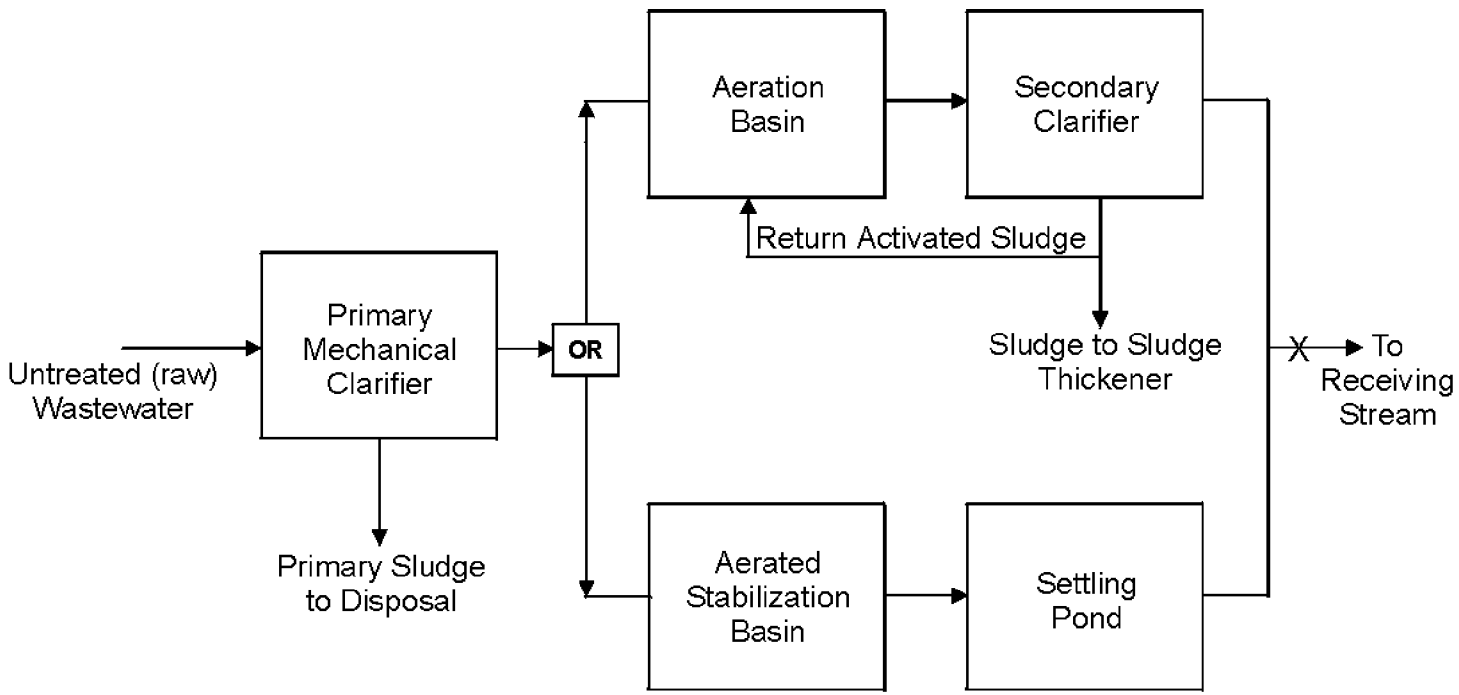
7.2.1 Description of the Process

Kraft pulp mills treat wastewater using primary (physical) and secondary (biological) treatment to reduce pollutant discharges to receiving waters. Kraft mills typically collect and treat the following wastewaters:

- Water used in wood handling and barking
- Digester, turpentine recovery, and evaporator condensates
- Wastewater from brown stock screening
- Bleach plant effluent
- Paper machine white water
- Spent pulping liquor spills from pulp processing areas

Figure 7-1 shows a typical sequence of the major equipment systems in the wastewater treatment plant. The function of each of these systems is described below.

Figure 7-1
Diagram of Wastewater Treatment Plant Major Equipment Systems



X - Point at which flow and pollutant content measured.

Primary treatment. Mills use primary treatment to remove suspended solids from wastewater, then treat the wastewater further in secondary treatment. Primary treatment processes used by kraft mills typically involve screening followed by either sedimentation or flotation.

Sedimentation. Kraft mills use mechanical clarifiers or, occasionally, settling ponds that provide sufficient holding time to enable suspended solids to settle. After settling occurs in the mechanical clarifier, the resulting sludge (which contains up to six percent solids) is pumped from the clarifier to sludge handling facilities where it is dewatered prior to disposal. Mechanical clarifiers can remove as much as eighty to ninety percent of suspended solids.

Settling ponds, a less sophisticated alternative to mechanical clarifiers, also remove suspended solids by sedimentation. Settling ponds may be clay-lined, synthetic-lined, or unlined and earthen, and have longer retention times than clarifiers. Settling ponds produce a less constant solids loadings than mechanical clarifiers, but still provide sufficient solids removal prior to secondary treatment.

Flotation. Flotation is a solids removal process that introduces a gas, usually air, into the wastewater stream. The gas adheres to the suspended solids, reducing their density and causing them to rise to the surface of the water, where they are skimmed off. The advantage of flotation clarification over sedimentation is that lighter particles that require very long retention times to settle are removed more quickly.

A common modification of this process is dissolved air flotation (DAF), in which air under pressure is injected into the wastewater. DAF units are more efficient than conventional flotation clarifiers because more air is introduced into the wastewater, thereby removing more solids.

Secondary treatment. Kraft mills employ secondary treatment to reduce biochemical oxygen demand (BOD_5) and toxicity in wastewaters. This process makes use of microorganisms (mostly bacteria and fungi) under aerobic conditions to digest the organic matter in the wastewater. The organic matter is removed as sludge and the treated wastewater is discharged into receiving waters. Because pulp mill wastewater is deficient in nitrogen and phosphorus relative to its high carbon load, these nutrients are usually added to the process to enhance microbial activity. Kraft mills generally use one (or more) of two basic types of secondary treatment processes described below.

Aerated and non-aerated stabilization basins. About seventy-five percent of U.S. kraft mills use aerated stabilization basins. These basins are equipped with continuous mechanical aerators or diffusers to introduce air into the wastewater. By aerating the wastewater, an increased amount of oxygen is introduced into the wastewater stream. This action significantly speeds up the biological activity compared to a non-aerated basin, so that a retention time of five days may achieve ninety percent BOD_5 removal. The

continuous aeration also provides thorough mixing which allows mills to operate effective aeration lagoons at depths up to twenty-five feet. These basins are typically lined with clay or a combination of synthetics and clay.

Some kraft mills use basins without mechanical aerators. Known as stabilization basins, this is the simplest form of aerobic treatment. This process uses shallow basins that cover very large areas and relies on natural diffusion of air into the wastewater to create aerobic conditions. At depths greater than four feet, anaerobic micro-organisms will become active in the lowest levels; thus, stabilization basins are shallow. Typically, the basin is earthen; however, some are lined with compacted clay. Wastewater retention time may last up to thirty days to achieve up to ninety percent BOD_5 removal.

Some kraft mills use both aerated and non-aerated basins. The stabilization basin, which may precede or follow the aerated stabilization basin, serves as a "polishing" or "holding" pond to remove additional organic wastes, including biological solids, or to control final effluent discharge to receiving waters.

Activated sludge system. This system features a microbial floc held in suspension in an aeration chamber. Soluble organic matter in the wastewater is metabolized by the microbial floc which changes it into solids, thereby increasing the suspended solids load. After aeration, treated wastewater is routed to a clarifier where the settled solids are removed as sludge. A significant fraction of this sludge is recycled back to the aeration chamber to maintain the high level of microbial floc (this is the "activated sludge"). The sludge that is removed is dewatered and disposed. Retention time for this system can range from less than six to over 12 hours.

7.2.2 Air Pollutant Emissions

The two main sources of air pollutants that may be emitted from the basic wastewater treatment plant operations are the pulping condensates and the bleach plant effluent. The pulping condensates may include total reduced sulfur (TRS) compounds as well as volatile organic compounds (VOC), such as methanol. The primary pollutants of concern for the bleach plant effluent are chloroform and methanol. Air emission concerns for the pulping condensates and bleach plant effluent are covered in Sections 4 and 6, respectively. The other sources of volatile compounds that could be released as air emissions from basic wastewater treatment plant operations are relatively minor in comparison to emissions from other mill operations and are generally not subject to specific regulation.

In addition, if a mill operates a sludge incinerator, there will be emissions from the incinerator. Inorganic gases (such as CO, NO_x, SO_x, and HCL) may be present, as well as particulate matter (including ash and heavy metals) and organic gases. The only compound subject to specific federal regulations for industrial wastewater sludge incinerators is mercury (40 CFR Part 61, Subpart E). In most cases, compliance with the Subpart E

incinerator requirements involves only an initial test to document mercury levels, with a follow up estimate of the impact on mercury emissions if operating conditions are changed. For this reason, these emissions are not discussed further in this section.

7.2.3 Water Pollutant Discharges

As discussed above, kraft mills treat wastewater in order to minimize effluent impacts on receiving waters. Generally, treated effluent is discharged from the wastewater treatment system from one discharge point. The following pollutants of concern exist at all kraft mills: BOD_5, total suspended solids (TSS), color, and chemical oxygen demand (COD). At kraft mills that bleach pulp with chlorine-containing compounds, additional pollutants of concern are: chloroform; 2,3,7,8-TCDD; 2,3,7,8-TCDF; chlorinated phenolic compounds; and adsorbable organic halides (AOX). Each of these pollutants is discussed below.

BOD_5 and TSS. High concentrations of organic matter found in kraft mill wastewater result in large quantities of BOD_5. Treatment of this BOD_5 results in the generation of large quantities of TSS. In general, kraft mills achieve ninety percent (or greater) removal of these pollutants when primary and secondary treatment are well-operated.

Color. Kraft pulp mill effluents contain highly colored lignin and lignin derivatives that have been solubilized and removed from wood during pulping and subsequent bleaching operations. For kraft mill wastewaters, color is determined by spectrophotometric comparison of the sample with a 1 mg/L solution of platinum, in the form of chloroplatinate ion. The color of kraft mill wastewaters is considered to be the color of the water from which turbidity has been removed ("true" color). Further, wastewater color is highly pH dependent, so the pH of color samples is adjusted to pH 7.6.

The EPA has not promulgated national regulations for color because the potential for significant aesthetic or aquatic impacts from color discharges is driven by highly site-specific conditions, such as the color of the receiving stream and the relative contribution of the mill discharge to the stream flow. However, many individual NPDES permits contain water quality-based effluent limitations on the discharge of color, developed to address local conditions.

COD. COD is a measure of the quantity of chemically oxidizable material present in wastewater. Sources of COD include the pulping area, chemical recovery area, bleaching area, and papermaking area. A portion of COD is readily biodegradable while the rest is resistant to biodegradation (i.e., "refractory"). Although the amount and sources of refractory COD will vary from mill to mill, some portion of it is derived from black liquor; thus, COD biodegradability indicates the degree to which black liquor is recovered from brown stock pulp and kept out of wastewater through effective BMPs. Wastewater COD loads also relate to discharges of toxic organic pollutants that are not readily

biodegraded. Although EPA has not established COD effluent limitations guidelines at this time, EPA is planning to do so in a future rulemaking.

Chloroform. Chloroform is an extremely volatile compound that is generated during the bleaching of pulp with hypochlorite, chlorine, or chlorine dioxide. Hypochlorite bleaching results in the greatest amount of chloroform generation, while chlorine dioxide bleaching results in the least amount of chloroform generation. As chloroform is generated, it partitions to air and to bleach plant effluent (with a small fraction remaining with the pulp). Any chloroform found in bleach plant effluent that is not emitted to the air prior to reaching the wastewater treatment plant may be volatilized or degraded during secondary treatment or discharged in the effluent.

2,3,7,8-TCDD (dioxin) and 2,3,7,8-TCDF (furan). During the late 1980s, bleaching with chlorine and hypochlorite were discovered to be sources of dioxin and furan. Although use of chlorine dioxide (ClO_2) bleaching minimizes the formation of chlorinated pollutants, measurable quantities of 2,3,7,8-TCDF and possibly 2,3,7,8-TCDD may still be formed. Dioxin and furan are not effectively degraded during wastewater treatment; they partition to the sludge and may be discharged with TSS into receiving waters untreated.

Chlorinated phenolic compounds. Chlorinated phenolic compounds include phenols, guaiacols, catechols, and vanillins substituted with from one to five chlorine atoms per molecule. Typically, bleaching processes that result in the formation of 2,3,7,8-TCDD and 2,3,7,8-TCDF also generate the higher substituted tri-, tetra-, and penta-chlorinated compounds. EPA has established effluent limitations guidelines and pretreatment standards for the following twelve chlorinated phenolic compounds:

- Trichlorosyringol
- 3,4,5-Trichlorocatechol
- 3,4,6-Trichlorocatechol
- 3,4,5-Trichloroguaiacol
- 3,4,6-Trichloroguaiacol
- 4,5,6-Trichloroguaiacol
- 2,4,5-Trichlorophenol
- 2,4,6-Trichlorophenol
- Tetrachlorocatechol
- Tetrachloroguaiacol
- 2,3,4,6-Tetrachlorophenol
- Pentachlorophenol

Adsorbable organic halides (AOX). AOX is a measure of the total amount of halogens (chlorine, bromine, and iodine) bound to dissolved or suspended organic matter in a wastewater sample. In bleached kraft mill effluent, essentially all of the AOX is comprised of chlorinated compounds formed during bleaching with chlorine and other chlorinated bleaching agents. Inefficient application of chlorine-containing bleaching

chemicals can generate increased levels of AOX. Minimizing AOX will usually have the effect of reducing the generation of chloroform, 2,3,7,8-TCDD, 2,3,7,8-TCDF, and chlorinated phenolic compounds. Some AOX is biodegraded during secondary treatment.

In addition to retaining the existing effluent limitations guidelines and standards for BOD_5, TSS, and pH, the Cluster Rules establish new effluent limitation guidelines and standards for bleached papergrade kraft mills for the other parameters described above, with the exception of color and COD. The Cluster Rules regulations require bleached kraft mills to meet limits on in-process streams *and* treated effluent, depending on the pollutant (see Section 7.3.3). See the References for further sources of information on the applicable discharges and control strategies.[1,2,3,4]

7.2.4 Solid/Hazardous Waste Discharges

Kraft pulp mills generate both primary sludge and secondary (biological) sludge. The collected sludges may be thickened in gravity or flotation thickeners and/or chemically conditioned prior to dewatering. Primary sludge is usually generated in greater quantities than biological sludge. Although the sludges potentially can be used for alternative beneficial uses, generally dewatered sludges are disposed of through land application, landfilling, or combustion. Because of concerns about potential contamination with dioxin, under paragraph 1(l)(ii) of the Consent Decree in EDF v Browner Civ. No. 89-0598 (D.D.C), EPA was required to make a hazardous waste listing determination for sludges from bleached kraft mill effluents *unless* the final effluent guidelines were based on the use of at least one of certain specified technologies. These technologies enable the mill to use less chlorine in bleaching pulp and thus to generate less dioxin contamination. After the promulgation of the Cluster Rules, EPA determined that the final guideline was based on the specified technologies, and thus EPA determined that it was not required to make a hazardous waste listing determination for pulp mill sludges.[5] If the sludges at a particular mill exhibit a hazardous waste characteristic, the sludges would be hazardous wastes even without an EPA listing determination.

Sludge handling processes. Some mills may perform sludge grinding, gravity, or flotation thickening or chemical preconditioning to achieve up to ten percent sludge solids content. Dewatering, the most common sludge handling process, is described below.

Belt filter press. Sludge is squeezed between two porous cloth belts. The dewatered sludge cake is scraped from the belts by blades. This operation results in typical sludge solids content of fifty percent for primary sludge and twenty percent for biological sludge.

Vacuum filters. Vacuum filter systems consist of a horizontal cylinder partially submerged in a tank of sludge. A layer of porous filter media fabric or tightly wound coils covers the outer surface of the cylinder. As the cylinder surface passes through the sludge tank, a layer of sludge adheres to the cylinder, and vacuum is applied. The dewatered sludge cake is then scraped off the fabric and consists of up to thirty percent solids.

Screw presses. Many kraft mills use screw presses that can achieve up to fifty-five percent sludge solids when dewatering primary sludge. This operation does not require preconditioning to achieve high sludge solids content.

Sludge disposal processes. Subsequent to sludge handling processes, kraft mills dispose of sludge by land application, landfill, or combustion. Each disposal method is discussed below.

Land application. Sludge from kraft mills is classified as a soil amendment because it is too low in nutrients to be of any value as a fertilizer. Due to concerns regarding dioxin and furan contaminated sludges, in 1994 EPA and AF&PA entered into an agreement governing the land disposal of sludge.[6] In this agreement, AF&PA agreed to compile annual monitoring reports for those mills that land apply materials with a dioxin/furan concentration equal to or greater than 10 ppt. Individual mills also entered in separate agreements with EPA governing the land application of their sludges.

Landfill. This is the most common disposal method. Kraft mills may use on-site landfills or off-site commercial landfills.

Combustion. Some mills will combust the sludge for heat recovery in a specialized sludge incinerator, or a hogged or fossil fuel power boiler. Currently, this disposal method is less common than landfilling.

7.2.5 EPCRA Chemicals and Reportable Releases

Facilities will have to provide information on chemicals used in the wastewater treatment plant to meet EPCRA's emergency preparedness requirements. Appendix D contains a process-based list of the types of hazardous chemicals that may be included in an EPCRA inventory for a kraft pulp mill.

On-site air, water and land (i.e., sludge) releases, including land disposals, of toxic chemicals from the wastewater treatment plant and off-site transfers of waste containing these toxic chemicals may have to be accounted for in filing TRI Form R reports. In addition, EPCRA/CERCLA emergency release reporting could apply for off-site releases that are not federally permitted and that exceed a certain reportable quantity. These releases most likely would involve water discharges resulting from wastewater treatment plant upsets or could involve spills resulting from material storage and handling activities.

These EPCRA issues are discussed in Section 7.6.

7.3 CWA Regulatory Requirements

Section 402 of the Clean Water Act (CWA) mandated that EPA establish the National Pollution Discharge Elimination System (NPDES) program to minimize the

discharge of pollutants to receiving waters. Within the NPDES program, industrial facilities that discharge process wastewaters from any point source into waters of the United States (i.e., direct dischargers) are required to obtain an NPDES permit. Permitting authorities must develop NPDES permits using technology-based effluent limitations guidelines established by EPA for the relevant industrial category. In cases where technology-based effluent limitations guidelines are insufficient to achieve and maintain the water quality standards of receiving waters, permitting authorities must impose water quality-based effluent limits (WQBELs) in addition to, or in place of, technology-based effluent limitations.

Technology-based effluent limitations. Technology-based effluent limitations guidelines and standards are established to require a minimum level of treatment for industrial point sources based on currently available in-plant process control and external treatment technologies, while allowing the discharger to use any available control technique to meet the limitations. The technology-based effluent limitations guidelines and standards established in 40 CFR Part 430 are based on the demonstrated performance of model process and treatment technologies that are within the economic means of the pulp and paper industry.

Kraft mills are subject to one of three federal effluent limitation regulations in 40 CFR Part 430:

- Subpart B for bleached papergrade kraft and soda mills
- Subpart A for dissolving kraft mills
- Subpart C for unbleached kraft mills

Mills that use purchased pulp, as well as pulp that they make on site, in their final product are also subject to effluent limitations regulations in:

- Subpart K for fine and lightweight papers
- Subpart L for tissue, filter, non-woven, and paperboard

For mills that discharge their wastewater directly to a receiving stream, these subparts establish effluent limitations guidelines that are implemented through the NPDES permit process. A mill is not required to comply with the guidelines until they are incorporated into the mill's NPDES permit, which is effective for five years. For mills that discharge their wastewater indirectly (i.e., to a POTW), the subparts establish pretreatment standards, which are effective on the dates specified in the regulations.

In the Cluster Rules, EPA revised effluent limitation guidelines and pretreatment standards for bleached papergrade kraft and soda mills, and revised the subcategorization scheme of Part 430. The EPA intends to promulgate revised regulations for unbleached kraft and dissolving kraft mills in future rulemakings.

Water quality-based effluent limitations (WQBELs). All receiving waters have ambient water quality standards which are established by the states or EPA in accordance with federal regulations to maintain and protect designated uses of the receiving water (e.g., aquatic life-warm water habitat, public water supply, and primary contact recreation). States can use the total maximum daily load (TMDL) process to quantify the allowable pollutant loadings in receiving waters, based on the relationship between pollution sources and in-stream water quality standards.

Some permitting authorities may find that the application of the technology-based effluent limitations guidelines result in pollutant discharges that still cause exceedances of the water quality standards in particular receiving waters. In such cases, permitting authorities are required to develop more stringent WQBELs for the pollutant to ensure that the water quality standards are met. For a description of how water quality standards are developed and incorporated into permits, refer to *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001) and *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001).

Summary of national regulatory requirements. This section describes the applicable national regulatory requirements for bleached, unbleached, and dissolving kraft mills, and points out where additional regulations may be added in the future. The inspector, however, should note that permit requirements will be specifically tailored for each discharging facility. Figure 7-2 summarizes the discussion of regulatory requirements presented below.

Figure 7-2
Wastewater Regulations for Existing Kraft Pulp Mills

Type of Kraft Mill	Direct or Indirect Discharger	BPT	Pre-Cluster Rules BAT	Cluster Rules BAT	Pre-Cluster Rules PSES	Cluster Rules PSES
Bleached Kraft Mills	Direct Discharger	✓	✓	✓		
	Indirect Discharger				✓	✓
Unbleached Kraft Mills	Direct Discharger	✓	✓			
	Indirect Discharger				✓	
Dissolving Kraft Mills	Direct Discharger	✓	✓			
	Indirect Discharger				✓	

7.3.1 Pollutants Regulated

Prior to the Cluster Rules, direct discharge kraft mills were subject to:

- Best practicable control technology currently available (BPT) and best conventional pollutant control technology (BCT) guidelines for the control of conventional pollutants (BOD_5, TSS, and pH)
- Best available technology economically achievable (BAT) guidelines for the control of toxic and nonconventional pollutants (pentachlorophenol and trichlorophenol, chemicals commonly used as biocides)
- New source performance standards (NSPS) for the same pollutants for new direct dischargers

Indirect discharge kraft mills were subject to performance standards for existing sources or new sources (PSES or PSNS, as applicable) for the control of pentachlorophenol and trichlorophenol.

For kraft pulp mills, the Cluster Rules add new requirements only for bleached papergrade kraft mills. For this subset of kraft mills, the Cluster Rules adds effluent limitations guidelines and standards for the following BAT and PSES pollutants (and NSPS/PSNS for new sources): chloroform; 2,3,7,8-TCDD; 2,3,7,8-TCDF; twelve chlorinated phenolic compounds; and AOX. All of the pre-Cluster Rules effluent limitation guidelines and standards applicable to kraft pulp mills remain in effect, although the Cluster Rules reorganized these limits into new subcategories.

NOTE! For kraft pulp mills, the Cluster Rules add toxic and nonconventional pollutants to the list of regulated pollutants *only for bleached papergrade kraft mills*. All existing guidelines and standards for kraft mills remain in effect.

7.3.2 Subcategorization

The Cluster Rules reorganized the subcategorization scheme of Part 430 to simplify the categories. Previously, mills were grouped by the types of products manufactured. The Cluster Rules reduced the number of subcategories by grouping mills by similar processes.

NOTE! Cluster Rules collapsed four previous bleached papergrade kraft mill subparts into 40 CFR 430 Subpart B and three previous unbleached kraft subparts into 40 CFR Part 430 Subpart C.

In the previous regulation, bleached kraft mills were divided into four subparts and unbleached kraft mills were divided into three subparts. As a result, the remaining pre-Cluster Rules limits (i.e., BPT for BOD_5, TSS, and pH, and BAT and PSES for pentachlorophenol and trichlorophenol) for the four previous bleached kraft mill subparts now exist as four segments of 40 CFR Part 430 (Subpart B). Likewise, the remaining pre-

Cluster Rules limits for the three previous unbleached kraft subparts now exist as three segments of 40 CFR Part 430 (Subpart C).

7.3.3 Compliance Monitoring Requirements and Locations

Before the Cluster Rules, all compliance monitoring for direct dischargers occurred at a location in the plant downstream of treatment but prior to the point at which the final effluent is discharged to the receiving waters. The revised BAT regulations require all bleached kraft mills, both direct and indirect dischargers, to demonstrate compliance with limitations for fifteen chlorinated compounds at the bleach plant (see Section 6). Bleach plant effluent limits are necessary for 2,3,7,8-TCDD, 2,3,7,8-TCDF, and the twelve chlorinated phenolic pollutants because pulp bleaching is the principal source of these pollutants, and it would not be possible, in all instances, to properly assess compliance at the final mill effluent due to dilution effects created by other wastewaters. Bleach plant effluent limits for chloroform are also necessary because there is the potential for volatilization and loss in mill sewer systems.

Direct discharge bleached kraft mills must assess compliance with AOX limitations at the point at which the final effluent is discharged to receiving waters (unless the permit provides otherwise). Indirect discharge mills, however, must assess compliance with AOX limitations at the bleach plant, because POTWs cannot achieve, through wastewater treatment alone, the degree of AOX removal achieved by in-process technologies that form the basis of BAT.

NOTE! Direct discharge bleached kraft mills must assess compliance with AOX limitations at the final effluent discharge. Indirect discharge mills, however, must assess compliance with AOX limitations at the bleach plant.

For the remaining regulated pollutants, the compliance monitoring requirements still apply at the point of final discharge. Note that, for the biocides pentachlorophenol and trichlorophenol, most mills certify that they do not use these chemicals and thus need not monitor effluent to demonstrate compliance. Figure 7-3 summarizes the discharge monitoring requirements that apply.

7.3.4 Production Definitions

Limits for BOD_5 and TSS, established before the Cluster Rules, are production normalized -- that is, they are expressed as pounds per 1,000 pound (or kg/kkg) of product. *Product* is defined as "... the annual off-the-machine production (including off-the-machine coating where applicable) divided by the number of operating days during that year." This definition includes the weight contributed by coatings and additives (e.g., clay, dyes, strengthening agents, etc.) which may account for as much as twenty percent of a final paper product's weight. If the mill produces market pulp, product is defined as production of market pulp in air-dried metric tons (ADMT) with ten percent moisture content.

Figure 7-3
Monitoring Requirements

Pollutant	Monitoring Location, Bleached Papergrade Kraft Mills	
	Direct Discharge Facilities	Indirect Discharge Facilities
Chlorinated Phenolic Pollutants*	Bleach plant effluent	Bleach plant effluent
2,3,7,8-TCDD	Bleach plant effluent	Bleach plant effluent
2,3,7,8-TCDF	Bleach plant effluent	Bleach plant effluent
Chloroform	Bleach plant effluent	Bleach plant effluent
AOX	Final effluent	Bleach plant effluent
Pentachlorophenol	Final effluent (or certify not used)	Final effluent (or certify not used)
Trichlorophenol	Final effluent (or certify not used)	Final effluent (or certify not used)
BOD_5	Final effluent	No national standards
TSS	Final effluent	No national standards
pH	Final effluent	No national standards

* Chlorinated phenolic pollutants are: tetrachlorocatechol; tetrachloroguiacol; trichlorosyringol; 4,5,6-trichloroguaiacol; 3,4,6-trichlorocatechol; 3,4,5-trichlorocatechol; 3,4,5-trichloroguaiacol; 2,3,4,6-tetrachlorophenol; 3,4,6-trichloroguaiacol; pentachlorophenol; 2,4,6-trichlorophenol; 2,4,5-trichlorophenol.

NOTE! *Product* is defined as off-machine tons (or air dry tons for market pulp) for BOD_5 and TSS limits, but as air-dried tons of unbleached pulp entering the bleach plant for AOX and chloroform limits.

The Cluster Rules limits for AOX and chloroform are also production normalized (with the exception noted below). However, for the Cluster Rules limits, *product* is defined as "... the annual unbleached pulp production entering the first stage of the bleach plant divided by the number of operating days during that year." The unbleached pulp must be measured in air-dried metric tons (with ten percent moisture) of brown stock pulp entering the bleach plant at the stage in which chlorine-containing compounds are first applied to the pulp. The other pollutant limits established by the Cluster Rules (2,3,7,8-TCDD; 2,3,7,8-TCDF; and the 12 chlorinated phenolic compounds; as well as AOX and chloroform limits for mills that certify to using totally chlorine free bleaching) are expressed as pollutant concentrations (e.g., micrograms per liter and picograms per liter). Note that the limitations, expressed as less than the minimum level (<ML), are concentrations because the minimum level is a concentration.

Typically, when effluent limitation guidelines are production normalized, permit limits are expressed as pounds of pollutant per day. To calculate these limits, the permit writer uses a daily production calculated from one year's data representative of operations for the five years prior to permit issuance. In certain circumstances, however, production for the past five years is not appropriate. For example, if a mill significantly expanded its operations, production should be based on data representative of the period of increased production. When effluent limitation guidelines are expressed as concentrations, permit limits are typically expressed as concentrations as well.

7.3.5 Storm Water Permitting

The CWA requires an NPDES permit for storm water discharges associated with industrial activity. As discussed in Appendix B, EPA or state agencies (as applicable) typically issue "general" permits to authorize discharges from a group of similar facilities. Storm water discharges from some mills, however, may be covered by site-specific "individual" permits. Where EPA is the NPDES permitting authority, most mills will be covered by EPA's multi-sector general permit (MSGP) requirements. State permit requirements will vary but, in general, can be expected to include requirements comparable to the MSGP requirements. The main elements of the permit are to maintain a storm water pollution prevention (SWPP) plan and conduct certain limited monitoring (quarterly visual examinations of grab samples and, in some cases, analytical tests for particular pollutants, such as COD, TSS, and total recoverable iron).

Both the wastewater treatment plant operations and the sludge landfill/land application sites at a kraft pulp mill are potential sources of contaminated storm water. The EPA considers landfills and land application sites a separate sector within the MSGP. The EPA has listed general best management practices (BMPs) for these operations. In addition, treatment works for sewage are a separate sector for which EPA also has developed appropriate BMPs. Although this MSGP sector is not specifically applicable nor binding to industrial wastewater treatment facilities, many of these BMPs are relevant to industrial facilities. Thus, the SWPP for kraft pulp mill wastewater treatment facilities should have comparable BMPs to sewage treatment works and should cover the same basic potential sources of contaminated storm water. Figures 7-4 and 7-5 outline the BMP guidelines established by EPA for treatment works and landfills, respectively. For landfill and land application sites, the monitoring requirements in Figure 7-6 apply in addition to the basic quarterly visual monitoring requirements applicable to all sources covered by the MSGP.

Figure 7-4
General Storm Water BMPs for Treatment Works

Activity	BMPs
Preparation of Biological and Physical Treatment Process	! Use drip pans under drums and equipment where feasible ! Store process chemical inside buildings ! Inspect the storage yard for filling drip pans and other problems regularly ! Train employees on procedures for storing and inspecting chemicals
Soil Amending and Grass Fertilizing	! Use the appropriate amount of fertilizer ! Do not overfertilize ! Train employee on proper fertilizing techniques
Liquid Storage in Above-Ground Storage Containers	! Maintain good integrity of all storage containers ! Install safeguards (such as diking or berming) against accidental releases at the storage area ! Inspect storage tanks to detect potential leaks and perform preventive maintenance ! Inspect piping systems (pipes, pumps, flanges, couplings, hoses, and valves) for failures or leaks ! Train employees on proper filling and transfer procedures
Pest Control	! Minimize pesticide application -- only apply pesticide if needed ! Train employees on proper pesticide application
Sludge Drying Beds	! Ensure drying bed is draining properly (e.g., check for clogging) ! Avoid overfilling drying bed ! Grade the land to divert flow around drying bed ! Berm, dike, or curb drying bed areas ! Cover drying beds
Sludge Storage Piles	! Confine storage of sludge to a designated area as far from any receiving water body as possible ! Store sludge on an impervious surface (e.g., concrete pad) ! Grade the land to divert flow around storage piles ! Berm, dike, or curb sludge storage piles ! Cover sludge storage piles
Sludge Transfer	! Promptly remove any sludge spilled during transfer ! Conduct transfer operations over an impervious surface ! Avoid transferring sludge during rain events ! Grade the land to divert flow around transfer areas ! Berm, curb, or dike transfer areas ! Avoid locating transfer operations near receiving water bodies
Incineration -- Ash Impoundments/Piles	! Line ash impoundments with clay (or other type of impervious material) ! Ensure ash impoundments will hold maximum volume of ash and a 10-year, 24-hour rain event ! Curb, berm, or dike ash storage areas ! Avoid locating ash storage areas near receiving water bodies
Miscellaneous	! Properly dispose of grit/scum and dispose of screens on a daily basis ! Maximize vegetative cover to stabilize soil and reduce erosion

Figure 7-5
Potential Sources of Pollution and General Storm Water BMPs for Landfills

Potential Pollutant Sources	BMPs
Erosion from: ! Exposed soil from excavating cells/trenches ! Exposed stockpiles of cover materials ! Inactive cells with final cover but not yet finally stabilized ! Daily or intermediate cover placed on cells or trenches ! Erosion from haul roads (including vehicle tracking of sediments)	! Stabilize soils with temporary seeding, mulching, and geotextiles; leave vegetative filter strips along streams ! Implement structural controls such as dikes, swales, silt fences, filter berms, sediment traps and ponds, outlet protection, pipe slope drains, check dams, and terraces to convey runoff, to divert storm water flows away from areas susceptible to erosion, and to prevent sediments from entering water bodies ! Frequently inspect all stabilization and structural erosion control measures and perform all necessary maintenance and repairs ! Stabilize haul roads and entrances to landfill with gravel or stone ! Construct vegetated swales along road ! Clean wheels and body of trucks or other equipment as necessary to minimize sediment tracking (but contain any wash waters [process wastewaters]) ! Frequently inspect all stabilization and structural erosion control measures and perform all necessary maintenance and repairs
Application of fertilizers, pesticides, and herbicides	! Observe all applicable Federal, State, and local regulations when using these products ! Strictly follow recommended application rates and methods (i.e., do not apply in excess of vegetative requirements) ! Have materials such as absorbent pads easily accessible to clean up spills
Exposure of waste at open face	! Minimize the area of exposed open face as much as is practicable ! Divert flows around open face using structural measures such as dikes, berms, swales, and pipe slope drains ! Frequently inspect erosion and sedimentation controls
Waste tracking onsite and haul roads, solids transport on wheels and exterior of trucks or other equipment (common with incinerator ash)	! Clean wheels and exterior of trucks or other equipment as necessary to minimize waste tracking (but contain any wash waters [process wastewaters])
Uncontrolled leachate (commingling of leachate with runoff or runon)	! Frequently inspect leachate collection system and landfill for leachate leaks
General sources	! Maintain landfill cover and vegetation ! Maintain leachate collection system

Figure 7-6
Stormwater Monitoring Requirements for Landfill/Land Application Sites

Pollutant	Monitoring Requirements
Total Suspended Solids (TSS)	! In 2nd year of permit, conduct quarterly monitoring ! Calculate average concentration for TSS -- if > 100 mg/L, then conduct same quarterly sampling in 4th year of permit ! In 4th year of permit, conduct quarterly TSS monitoring if landfill/land application activities or SWPP plan have been altered such that the storm water discharges will be adversely affected
Total Recoverable Iron	! In 2nd year of permit coverage, conduct quarterly monitoring ! Calculate average Total Recoverable Iron concentration -- if > 1.0 mg/L, then conduct same quarterly sampling in 4th year of permit ! In 4th year of permit, conduct quarterly Total Recoverable Iron monitoring if landfill/land application activities or SWPP plan have been altered such that the storm water discharges will be adversely affected

7.4 CWA Inspection Techniques

The *NPDES Compliance Inspection Manual* (EPA 300-B-94-014) provides inspectors with the information necessary to prepare for and perform thorough compliance assessments of wastewater treatment plants at direct discharging kraft mills that must comply with NPDES permits. See Section 2.4 of this manual for a description of the various types of NPDES inspections addressed in the *NPDES Compliance Inspection Manual*. Wastewater inspections of indirect discharging kraft mills may be undertaken as part of an Approval Authority's evaluation of a POTW's pretreatment program. The Approval Authority will either be the EPA Regional Office or the State with an approved NPDES program. *Guidance for Conducting a Pretreatment Inspection* (EPA 300 R92-009) details the procedures an Approval Authority should use to conduct a Pretreatment Compliance Inspection, including procedures for reviewing Industrial User files and visits to Industrial Users.

Note that a facility is not required to comply with national effluent limitations guidelines until they are incorporated into the facility's NPDES permit. Permit requirements will be specifically tailored for each discharging facility. The inspection procedures discussed below refer to the requirements of 40 CFR Part 430. Compliance, however, must always be evaluated against a mill's permit.

NOTE! Compliance must always be evaluated against a mill's permit, because national effluent limitations guidelines are not binding until they are incorporated in an NPDES permit. Also, mills are only authorized to discharge wastewaters from operations identified in their permit application.

The purpose of this section is to provide further information specific to kraft mills that will assist:

- Inspectors in assessing kraft pulp mill compliance with NPDES permit limits applied at the mill's final effluent discharge to the receiving stream. This section generally outlines procedures consistent with conducting a Compliance Evaluation Inspection (CEI) or Compliance Sampling Inspection (CSI)
- POTWs as they assess the compliance of kraft pulp mills with pretreatment permits
- Approval Authorities when inspecting POTWs that receive wastewater from kraft pulp mills

7.4.1 Record Reviews

The elements of a comprehensive record review undertaken as part of an NPDES compliance inspection are presented in Sections 2A (Pre-Inspection Preparation) and 3A (Documentation, Recordkeeping, and Reporting Evaluation Procedures) of the *NPDES Compliance Inspection Manual*. Pre-inspection preparation includes review of facility background information, such as:

- General mill information
- Copies of all permits, regulations and restrictions placed on the mill discharge (including the NPDES permit application, "fact sheet," and other information in the NPDES permit file)
- Receiving stream water quality standards
- Mill compliance and enforcement history (including Discharge Monitoring Reports)

While on site, the inspector should review mill records to verify that the permit description of mill operations is correct, current, and complete. In addition, the inspector should:

- Verify that the mill is meeting all recordkeeping and reporting requirements
- Determine the mill status with any compliance schedules established as part of an enforcement order
- For indirect dischargers, verify that the mill is meeting POTW pretreatment requirements

Record review activities specific to kraft mills are described below.

As described in Section 4.6.2, Best Management Practices (BMPs) promulgated as part of the Cluster Rules require bleached kraft mills to monitor the influent to the wastewater treatment system for a measure of organic content such as COD or Total Organic Carbon (TOC). Alternatively, the mill may use a measure related to spent pulping liquor losses measured continuously, such as conductivity or color. The Discharge Monitoring Reports (DMRs) and reports of BMP monitoring activities must be submitted to the permitting authority annually, or more frequently if required by permit. Further, as discussed in Section 4.5, mills deciding to comply with the MACT standards for pulping

process condensates by transporting the condensates to, and treating them in, the mill's biological treatment system, have additional monitoring and recordkeeping requirements.

Prior to the inspection, the inspector should review the following to focus the on-site phase of the inspection:

Permit review. Review permit(s) applicable to the effluent discharges, the permit application and fact sheet. In addition, the inspector may want to review air emission permits to determine if the mill chose to comply with MACT standards for pulp mill condensates by using the mill biological treatment system. If so, a multi-media screening inspection opportunity exists for the water inspector. The water inspector can review the MACT requirements for monitoring the treatment system and all available monitoring reports. See Section 4.5.3 for a discussion of inspection procedures for determining compliance with the MACT standards for pulping condensates.

DMR review. The inspector should review DMRs submitted since the last inspection to determine whether there has been a violation of permit limits and to identify any excursions from typical performance that may not have been violations. If problems are indicated, they should be discussed during the on-site inspection. Events occurring at the mill and in the treatment plant at the time of the excursions should be reviewed with mill operators to determine both the cause of the problem and the corrective action taken by the mill.

Identify black liquor spills. Black liquor (spent pulping liquor) spills may upset the operation of the wastewater treatment plant. Indications of such a spill may be initially detected during DMR review, as described above. If the inspector identifies any excursions from typical treatment system performance, during the on-site inspection the inspector should:

- Review records of the influent flow and pollutant load (COD, TOC, conductivity, or color) that the mill is required to maintain in accordance with the Cluster Rules' BMP requirements. If BMP action levels were exceeded, did the mill undertake the required corrective actions?
- Review operator logs to determine if spills were recorded
- Interview operators (detailed in Section 7.4.2)
- Verify that the mill prepared a report of all spills and intentional diversions not contained at the immediate process area
- Review spill record reports required by BMPs
- Consider forwarding the information to an EPCRA inspector for follow-up on emergency notification requirements

Determine if MACT standards were met. If a mill has chosen to comply with MACT standards for pulp mill condensates by transporting the condensates to, and treating them in, the mill biological treatment system, treatment system upsets may result in exceedances of MACT standards. If the inspector identifies any excursions from typical

treatment system performance, the inspector should assess compliance with the applicable MACT standards or forward the concern to the air inspector for follow-up (see Section 4.5.3).

7.4.2 Physical Inspection of Wastewater Treatment Plants (Mill Site Review)

The elements of a comprehensive facility site review undertaken as part of an NPDES compliance inspection are presented in Section 4 (Facility Site Review) of the *NPDES Compliance Inspection Manual*. Site review includes a physical inspection of the wastewater treatment plant, as well as an evaluation of operation and maintenance procedures and practices. The inspector should visually examine:

- Wastewater treatment plant influent characteristics
- Process controls
- All components of the wastewater treatment plant, including supply of treatment chemicals and sludge handling equipment
- Equipment condition
- Safety controls and equipment
- Effluent characteristics
- Flow measurement devices

The inspector should also interview treatment plant operators and maintenance staff. Topics discussed should include:

- Policies and procedures
- Organization
- Staffing and training
- Planning and scheduling
- Record systems
- Spare parts and treatment chemical inventory controls
- Stand-by equipment

During these interviews, the inspector should determine if there have been any production changes that were not anticipated when the permit was issued.

Facility site review issues specific to kraft mills are discussed below.

Interview wastewater treatment plant personnel. Inspectors should interview wastewater treatment plant operators and staff to determine:

- How personnel in the pulping area report imminent upsets or discharges of highly contaminated wastewater (i.e., shock loads) to wastewater treatment personnel
- How wastewater treatment plant personnel respond to spills in the process area
- If there have been mill upsets that affected wastewater treatment plant operations (that may not have been identified during record review)

- How any spills or intentional diversions of process materials (pulp, black liquor, soap, turpentine, lime mud, or other materials) were accommodated by wastewater treatment
- Number and level of certified operators

Remember, even though permit limits have not been exceeded, the failure to *document* a spill not contained in the immediate process area constitutes a violation of the spent liquor, soap and turpentine BMP requirements discussed in Section 4.6. In addition, exceedances of influent monitoring action levels established as part of the BMP Plan do not constitute permit violations; however, failure to *investigate* and *correct* exceedances are violations.

Examine wastewater treatment plant equipment. In addition to evaluating the final effluent monitoring equipment, inspectors should examine the equipment used to monitor the influent to the wastewater treatment plant, as required by BMPs. For direct dischargers, monitoring must be conducted at the point influent enters the wastewater treatment system. For indirect dischargers, monitoring must be conducted at the point of discharge to the POTW. Mills may select alternate monitoring locations in order to isolate possible sources of black liquor, soap, or turpentine from other streams routed to treatment, such as non-contact cooling water. Inspectors should review the mill's BMP plan to identify these locations. Inspectors should examine the monitoring equipment to ensure that it is operational and in the specified (and appropriate) location. Inspectors should also determine how the equipment is calibrated and at what frequency.

7.4.3 Flow Monitoring Evaluations

The elements of flow monitoring evaluations undertaken as part of an NPDES compliance inspection are presented in Section 4B (Physical Inspection of the Facility) and Section 6 (Flow Measurement) of the *NPDES Compliance Inspection Manual*. Flow monitoring evaluations include a review of the general conditions of those flow measurement devices necessary for compliance with NPDES permit conditions, such as:

- Surcharging of influent lines, overflow weirs and other structures
- Flowthrough bypass channels
- Overflows at alternative discharge points
- Flow from unknown source or origin

NPDES permits require accurate determination of the quantity of wastewater discharged. Thus, accuracy of the flow measurement must be determined by the inspector. The inspector should verify that:

- Facility-installed flow devices are properly installed
- Corrosion and solids accumulation are not interfering with the operation of the flow measurement device

- The flow measurement system measures the entire wastewater discharge, is installed at an appropriate site, and meets all permit requirements
- Flow measurement devices are properly calibrated at an appropriate frequency
- Calculations made using primary measurements are correct and accurate

The inspector also should review historical records for evidence of continuous flow measurement, evaluate the mill's data handling and reporting (including quality control procedures), and collect accurate flow data during the inspection to validate the mill's monitoring data. There are no flow measurement issues unique to kraft pulp mill wastewater treatment plants.

7.4.4 Sampling Evaluations

The elements of sampling evaluations undertaken as part of an NPDES compliance inspection are presented in Section 5 (Sampling) of the *NPDES Compliance Inspection Manual*. During a sampling evaluation the inspector should assess the mill's sampling program to verify:

- That the program complies with the mill's permit and with 40 CFR Part 136
- Sample preservation and handling (including holding times prior to analysis) conform to 40 CFR Part 136
- That the mill has reported accurate data in discharge monitoring reports

The inspector may also collect samples of mill effluent to verify compliance with daily maximum effluent limitations. The *NPDES Compliance Inspection Manual* provides extensive detail about proper sample collection techniques, sample identification methods, sample preservation and holding time, transfer of custody and sample shipment, quality control, and data handling and reporting. Sampling evaluation activities specific to kraft mills are described below.

All kraft mills will have final effluent limits on the discharge of BOD_5 and TSS, as well as on pH. Bleached papergrade kraft mills will also have limits on the discharge of AOX. Inspectors should verify that the mill follows the method-specified sampling procedures, summarized in Figure 7-7 (see 40 CFR Part 136 for more detail). Note that each mill is required to analyze for all pollutants specified in its permit and to follow any permit-specified sampling procedures.

Figure 7-7
Sampling Procedures for BOD_5, TSS, pH and AOX

Pollutant	Container	Preservation	Maximum Holding Time
BOD_5	Plastic or glass	Cool, 4 °C	48 hrs
TSS	Plastic or glass	None	7 days
pH	Plastic or glass	None, analyze immediately	Continuously monitor or analyze immediately
AOX	Amber glass bottle with Teflon®-lined lid	$Na_2S_2O_3$ to remove free chlorine, HNO_3 to pH 2-3, Cool 4 °C	6 months*

* Sample must be analyzed no less than 3 days after collection.

7.4.5 Laboratory/QA Evaluations

The elements of laboratory and QA evaluations undertaken as part of an NPDES compliance inspection are presented in Section 7 (Laboratory Procedures and Quality Assurance) of the *NPDES Compliance Inspection Manual*. For laboratories operated by the mill, the inspector should evaluate:

- Facilities and equipment
- Precision and accuracy
- Data handling and reporting
- Personnel qualifications and training

Laboratory performance is also evaluated by the DMR QA program, in which participating laboratories analyze performance evaluation samples containing constituents normally found in industrial and municipal wastewaters.

At kraft mills, on-site analyses for BOD_5 and TSS are common due to the short holding time allowed prior to analysis. In contrast, many mills will contract laboratories to perform AOX analysis because of its long holding time and because it requires complex procedures and equipment.

Whether the analyses are performed on site or at contract laboratories, all pollutants must be analyzed using the analytical method specified in 40 CFR Part 136. Note that the analytical methods for AOX, TCDD, TCDF, and chlorine phenolics were

recently promulgated and will appear in a future revision to 40 CFR Part 136. Figure 7-8 lists the analytical methods that must be used for each pollutant sampled at the wastewater treatment plant. The methods for pollutants sampled at a bleach plant effluent location are listed in Section 6 (Figure 6-14).

Figure 7-8
Analytical Methods

Pollutant	Method
AOX	1650
BOD_5	405.1
TSS	160.2
pH	150.1

7.4.6 Special Considerations for Kraft Pulp Mill Wastewater Treatment Plants

Inspectors should be aware of three potential special considerations for kraft mill wastewater treatment plants:

- Non-continuous discharge of wastewater
- Co-treatment of municipal wastewater
- Foam restrictions of treated wastewater

Non-continuous dischargers. A mill is a non-continuous discharger if, for reasons other than treatment plant upset control (e.g., to protect receiving water quality), the mill is prohibited by the NPDES authority from discharging pollutants during specific periods of time or is required to release its discharge on a variable flow or pollutant loading rate basis. However, one-day maximum limitations and thirty-day average limitations were developed for *continuous* dischargers. Because non-continuous dischargers release higher flows than continuous dischargers during their limited discharge periods, they will release greater daily pollutant loads than continuous dischargers. These high daily pollutant loads, however, may not reflect the pollutant control actually achieved by non-continuous dischargers on an annual basis. To allow for such circumstances, EPA established annual average discharge limitations for non-continuous dischargers.

Regulations promulgated prior to the Cluster Rules that are still in effect require that the NPDES authority establish alternative maximum day and average of thirty consecutive days effluent limitations for non-continuous dischargers, in addition to applying the mass-based annual average limitations. These alternative daily and monthly limitations must be concentrations that reflect the performance of BPT, BCT, or NSPS wastewater treatment, as appropriate. See 40 CFR 430.01(k)(1).

In the new effluent limitations guidelines promulgated by EPA as part of the Cluster Rules, EPA did not require the NPDES authority to include maximum one-day and thirty-day average concentration limitations for non-continuous dischargers. Instead, EPA will defer to the NPDES authority to establish maximum day and maximum thirty-day average limitations that are necessary to protect receiving water quality.

Figure 7-9 shows a summary of permit specifications for bleached and unbleached kraft mills. Inspectors should review mill permits to determine whether the limits specified are accurate.

Figure 7-9
Summary of Permit Specifications for Non-Continuous Dischargers

Limitations *Required* for Non-continuous Dischargers		
Applicable Limitations	**Bleached Papergrade Kraft and Soda (Subpart B)**	**Unbleached Kraft (Subpart C)**
Annual average	✓	✓
One-day maximum concentration, reflective of BPT or NSPS	If determined by permitting authority to be necessary to protect receiving water quality	✓
30-day average concentration, reflective of BPT or NSPS	If determined by permitting authority to be necessary to protect receiving water quality	✓

Co-treatment of municipal wastewater. Some mills operate wastewater treatment plants that receive and treat municipal waste. These mills operate wastewater treatment plants with sufficient capacity to accommodate the municipal wastewater from surrounding communities. Mills that treat municipal wastewater may chlorinate this stream before it is mixed with pulp mill wastewater. These mills may be subject to standards and monitoring requirements typical of sanitary wastewater treatment plants, especially those for total and fecal coliform. Inspectors should review monitoring records to determine whether these mills are in compliance with permit limits.

Foam restrictions. Treated wastewaters from some mills experience excessive foaming. Although foam is not regulated nationally, some state or regional authorities may require mills to control wastewater foam for aesthetic purposes. Inspectors should review any permit requirements and verify whether mills meet the applicable requirements.

7.4.7 Storm Water Inspection Considerations

To evaluate compliance with storm water permit requirements, the inspector should:

- Conduct a records review to assure that the SWPP plan is up-to-date and includes all required elements, and to assure that the mill has performed all of the required self-monitoring and self-inspection procedures
- Review required monitoring and inspection data -- if the data indicate potential problems with storm water contamination, determine what, if any, corrective actions were taken by the mill in response to the data
- Observe control and prevention measures to evaluate whether good operation and maintenance practices are being used

The inspector should review Section 9 for further discussion of these basic storm water inspection steps. The inspector should also consider the following procedures to evaluate compliance with potential storm water contamination problems specifically relevant to wastewater treatment plant operations:

- Review the SWPP plan to document that runon/runoff from the wastewater treatment plant area is addressed
- Evaluate the quarterly visual inspection records to determine if any concerns are noted -- if so, document that appropriate corrective actions were taken
- Determine what BMPs are used to eliminate/reduce discharges from wastewater treatment plant areas
- Visually observe BMP implementation to check for excessive wear or damage to containment mechanisms and for evidence of poor material handling (evidence of spills, leaks, uncovered raw materials, etc.)

7.5 RCRA Issues

Kraft mills do not generate significant quantities of hazardous wastes. As part of a consent decree, EPA considered making a determination of whether it was appropriate to list bleached kraft mill wastewater treatment sludges as hazardous wastes because wastewater treatment sludge generated at bleached papergrade kraft mills may contain dioxin and furan if these pollutants contaminate wastewaters at these mills. Because the Cluster Rules effluent limitations guidelines and standards are based on bleaching technologies that substantially reduce the use of chlorine-containing compounds, EPA has determined that the dioxin and furan content of wastewater treatment sludges will also be substantially reduced, and no listing determination is required.[5] If the sludges at a particular mill exhibit a hazardous waste characteristic, the sludges would be hazardous wastes even without an EPA listing determination.

7.6 EPCRA Issues and Inspection Considerations

NOTE! See Appendix D for detailed overview of EPCRA regulations and basic assessment procedures.

General concerns. The basic regulatory requirements for EPCRA are not process-specific but rather apply on a facility-wide basis. Thus the basic requirements of EPCRA are discussed in Appendix D. For wastewater treatment plant operations, the key EPCRA issues will be to quantify air, water and land releases in the annual Toxic Release Inventory (TRI) report (known as the "Form R" report). In addition, wastewater treatment plant upsets could result in water discharges that exceed applicable reportable quantities that would require emergency notification under EPCRA and parallel provisions of CERCLA.

Inspection considerations. Generally, the EPCRA compliance assessment will focus initially on a records review. The inspector should review the following materials:

- *Emergency preparedness information*. These obligations are not process-specific, and thus the basic assessment considerations are covered for all facility operations in Appendix D to this manual.

- *TRI Form R*. Check to ensure that the form is on file and that the mill has adequately considered releases associated with the wastewater treatment plant operations, including but not limited to, the water discharges and air releases of volatile compounds such as methanol. Also, ask to see the estimation technique being used. If the estimation technique involves an assumed reduction efficiency for control methods, make sure that the assumed efficiency is consistent with the overall efficiency that the mill is achieving. The overall assumed efficiency should account for any excess releases that occur as a result of treatment upsets in a manner consistent with the actual percent of operating time such releases occur. Uncontrolled discharge episodes or periods of reduced control efficiency can have a significant impact on the estimate of total releases.

- *Emergency notifications*. Request documentation that the mill has filed all required notices.

If a water inspector plans to screen for EPCRA compliance, the inspector should confirm the necessary information with the facility contact during the opening conference or just in advance of the closing conference. For an announced inspection, the inspector should ask the source to have ready EPCRA-related documentation so that this screening check can be performed without interrupting the main focus of the inspection. A screening checklist is included as part of the example assessment form in Appendix E.

In addition to a screening-type records review inspection, an EPCRA inspector may want to conduct further assessments to identify potential compliance concerns with emergency notification requirements. As one technique, the inspector first can check

wastewater treatment plant upset reports and citizen complaints since the previous inspection. The inspector then should cross-check those incidents with notification records identified in EPA's ERNS database, records on file with state/local emergency officials, or records requested from the mill. If this type of investigation identifies episodes of abnormal discharges in which no notification was provided, the inspector should consider a follow-up investigation to determine if reportable quantity thresholds were exceeded.

References:

1. *Proposed Technical Development Document for the Pulp, Paper and Paperboard Category and Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards.* U.S. Environmental Protection Agency, Washington, D.C., October 1993.

2. *Supplemental Technical Development Document for Effluent Limitations Guidelines and Standards for the Pulp, Paper, and Paperboard Category Subpart B (Bleached Papergrade Kraft and Soda) and Subpart E (Papergrade Sulfite)*, U.S. Environmental Protection Agency, Document Control Number 14487, October 15, 1997.

3. *Data Available for Limitations Development for Toxics and Nonconventional Pollutants*, U.S. Environmental Protection Agency, November 12, 1997.

4. *Final Analysis of Data Available for Development of COD Limitations*, Eastern Research Group, prepared for U.S. Environmental Protection Agency, August, 25, 1997.

5. U.S. Environmental Protection Agency, Letter of December 12, 1997, to K. Florini (Environmental Defense Fund) and D. Lenett re Pulp and Paper Mill Sludge under EDF v. Browner, Civ. No. 89-0598 (D.D.C.)

6. Memorandum of Understanding between the American Forest & Paper Association and the U.S. Environmental Protection Agency, Regarding the Implementation of Land Application Agreements Among AF&PA Member Pulp and Paper Mills and the U.S. Environmental Protection Agency (executed April 14, 1994).

This page intentionally left blank

SECTION 8: ASSESSMENT MODULE FOR POWER BOILER OPERATIONS

CONTENTS

8.1 Introduction
8.2 Overview of Process and Discharges
8.3 Air Issues and Inspection Techniques
8.4 Water Issues and Inspection Considerations
8.5 RCRA Issues and Inspection Considerations
8.6 EPCRA Issues and Inspection Considerations

8.1 Introduction

This section addresses the power boilers commonly used at kraft pulp mills. The regulations that will apply are not unique to kraft pulp mills and affect power boilers used in various manufacturing processes. Thus, this section generally provides only an abbreviated overview of this process area, the regulatory requirements that apply, and recommended assessment procedures. Where appropriate, specific issues relevant to kraft mills are discussed. In addition, Appendix E contains an example assessment form specifically designed to address the issues raised in this process area.

8.2 Overview of Process and Discharges

8.2.1 Description of the Process

Energy generation to meet electric and steam needs at kraft pulp mills is provided in part by the recovery boiler; industry information indicates that approximately 40 percent of on-site power needs typically will be met by recovery boiler operations. The remaining generation needs are made up of power boilers burning various fuels. Increasingly, mills are relying on waste wood, wood chips and bark (so-called "hogged fuel"), as well as other materials such as tire-derived fuel, as fuel sources. For wood-fired boilers, a traveling-grate type boiler, where hogged fuel is mass-fed onto a traveling grate, would be a typical boiler type.[1,2] However, coal, fuel oil and natural gas all remain significant fuel types for on-site power boilers. For coal-fired boilers, either spreader stoker or pulverized coal boilers may be used at some mills, and both types of boilers are addressed in this section.

8.2.2 Air Pollutant Emissions

The major emissions of regulatory concern from power boilers are particulate matter, SO_2 and NO_x. The quantity of each pollutant produced is a function of the fuel characteristics, the firing method, and the combustion characteristics for each boiler. In general, kraft mill power boilers currently do not use add-on control equipment for the

control of SO_2 or NO_x. Most mills will limit the sulfur in the fuel they burn to meet state sulfur-in-fuel limits, and more modern boilers may have some form of low NO_x burner or other combustion control design features that act to limit NO_x emissions. Generally, only coal- and hogged fuel/bark-fired boilers use particulate matter add-on control devices. Multicyclones, scrubbers, ESPs, and fabric filters are the most commonly used devices for the control of particulate emissions from coal-fired boilers. Particulate emissions from hogged fuel/bark-fired boilers are generally controlled by mechanical collectors, scrubbers and, more recently, ESPs. Section 8.3 provides an overview of the regulations that apply to these emissions and basic inspection techniques for power boiler air emissions.

8.2.3 Water Pollutant Discharges

In 1989, 5 to 15 percent of the flow discharged to the wastewater treatment plant originated in power operations at kraft mills.[4] This wastewater may include non-contact cooling water, air pollution control blowdown (e.g., scrubber blowdown), and boiler blowdown. Boiler blowdown water may contain small amounts of materials such as:

- Soluble inorganic salts (chlorides, sulfates)
- Precipitated solids containing calcium and magnesium salts
- Corrosion products (both soluble and insoluble)

In addition, the wastewater may contain parts per million concentrations (mg/liter) of conditioning chemicals, such as inorganic phosphates, sodium hydroxide, and ethylenediamine tetraacetic acid (EDTA) (a chelating agent). Sodium sulfite or hydrazine may be added to control corrosive gases, most commonly dissolved oxygen and carbon dioxide. Ammonia, morpholine, or cyclohexane may be added to adjust pH. In addition, various starches and other organic materials may be added to retard solids deposition.[5] These water discharges from the power boilers are sent to the wastewater treatment plant for treatment prior to discharge. See Section 7 for a discussion of regulatory and inspection issues for the wastewater treatment plant.

In addition, storm water associated with power boiler operations and potential releases of oil to receiving waters (if applicable based on the types of boilers used at a mill) are two areas that are subject to regulation and may involve compliance issues at some mills. Section 8.4 provides an overview of the CWA requirements that may apply for both storm water and oil handling.

8.2.4 Solid/Hazardous Waste Discharges

Bottom and fly ash are the primary solid wastes generated by power boiler operations. This material is usually landfilled, although ash in some situations may be either reused as an additive for various products or spread over agricultural or forest lands. Section 8.5 briefly discusses RCRA issues and inspection procedures for the power boiler process area.

8.2.5 EPCRA Chemicals and Reportable Releases

Facilities will have to provide information on chemicals used in the power boiler area to meet EPCRA's emergency preparedness requirements. Appendix D contains a process-based list of the types of hazardous chemicals that may be included in an EPCRA inventory for a kraft pulp mill. On-site air, water and land releases, including land disposals, of toxic chemicals from the power boiler area and off-site transfers of waste containing these toxic chemicals may have to be accounted for in TRI Form R reports. TRI toxic chemicals may be found in fly and bottom ash -- especially for coal or oil-fired boilers. In addition, EPCRA/CERCLA emergency release reporting could apply for off-site releases that are not federally permitted and that exceed a certain reportable quantity (RQ). A primary example of this type of release from power boiler operations would involve air emissions of SO_2 or NO_2 that are not federally permitted releases and exceed the applicable daily RQ (500 pounds for SO_2 and 10 pounds for NO_2). These EPCRA issues are discussed in Section 8.6.

8.3 Air Issues and Inspection Techniques

8.3.1 Air Regulations

Basic emission limits. Fossil fuel-fired combustion sources are perhaps one of the most heavily regulated source categories for air pollution. For federal standards, NSPS subparts D, Db and Dc could all potentially apply to power boilers at a kraft pulp mill. In addition, some plants potentially could use gas fired turbines that could be subject to NSPS subpart GG. Figures 8-1 through 8-7 summarize these NSPS subparts.

Special NSPS Considerations for Wood-fired Boilers

- **Subject to Subpart D only if also combust fossil fuels -- if so, subject to PM, SO_2 and NO_x limits**
- **Subject to Subpart Db and Dc PM limits**
- **Under Subpart Db and Dc, subtract out wood fuel usage in determining compliance with SO_2 limits for fossil fuels**
- **Under Subpart Db, subject to NO_x limit only if also combust fossil fuels**

State SIP regulations also generally will include standards for at least particulate matter and SO_2 from pre-NSPS combustion sources. Although these limits may be expressed similarly to the NSPS (such as grains per dry standard cubic foot (gr/dscf) or lb/mmBtu for particulate matter, or lb/mmBtu for SO_2), many States will express particulate matter limits in the form of process weight regulations and SO_2 limits as sulfur-in-fuel limits. Recent requirements designed to limit NO_x emissions as part of ozone attainment strategies may also apply to the mill's power boilers. Because States have a number of regulations that may apply, this summary does not address these regulations in any further detail.

Figure 8-1
Particulate Matter, Sulfur Dioxide and Nitrogen Oxides Requirements for Fossil Fuel Fired Steam Generators (NSPS Subpart D)

Regulatory Area	Requirements
Applicability	Fossil fuel and fossil fuel/wood residue-fired steam generating units for which construction or modification is commenced after August 17, 1971, and that have a heat input capacity >73 MW (250 mmBtu/hr). Fossil fuel use must be ≥10 percent.
Emission Standard/ Avg. Time*	! PM: - 0.10 lb/mmBtu/3-hr. avg. - 20% opacity, except for one 6-min. period per hr. of 27% opacity/6-min. avg. ! SO_2: 0.80-1.2 lb/mmBtu depending on fuel fired/3-hr. avg. ! NO_x: 0.20-0.80 lb/mmBtu depending on fuel fired/3-hr. avg. ! Note: SO_2 standard inapplicable to gaseous fossil fuel-fired units
Monitoring	
System/ Procedure	! PM: Opacity CEMS, except not required if only gaseous fossil fuel burned ! SO_2: CEMS, except not required if only gaseous fossil fuel burned or if no control device used and SO_2 monitored by fuel sampling and analysis ! NO_x: CEMS, except if test shows emissions <70% of emission limit
Exceedance Level	! Opacity CEMS: Any 6-min. period of avg. opacity > opacity limit ! CEMS: Any 3-hr. period of avg. SO_2 or NO_x emissions > emission limit
Reporting and Recordkeeping	! Quarterly excess emission reports (EERs); semiannual reporting if history of no exceedances ! Other general NSPS reporting and recordkeeping requirements apply

Figure 8-2
Particulate Matter Requirements for Industrial-Commercial-Institutional Steam Generating Units (NSPS Subpart Db)

Regulatory Area	Requirements
Applicability	! Steam generating units for which construction, modification, or reconstruction is commenced after June 19, 1984, with a heat input capacity >29 MW (100 mmBtu/hr), except for certain new/modified oil-fired units prior to June 19, 1986, and units meeting Subpart Da requirements:
Emission Standard/ Avg. Time*	! If use coal, oil, wood, or municipal-type solid waste (alone or in combination with other fuels), PM less than 0.05 lb/mmBtu to 0.20 lb/mmBtu heat input, depending on fuel type/6-hr. avg. ! If use coal, oil, or wood (alone or in combination with any other fuels), 20% opacity, except for one 6-min. period per hr. of 27% opacity/6-min. avg.
Monitoring	
System/ Procedure	! Opacity CEMS (if subject to opacity standard)
Exceedance Level	! Any 6-min. period in which opacity > opacity standard
Reporting and Recordkeeping	! Opacity EER's quarterly, with semiannual report if no exceedances ! Records of amounts of each fuel combusted, with recorded calculation of annual capacity factors maintained on a quarterly basis ! Other general NSPS requirements apply

* Averaging time based on minimum sampling time of performance test if not stated explicitly in standard.

Figure 8-3
Sulfur Dioxide Requirements for Industrial-Commercial-Institutional Steam Generating Units (NSPS Subpart Db)

Regulatory Area	Requirements
Applicability	! Steam generating units for which construction, modification, or reconstruction is commenced after June 19, 1984, and that have a heat input capacity >29 MW (100 mmBtu/hr), except for: - Certain coal and oil-fired affected units for which construction, modification, or reconstruction is commenced on or before June 19, 1986 - Units also meeting the applicability requirements under Subpart J - Units also meeting the applicability requirements under Subpart E - Steam generating units meeting the applicability requirements under Subpart Da
Emission Standard/ Avg. Time	! Various standards expressed in lb of SO_2/mmBtu heat input, depending on fuel type/30-day rolling avg. with limited exception for certain units burning only very low sulfur oil ! Various percent reduction requirements, depending on fuel type/30-day rolling average ! Percent reduction not applicable to facilities: - With annual capacity factor for coal and oil ≤30% - In noncontinental areas - Using a duct burner where ≥70% heat input from exhaust gases entering the duct burner - Burning very low sulfur oil
Monitoring	
System/ Procedure	! Inlet/outlet SO_2 CEMS with diluent (used as performance test method), subject to following alternatives: - For inlet CEMS, fuel sampling and analysis in "as fired" condition using Reference Method (RM) 19 - For inlet or outlet CEMS, daily RM 6B testing - If burning only very low sulfur oil, may use fuel supplier certification instead of any CEMS
Exceedance Level	! Any 30-day rolling avg. in which SO_2 is > applicable standard(s)
Reporting and Recordkeeping	! Quarterly reports of emissions and monitor performance data, and capacity factors for fuels used ! If fuel pretreatment used, signed statement with quarterly report indicating removal efficiency achieved and documenting proper procedures ! If demonstrating compliance for units using only very low sulfur oil by obtaining fuel supplier certifications, quarterly certification that only such fuel was used ! Records of amounts of each fuel combusted, with recorded calculation of annual capacity factors maintained on a quarterly basis ! Other general NSPS requirements apply

Figure 8-4
Nitrogen Oxides Requirements for Industrial-Commercial-Institutional Steam Generating Units (NSPS Subpart Db)

Regulatory Area	Requirements
Applicability	! Steam generating units for which construction, modification, or reconstruction is commenced after June 19, 1984, and that have a heat input capacity >29 MW (100 mmBtu/hr), except for steam generating units subject to the applicability requirements under Subpart Da
Emission Standard/ Avg. Time	! Various NO_x (expressed as NO_2) emission limits expressed in lb/mmBtu heat input, depending on fuel type/30-day rolling avg. ! 24-hr. avg. (initial performance test), 3-hr. avg. (other performance tests) for units with federally-enforceable low capacity factors and low nitrogen fuels ! Exemption from NO_x emission standard: Units with heat input capacity ≤73 MW (250 mmBtu/hr) **and** federally-enforceable low capacity factors/low nitrogen fuels
Monitoring	
System/ Procedure	! NO_x CEMS (used as performance test method), except not required for: - Duct burners used in a combined cycle system (use RM 20) - Low capacity factor/low nitrogen fuel facilities that are either subject to the 24-hr./3-hr. emission standards or are exempt from the NO_x emission standards (use RM 7 or RM 7 alternates) ! Facilities using low nitrogen fuels, but with capacity factors >10%, can use NO_x CEMS or EPA-approved predictive approach (used as performance test method for initial and "upon request" 30-day tests only)
Exceedance Level	! Any 30-day rolling avg. in which NO_x CEMS data (or calculated NO_x rate from operating conditions) > applicable emission standard
Reporting and Recordkeeping	! For facilities subject to continuous NO_x monitoring requirements, quarterly reports on emissions/monitor performance data; semiannual reporting if no exceedances in limited circumstances ! For facilities with federally-enforceable low capacity factors (≤10%) and low nitrogen fuels, quarterly reports on: annual capacity factor, average fuel nitrogen content if residual oil fired, and, if applicable, performance test results, hours of operation, and number of hours since last performance test ! Plan for monitoring operating conditions, if applicable ! Records of amounts of each fuel combusted, with recorded calculation of annual capacity factors maintained on a quarterly basis ! For residual-oil fired facilities that have federally-enforceable low capacity factors (≤10%) and low nitrogen fuels, or that have heat input capacity ≤73 MW and use low nitrogen fuel: records of nitrogen content of residual oil combusted, with calculated quarterly average ! For facilities with federally-enforceable low capacity factors (≤10%) and low nitrogen fuels, record for each operating day: calendar date, hours of operation, and hourly steam load ! Other general NSPS requirements apply

Figure 8-5
Particulate Matter Requirements for Small Industrial-Commercial-Institutional Steam Generating Units (NSPS Subpart Dc)

Regulatory Area	Requirements
Applicability	! Steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989, and that has a maximum design heat input capacity of ≥2.9 MW (10 mmBtu/hr) but ≤29 MW (100 mmBtu/hr)
Emission Standard/ Avg. Time	! PM less than various levels of lb/mmBtu heat input for facilities with heat input capacity ≥8.7 MW, and combusting coal or wood (either alone or in combination with other fuels)/6-hr. avg. ! 20% opacity for facilities with heat input capacity ≥8.7 MW and combusting coal, wood or oil, with allowance for one 6-min. period per hr. of up to 27% opacity/6-min. avg.
Monitoring	
System/ Procedure	! Opacity CEMS if combust coal, wood or residual oil either alone or in combination with other fuels
Exceedance Level	! Any 6-min. period in which opacity > opacity standard
Reporting and Recordkeeping	! Quarterly EERs, except semiannual report if no excess emissions ! All performance test data ! Amounts of each fuel combusted during each day ! Other general NSPS requirements apply

* Averaging time based on minimum sampling time of performance test if not stated explicitly in standard.

Figure 8-6
Sulfur Dioxide Requirements for Small Industrial-Commercial-Institutional Steam Generating Units (NSPS Subpart Dc)

Regulatory Area	Requirements
Applicability	! Steam generating units for which construction, modification, or reconstruction is commenced after June 9, 1989, and that have a maximum design heat input capacity ≥2.9 MW (10 mmBtu/hr) but ≤29 MW (100 mmBtu/hr)
Emission Standard/ Avg. Time	! General SO_2 standard is both: - Various levels of lb/mmBtu heat input, depending on fuel type/30-day rolling avg., unless supplier certification applicable - Various levels of % reduction, depending on fuel type/30-day rolling avg., unless supplier certification applicable ! % reduction standards do not apply to certain facilities fired with coal (alone or in combination with other fuels) that meet specified criteria ! For oil-fired facilities, unless fuel supplier certification applies, standard is either: - 0.50 lb/mmBtu/30-day rolling avg. - 0.5 weight % sulfur in fuel/30-day rolling avg.
Monitoring	
System/ Procedure	! Monitoring procedures used as compliance determination method in all cases ! Inlet/outlet SO_2/diluent CEMS, except outlet only if no % reduction applies ! Daily as-fired fuel sampling and analysis (FSA) or Reference Method (RM) 6B are alternatives to SO_2 CEMS in specified situations ! For FSA of oil, measurements on tank filling basis -- not daily -- allowed ! Fuel supplier certifications of sulfur content alternative to CEMS for: - Distillate oil-fired affected facilities - Residual oil/coal-fired facilities with heat input capacities between 2.9 and 8.7 MW
Exceedance Level	! Any 30-day rolling avg. in which data shows failure to achieve compliance
Reporting and Recordkeeping	! Quarterly reports of all emissions/monitor performance data, except semiannual reporting if maintain a history of no exceedances ! For fuel supplier certifications, quarterly report includes: - Certification that records submitted account for all fuel combusted - All certification records ! All performance test data ! Maintain records of amounts of each fuel combusted during each day, and fuel supplier certification that include, for residual oil or coal, name of supplier, sampling location, sampling method, and sulfur analysis results; for distillate oil, certification includes only the name of the supplier and a statement that the oil supplied meets distillate oil specifications ! Other general NSPS requirements apply

Figure 8-7
Sulfur Dioxide and Nitrogen Oxides Requirements for Gas-fired Turbines (NSPS Subpart GG)

Regulatory Area	Requirements
Emissions Unit(s)	! Stationary gas turbine units for which construction, modification, or reconstruction commenced after October 3, 1977, and that has a heat input at peak load ≥10 mmBtu/hr, based on lower heating value of fuel fired
Emission Standard/ Avg. Time	! SO_2: Either achieve a limit of ≤ 0.015% by volume at 15% O_2 (dry basis), or use fuel with ≤ 0.8% sulfur by weight ! NO_x: Achieve a limit established by equations included in the standard, expressed on a % by volume basis at 15% O_2 (dry basis) [see § 60.332(a)-(l) for actual values and exceptions]
Monitoring	
System/ Procedure	! SO_2: Monitor sulfur content of fuel fired (used for direct compliance with % sulfur standard) ! NO_x: Continuous monitoring of fuel consumption and ratio of water to fuel being fired for units using water injection, and monitor nitrogen content of fuel being fired
Exceedance Level	! Daily period in which sulfur content of fuel fired >0.8% ! Any 1-hr period in which avg. water-to-fuel ratio data < baseline ! Any period in which nitrogen content > allowance used in baseline performance test
Reporting and Recordkeeping	! For NO_x, semiannual EER (for parameter exceedances) that also include avg. water-to-fuel ratio, avg. fuel consumption, ambient conditions, gas turbine load, and nitrogen content of fuel during exceedance periods, plus graphs or figures developed during performance test ! Other general NSPS provisions apply

Asbestos NESHAP. In addition to the basic emission limits applicable to the power boilers, a number of mills may have asbestos-containing material (ACM) used to insulate steam pipes or used for similar purposes in the power boiler process area. Any demolition or renovation activity that involves removing or disturbing asbestos-containing material may be subject to the requirements in 40 CFR Part 61, Subpart M. Generally, Subpart M requires prior notice of demolition/renovation activity that will disturb a certain amount of asbestos and requires compliance with a number of work practice and waste disposal requirements. Figure 8-8 provides a brief overview of these requirements.

Figure 8-8
Asbestos Demolition and Renovation (D&R) Requirements
(NESHAP 40 CFR Part 61, Subpart M)

Regulatory Area	Requirements
Applicability	! Covers regulated ACM (RACM) only: friable asbestos, certain "Category I" nonfriable material with >1% asbestos that has become friable, or other "Category II" nonfriable material with >1% asbestos that likely will be crumbled/pulverized or be reduced to powder as a result of the D&R activity [see 40 CFR 61.141 for all definitions] ! For pipes, the D&R activity must affect ≥80 linear meters (260 linear feet) ! For other facility components, the threshold is ≥15 square meters (160 square feet) ! For planned renovations, consider all planned activities for the calendar year in determining total amount of RACM that will be disturbed ! A number of exceptions and alternatives also apply [see 40 CFR 61.145(a)]
Notice Requirements	! General rule is written notice ≥10 working days prior to the removal activity begins (i.e., any activity that could disturb the RACM), or at least 10 days before end of the calendar year preceding the year in which applicable planned renovation activity occurs ! Follow-up notice required if the amount of asbestos affected changes by ≥20%, or if start date of work changes ! Exceptions apply for emergency D&R activities ! Regulations prescribe elements that must be included in the notice and require use of form included in Subpart M (or a similar form)
Work Practices	! General rule is to remove RACM prior to any activity that could break up/disturb the RACM or preclude access for subsequent removal ! Wetting requirements apply in numerous stripping and other situations, although use of ventilation system to a glove bag and leak tight wrapping with no visible emissions is alternative for stripping procedures, and leak tight wrapping is alternative to wetting after removal. Other wetting exceptions apply ! Careful handling procedures to preclude disturbing the RACM apply ! Other specific requirements apply
Waste Disposal	! Additional work practice standards apply for handling RACM ! Must deposit the RACM at a landfill that meets specific Subpart M requirements ! A RCRA-type manifest system must be used by the facility, with follow-up reporting required if the generating facility does not receive a receipt from the disposal facility within 45 days ! Other specific requirements apply

8.3.2 Inspection Techniques

8.3.2.1 Pre-inspection Steps

As discussed in Section 3, there are a number of steps that should be routinely taken prior to conducting an actual on-site inspection, including file review. As part of the file review, the inspection should consider at least the following items:

Permit verification. One objective of a standard Level 2 air inspection will be to verify that the operating permit includes all of the appropriate requirements. Prior to the

inspection, the permit should be reviewed to determine what conditions apply to the facility's power boilers. This permit review is particularly critical in the case of power boilers because the federal and State regulatory requirements are so varied. In reviewing a facility's permit, the inspector should consider the following questions:

- What fuels are permitted to be burned in the power boiler(s)?
- If special fuels/wastes may be burned, are they subject to any limits, constraints, or reporting/recordkeeping requirements?
- Are there any specific maintenance or testing requirements, such as annual testing or semiannual boiler or control device maintenance?
- Do NSPS requirements apply?
- What types of modifications have occurred, and were NSR requirements met?
- Has debottlenecking occurred in the main mill process areas, and thereby increased utilization of the power boilers? If so, were potential NSR applicability issues addressed?

NOTE! Check Title V permit materials for process diagrams/layouts.

Process diagrams/layouts. Obtain a simplified diagram of the mill's power boilers and note what control(s) are employed. This type of diagram may be available in the Part 70 operating permits file if submitted with the application. Use this information to:

- Determine where the power boiler(s) are located in order to perform a quick initial evaluation of stack opacity upon arrival.
- Understand how the control room(s) for the boiler operations are set up, what process and control parameters can be evaluated from the control rooms, and what distributed control system (DCS) data capabilities are on-site. Especially for larger boilers, a significant portion of the on-site inspection for the power boilers will occur in the control room(s), and an up-front understanding of what data are available, both real-time data and historical data from a DCS, can streamline the on-site phase of the investigation.

Evaluation of periodic monitoring reports. Review any monitoring reports that have been submitted since the last inspection in order to prioritize the need for follow-up while on-site. As noted in Figures 8-1 through 8-7, the NSPS subparts for boilers and turbines require excess emissions reports (EER) for continuous emission monitoring system (CEMS) data in a number of instances. In addition, as mills obtain operating permits under Part 70 programs, the permit conditions that implement Part 64 compliance assurance monitoring (CAM) or Part 70 periodic monitoring will likely require parameter monitoring for particulate matter control devices in those cases where the NSPS or comparable State monitoring requirements do not apply. In those cases, the semiannual Part 70 reports will include data on any parameter excursions that have occurred.

The inspector should confirm that any periods of excess emissions/parameter excursions indicated in the reports are within regulatory limits. If not, the inspector may need to evaluate on-site records that document the reasons for the excess emissions. The review will be necessary to evaluate claims of allowable excursions, such as those from startup, shutdown, or malfunction periods.

Evaluation of episodic malfunction reports. Review malfunction reports submitted since the last inspection, if available. If the reports identify corrective actions to be taken by the facility, the inspector should note the need to verify during the on-site inspection that the corrective steps were actually taken and that they resolved the problem.

If a malfunction report is required for all or some specified subset(s) of malfunctions, the inspector also should note any discrepancies between the periods covered by the malfunction reports submitted and the claimed reasons for excess emissions included an EER (if required). Significant discrepancies signify errors in monitoring or malfunction reporting that should be addressed with the facility either as part of the inspection or by agency compliance staff responsible for processing periodic and episodic reports.

8.3.2.2 On-site Inspection Steps

The on-site inspection for power boilers should include direct compliance determinations where practicable (such as confirming compliance with sulfur-in-fuel limits or conducting RM 9 visible emission observations for opacity standards). In other cases, the inspector will have to conduct indirect compliance assessments (such as to evaluate compliance with particulate matter limits). In these cases, the inspector should use indirect compliance indicators to evaluate whether operating conditions for a particular boiler/control equipment combination are consistent with baseline values. The baseline values may be established during a performance test or other pertinent data (such as design standards). If the boiler is operating outside normal ranges, follow-up activities may be warranted. The following subsections summarize specific areas that should be checked during the inspection.

NOTE! Visible emission checks are unnecessary for gas-fired boilers.

Visible emissions. Begin with a visible emission observation (VEO) using Method 9 or comparable State procedures. If weather and site conditions permit, the inspector should check for visible emissions before entering the facility. Generally, a 12 to 30 minute VEO can account for a full ESP rapper operating cycle and allow the inspector to determine if any cyclic patterns are present. Where ESPs or fabric filters are used and further evaluation is warranted, the inspector should observe the stack plume over a continuous period to identify any "puffing" (i.e. spiking) problems. A VEO should not be necessary for boilers firing only natural gas, although a smoking natural gas boiler is typically indicative of combustion problems.[1]

Evaluation of proper operation of control equipment. Because coal and wood-fired power boilers typically use control equipment for the abatement of particulate emissions, a routine Level 2 inspection should include an evaluation of control equipment operation and maintenance in addition to a VEO. The appropriate steps for this phase of the inspection will vary depending upon the type of control device(s) being used. Possible particulate matter abatement systems at kraft mill power boilers include multicyclones, scrubbers, ESPs, and fabric filters.

Multicyclones. Inspections of multicyclones are relatively limited due to restricted equipment access and the limited number of key operating parameters to be evaluated. Detailed checks for proper operation require internal access to the multicyclone. This requires scheduling a visit during boiler outage with full consideration of all safety restrictions that apply. Routine checks that are available include:

- Pressure drop across the device
- Proper hopper discharge
- Gas flow rates near nominal design rates

The initial VEO, although appropriate for determining compliance with any required opacity limits, usually does not provide useful information about multicyclone performance because the controls do not normally collect the smaller light scattering particles. Because multicyclones only collect the larger sized particles, little or no observable shift in opacity may be noted when performance has decreased. Note that for units with multicyclone controls only, opacity CEMS data likely will not be available.

Pressure drops (in the normal pressure drop range) across a multicyclone are useful only if extreme values are present. Although very low or very high pressure drops tend to indicate that something is wrong inside the multicyclone and that maintenance is required, small shifts in pressure drop have little meaning in evaluating performance.

NOTE! See Section 5 for detailed overview of scrubber and ESP inspection techniques.

Scrubbers. Because the venturi scrubbers applied to power boilers are nearly identical to those applied to lime kilns, a detailed discussion of the appropriate data and operating parameters to be evaluated in a Level 2 inspection can be found in Section 5.3.3.2. It should be noted, however, that there is a difference in the operating pH of these two scrubbers. Lime kiln scrubbers operate under alkaline conditions; whereas power boilers operate under acidic conditions. As a result of the acidic conditions, the power boiler scrubber may be more susceptible to corrosion problems.[1]

Electrostatic precipitators (ESPs). ESPs applied to power boilers and those applied to recovery boilers are also quite similar, both with respect to layout and key parameters that should be evaluated. A detailed discussion of the appropriate data and

operating parameters (including opacity CEMS data) to be evaluated in a Level 2 inspection can therefore be found in Section 5.3.3.2. It is important to note, however, that power boiler and recovery boiler ESPs are not identical. A critical distinction between the two precipitators is the increased possibility of resistivity problems that exists with power boilers:[1,2]

- *Low resistivity concerns* are generally not expected, except on stoker-fired boilers and boilers firing high-sulfur coal. Possible indicators of low resistivity include: (1) reduced primary and secondary voltages; (2) significantly increased primary and secondary voltages, especially in the inlet fields; (3) decreased spark rates, especially in the inlet fields; or (4) all or most fields at either the primary current or secondary current limits. In addition, low resistivity may be indicated by a VEO and/or review of opacity CEMS data that indicates rapper reentrainment problems. Where low resistivity is suspected, the inspector should look for changes in temperature or fuel quality that could be responsible for the change in resistivity.

- *High resistivities* can significantly impair performance if an ESP is not designed to handle the high values. As the ash becomes more difficult to remove from the collector plates, power levels decrease and sparking increases throughout the ESP. In severe cases, virtually no normally expected increase in power or current levels occurs from inlet to outlet. Possible causes of increased resistivity include a change in coal sulfur content, a change in other ash constituents, or a change in temperature.

Fabric filters. There are a number of variables that can be used to qualitatively check baghouse operations for symptoms of operating and/or design problems. Each of these checks provides some indication of the typical problems that can occur with fabric filter operations. Note that as sources develop compliance assurance monitoring approaches to satisfy 40 CFR Part 64, a mill's Part 70 operating permit should contain specific fabric filter parameters to be monitored. Those parameters should be the most appropriate to indicate proper performance for the particular fabric filter application.

Basic Fabric Filter Assessments

- **VEO**
- **Opacity CEMS data (if applicable)**
- **Static pressure drop**
- **Inlet and outlet gas temperatures**
- **Compressed air pressure (pulse jet systems only)**
- **Walkaround inspection for air infiltration, corrosion and fugitive emissions**

The key external inspection parameters and their relevance in evaluating the operation and maintenance of filters are summarized in Figure 8-9.[1,2]

Figure 8-9
Fabric Filters: External Level 2 Inspection Parameters[1,2]

Inspection Parameters	Relevance in Evaluating Filter O&M
Opacity/Visible Emissions	! Unless condensable plume is present, average opacity should be low; opacity levels >5-10% warrant follow-up inspection ! Opacity should increase slightly after cleaning cycle ! Significant increase in opacity may indicate pinhole leak in given module of row of bags ! Length of time required to restore opacity to previous levels indicates severity of problem
Pressure Drop	! Reverse air and pulse jet systems generally should operate at overall static pressure drops <6 in. W.C. ! Except for large holes and tears, pressure drop is not as sensitive as opacity for detecting bag holes and tears ! Increase in pressure drop (1-2 in. W.C. from baseline) may indicate cleaning system problems, increase in gas flow through filter, or increase in dust layer resistance to gas flow ! Gradual increase in pressure drop usually indicates bag blinding caused by deeper penetration of particulate into fabric weave ! Low pressure drop may indicate air infiltration problems ! For reverse air systems, reverse direction static pressure drop should be <0.0 during cleaning
Inlet/Outlet Gas Temperatures	! Temperatures should be maintained within moderate range, slightly below the maximum temperature rating for the type of bag in use ! Short term excursions > 25°F above rated temperature for bags being used can cause bag damage ! Low temperatures below acid vapor dewpoint can cause acid attack to bags
Cleaning System (should be checked when time between cleaning cycles is too long)	! Pulse-jet systems should fire with resounding thud, with compressed air pressures normally of 60 to 90 psig, although site-specific baseline values important because of difference in designs. Compressed air gauges generally will be located only on the compressed air manifold ! Reverse-air systems should isolate each filter compartment ! Reverse-air and dwell cycles should be sequenced to allow flexing and release of dust cake under gentle conditions
Hopper Discharge, Air Infiltration, Corrosion, Fugitive Emissions	! Check for plugged or damaged hoppers, which can allow ash to build up in bags and bags to be shut off from gas flow ! Listen for an air rushing sound to detect for severe air infiltration problems on negative pressure units. For reverse air systems, listen near hopper poke holes/access hatches, compartment side access hatches, and ductwork expansion joints. For pulse jet systems, listen near top access hatches, hopper solids discharge valves, ductwork expansion joints, and welded side walls ! Check for signs of corrosion on hopper wall, top access hatches, and other portions of the baghouse. Corrosion can indicate low temperature operation and possible chemical attack of the bags

If the basic inspection steps indicate potential problems, the inspector can follow-up on several issues, as appropriate. Figure 8-10 identifies several possible follow-up considerations.

Figure 8-10
Fabric Filters: Follow-up Level 2 Inspection Parameters[2]

Follow-up Procedure	Relevance in Evaluating Filter O&M
Opacity Monitor QA	! If VEO and opacity CEMS data provide significantly different results, check opacity CEMS QA data for possible monitor problems ! Evaluate daily zero and span checks at monitor console ! Confirm fault lamps do not indicate major malfunctions ! Discuss with mill personnel if any other QA activities have been conducted recently and check records to evaluate results
Inlet/Outlet Gas Temperatures (Pulse jet systems)	! Check inlet and outlet temperatures for temperature drop on hot gas streams. Monitors generally located near baghouse inlet and fan inlet ! Temperature drop from inlet to outlet should range from 5-25°F; higher drops could indicate air infiltration problems ! Increase in baseline temperature drop of 5-10°F (at similar process rate to baseline conditions) also indicates air infiltration concerns
Compressed Air Leaks/Inoperative Diaphragm Valves (Pulse jet systems)	! If static pressure drop is significantly higher than baseline levels, conduct walkaround check for compressed air pipe leaks and check for inoperative diaphragm valves ! For leaks, check threaded fittings leading to manifolds and leading from the manifolds to the diaphragm valves ! Severe leaks can be detected audibly; for smaller leaks, look for oil deposition on the outside of the fittings ! For inoperative valves, check valves to determine if frozen in the closed position -- Note: This concern is applicable only to cold weather conditions for units that do not have compressed air dryers and that have valves mounted below the air manifolds
Records Checks	! For frequent bag failure problems, check bag failure records. Spatial bag failure record charts may be used by mill personnel to spot localized causes of bag failures. Timeline records may also be used to indicate when increases in failure rates indicates potential need to rebag entire compartment. Check any lab tests on fabric to evaluate potential need to replace bags ! Check internal inspection/tracer dust test records to evaluate quality of the mill's efforts to track causes of bag failures/other operating problems and to develop appropriate procedures to minimize control problems

For many safety reasons, including OSHA confined space entry regulatory restrictions, agency inspectors should not conduct internal baghouse inspections. In some situations, an inspector may be able to arrange with plant personnel to open one or more top access hatches to conduct a visual check of clean side conditions of a pulse jet

baghouse. The inspector must not break the plane of the hatch opening while conducting this observation. Fresh dust deposits on the top surface of the tube sheet indicates likely bag holes or leaks.[2]

In addition, as noted in Figure 8-10, the agency inspector can check records of internal inspections conducted by mill personnel. Typical key points in an internal inspection include the following:

- Proper installation and tensioning of bags
- Presence and patterns of deposits on "clean side" of fabric filter
- Location and integrity of baffle plate
- Apparent bag/hopper pluggage
- Moisture or oil problems blinding the bag
- Evidence of high temperatures in fabric filter

Finally, for units with chronic high levels of excess emissions, the inspector should review the startup and shutdown procedures for the boiler with the mill operators. Baghouses cannot operate during early stages of startup or late stages of shutdown procedures because of the low temperatures. Verify that the operators are scheduling startup and shutdown cycles consistent with good O&M practices for minimizing emissions.[2] One check would be to compare similar mills to determine whether the mill with problems has significantly higher startup/shutdown periods than a typical mill.

Evaluation of proper operation of process equipment. During a Level 2 inspection, the inspector should review pertinent boiler operating data that directly affects compliance with applicable requirements. If sulfur-in-fuel limits apply, the records of fuel sulfur content should be checked. If operating limits apply, such as limits on the type of fuel that may be burned or restrictions on hours or levels of operation, the appropriate records for those operating conditions should be checked.

Key Process Parameter Checks

- **Fuel sulfur content (for sulfur-in-fuel standards)**
- **Basic operating data (fuel type and operating hours/levels) to the extent permit limits apply**
- **Follow-up checks on fuel characteristics, firing conditions, or ash characteristics if compliance problems suspected**

Furthermore, a number of other boiler process parameters can affect emissions. The appropriate parameters are highly boiler-specific. However, Figure 8-11 summarizes a number of potential process operating conditions and data sources that may be appropriate for this type of process evaluation. If potential compliance problems are suspected, the inspector may want to evaluate some of these conditions as applicable. The values for these parameters collected during the inspection should be used to determine if the boiler is

operating at normal production levels and also should be compared with historic baseline data obtained during performance tests.[1]

Most critical boiler parameters are recorded through automated distributed control systems (DCS) at modern mills (especially for larger boilers), or some other records at older mills (such as log sheets, strip charts or chart recorders). The availability of DCS data allows for quick access to data and potential trend analysis capability. If the data are not available through a DCS, copies of the other records may be obtained after the inspection to provide necessary documentation.

Figure 8-11
Power Boiler O&M: Key Level 2 Inspection Parameters[2]

Fuel Characteristics	
Fuel Type(s)	! Generally specified in operating permit ! Various types of wood waste have significantly different moisture contents and size distributions which can affect ability to change loads rapidly
Ultimate Analysis (sulfur, nitrogen, chlorine, ash)	! Ultimate analyses data are usually available in laboratory data sheets kept on file ! Check for regulatory requirements pertaining directly to sulfur content ! Higher than allowed sulfur content will cause excessive SO_2 emissions ! Much lower than normal sulfur content may create problems for ESPs ! Nitrogen content roughly indicates potential for NO_x formation
Proximate Analysis (volatile matter, fixed carbon, moisture, ash, heating value)	! Heating value is directly related to amount of fuel that must be burned to generate specific amount of steam ! Reduced heating values generally result in increased ash, SO_2, and other emissions
Fuel Sizing	! Sizing is important variable in boilers where coal, wood, or refuse-derived fuel is mechanically distributed ! Changes in fuel size distribution can adversely affect adequacy of fuel/air distribution and increase PM emissions
Free-swell Index (Grate-based Boilers)	! Determined using ASTM Procedure D 720-67, although the test is not typically performed ! For grate-based boilers, coals with high free-swell indices are especially prone to combustion problems

Figure 8-11 (cont.)
Power Boiler O&M: Key Level 2 Inspection Parameters[2]

Firing Conditions	
Load	! Determine boiler load using steam generation rate data and/or feed water flow rate data ! High boiler loads in excess of permitted value likely to cause a general increase in pollutant emissions ! High boiler loads may generate substantially increased NO_x due to high combustion zone temperatures (although any load/NO_x relationship will vary between boilers) ! Below-design boiler loads generate insufficient heat in the boiler, which allows for the emission of partial oxidation products, CO, and carbonaceous PM
O_2 Concentrations (excess air rates)	! Flue gas O_2 concentration data should be obtained from both economizer outlet unit and (if available) O_2 monitor that accompanies SO_2 and/or NO_x CEMS ! Emissions of CO, partial oxidation products, and PM occur rapidly as O_2 concentration decreases from desired range
CO Concentrations	! CO monitor rarely in place -- portable monitor likely necessary ! Significant increases in hourly average and instantaneous CO data indicate combustion problems that can lead to changes in pollutant characteristics, as well as increases in pollutant generation
Air Infiltration	! Best indicated by gradual increase in average O_2 concentration at given boiler load ! May also be indicated by audible leaks in lower areas of boiler unit and/or boiler drafts close to or exceeding 0.0 in W.C. ! Air infiltration cools down gas stream thereby inhibiting completion of oxidation reactions

Figure 8-11 (cont.)
Power Boiler O&M: Key Level 2 Inspection Parameters[2]

Firing Conditions (cont.)	
Overfire and Underfire Air Flow Rates (Stoker boilers)	! Overfire air supply header and undergrate plenum pressure data for inspection period are available from control room static pressure monitors ! Data are usually recorded once per shift in unit operating logs ! Shifts from baseline overfire and underfire pressures combined with obvious increases in emissions (CO and stack opacity) could indicate non-ideal combustion conditions
Soot Blowing Practices	! Soot blower activation frequency can be determined by observing indicator lights in soot blower control room or by using DCS data ! Information about soot blowing cycle is helpful in interpreting performance of air pollution control system
Fuel/Air Distribution	! Fuel air distribution can be evaluated qualitatively by observing grate from protected, side-access hatches ! Large variations in side-to-side and front-to-back fuel bed thickness may cause combustion problems, thereby leading to increased pollutant emissions
Boiler Draft (static pressure in combustion chamber)	! Monitored by gauge located upstream of heat exchange equipment ! Static pressure below normal -0.05 to -0.25 range suggests ambient infiltration into combustion zone ! Positive (greater than atmospheric) static pressure may indicate fugitive emissions from boiler -- emissions are usually visible
Ash Characteristics	
Loss-on-ignition (LOI) and Appearance	! High LOI values are associated with above-normal concentrations of carbonaceous matter in exhaust gases ! Can reduce ESP efficiency or lead to baghouse/ESP fires
Fugitive Emissions	! Fugitive emissions may indicate poor ash handling/transportation practices

Asbestos NESHAP compliance evaluation. Finally, the on-site inspection provides an opportunity to screen for compliance with asbestos demolition and renovation (D&R) notice requirements. The inspector should interview mill personnel to determine whether any maintenance, repair or similar construction activity conducted since the last

inspection involved insulated piping or similar locations likely to involve asbestos-containing materials, and, if so, whether asbestos compliance issues were considered and properly addressed. Obtain copies of any notice provided concerning the D&R activities. If there was activity but no notice was filed, follow-up to determine whether asbestos-containing materials were involved, and, if so, whether the applicability provisions of Subpart M were triggered (see the summary of Subpart M requirements in Figure 8-8). Also, verify that the wastes containing the removed asbestos-containing material were properly sent to a waste disposal site that meets the requirements of Subpart M. The mill should have copies of all waste shipment records required under Subpart M.

For routine inspections conducted in response to an asbestos D&R notification, see the procedures outlined in applicable Agency guidance, such as *Guidelines for Asbestos NESHAP Demolition and Renovation Inspection Procedures* (EPA 340/1-90-007, November 1990).

8.4 Water Issues and Inspection Considerations

General process wastewaters. As noted in Section 8.2.3, a significant percentage of the overall flow to the wastewater treatment plant involves process wastewater from power operations. However, the effluent limits and monitoring requirements under the CWA do not involve specific requirements applicable to the power boiler wastewaters. Instead, the inspector will evaluate compliance with any permit limits for pollutants that originate in power operations at the wastewater treatment plant (see Section 7).

Oil-fired boilers. If the mill operates oil-fired boilers, additional requirements under the Clean Water Act may apply specifically to power boiler operations. The basic structure of these requirements is as follows:

- *Part 110 of the CWA* prohibits discharges of oil that violate applicable water quality standards, cause a film or sheen upon (or a discoloration of) the surface of the water or on the adjoining shoreline, or cause a sludge or emulsion to be deposited beneath the surface of the water or on the adjoining shoreline. If a prohibited discharge occurs, then the owner or operator must provide immediate notification to the National Response Center.

- *Part 112* requires a Spill Prevention Control and Countermeasure (SPCC) plan for oil-storing/consuming facilities, except where underground storage is $\leq$ 42,000 gallons and unburied storage is $\leq$ 1320 gallons (with no single container > 660 gallons). In addition to developing the plan, Part 112 imposes obligations related to response planning, plan updating, and employee training.

- *Parts 116 and 117* designate hazardous substances and reportable quantities (RQs) for those substances. Except for allowable discharges to a POTW or under an NPDES permit, discharges of a designated substance in excess of the applicable RQ

must be reported to the federal government in accordance with applicable Department of Transportation regulations.

For these requirements, the key assessment procedures are to:

- Assure that the mill has developed an SPCC plan, if required
- Inquire about past instances of spills, leaks, and similar events
- Identify how the facility reacted to the event and whether similar events appear to recur

This type of assessment provides a useful screening opportunity for the air inspector, given that the water inspector generally will evaluate NPDES compliance issues at the wastewater treatment plant and not in the power boiler process area. The air inspector can note generally whether spills have occurred, and then the water inspector can evaluate the details of the spill, and the facility's response, in a follow-up discussion with facility staff or on-site inspection if warranted. Appropriate details for a follow-up inspection include:

- The material and quantity spilled, and the RQ for the material
- The waters affected by the discharge
- The timing of notice in relation to the timing of the spill
- The facility's response, whether the response was consistent with the SPCC, whether the SPCC was adequate to address the spill, and appropriate modifications to the SPCC
- Identification of health and safety issues for the plant, the community and the receiving waters

Storm water requirements and inspection procedures. The CWA requires an NPDES permit for storm water discharges associated with industrial activity. As discussed in Appendix B, EPA or State agencies (as applicable) typically issue "general" permits to authorize discharges from a group of similar facilities. Storm water discharges from some mills may, however, be covered by site-specific "individual" permits. Where EPA is the NPDES permitting authority, most mills will be covered by EPA’s multi-sector general permit (MSGP) requirements. State permit requirements will vary but, in general, can be expected to include requirements comparable to the MSGP requirements. The main elements of the permit are to maintain a storm water pollution prevention (SWPP) plan and conduct certain limited monitoring (quarterly visual examinations of grab samples and, in some cases, analytical tests for particular pollutants).

The MSGP requirements applicable to the paper and allied products sector do not specifically address power boiler operations at pulp mills. However, the MSGP also includes separate requirements for the steam electric power generating sector. Because the various MSGP requirements for different sectors apply to all co-located activities at a facility, these requirements will apply to power boilers that supply electricity to kraft mill process operations. For the power generating sector, the MSGP includes specific SWPP elements that are in addition to the requirements applicable to all general permits (see

Figure 8-12). The MSGP also requires specific monitoring of total recoverable iron in the second and possibly fourth year of permit coverage for the steam electric generating facilities.

Figure 8-12
Measures and Controls for Inclusion in Steam Electric Power Generating Facility SWPP Plan

Activity/Pollutant Source	Measures and Controls
Fugitive Dust Emissions	! Plan must describe measures to prevent or minimize fugitive dust emissions from coal handling areas ! Facility shall consider establishing procedures to minimize offsite tracking of coal dust. To prevent offsite tracking, facility may consider: -- Specially designed tires; or -- Washing vehicles in designated areas before they leave the site and controlling wash water
Delivery Vehicles	Plan must describe measures that prevent or minimize contamination of storm water runoff from delivery vehicles arriving on site. At a minimum, facility should consider the following: ! Develop procedures for the inspection of delivery vehicles arriving on site and ensuring overall integrity of the body of the container ! Develop procedures to control leakage or spillage from vehicles or containers and ensure that proper protective measures are available for personnel and environment
Fuel Oil Unloading Areas	Plan must describe measures that prevent or minimize contamination of storm water runoff from fuel oil unloading areas. At a minimum, facility must consider using the following measures or an equivalent: ! Use containment curbs in unloading areas ! During deliveries, station personnel familiar with spill prevention and response procedures must be present to ensure that any leaks or spills are immediately contained and cleaned up ! Use spill and overflow protection (drip pans, drip diapers, and/or other containment devices shall be placed beneath fuel oil connectors to contain any spillage that may occur during deliveries or due to leaks at such connectors)
Chemical Loading/Unloading Area	Plan must describe measures that prevent or minimize the contamination of storm water runoff from chemical loading/unloading areas. At a minimum, facility must consider using the following measures or an equivalent: ! Use containment curbs at chemical loading/unloading areas ! During deliveries, station personnel familiar with spill prevention and response procedures must be present to ensure that any leaks or spills are immediately contained and cleaned up ! Where practicable, chemical loading/unloading areas should be covered, and chemicals should be stored indoors

Figure 8-12 (cont.)
Measures and Controls for Inclusion in Steam Electric Power Generating Facility SWPP Plan

Activity/Pollutant Source	Measures and Controls
Miscellaneous Loading/Unloading	Plan must describe measures that prevent or minimize contamination of storm water runoff from loading and unloading areas. Facility may consider: ! Covering the loading area; ! Minimizing storm water runon to the loading area by grading, berming, or curbing the area around the loading area to direct storm water away from the area; or ! Locating the loading/unloading equipment and vehicles so that leaks can be controlled in existing containment and flow diversion systems
Liquid Storage Tanks	Plan must describe measures that prevent or minimize contamination of storm water runoff from above ground storage tanks. At a minimum, facility must consider employing the following measures or an equivalent: ! Use protective guards around tanks ! Use containment curbs ! Use spill and overflow protection (drip pans, drip diapers, and/or other containment devices shall be placed beneath chemical connectors to contain any spillage that may occur during deliveries or due to leaks at such connectors) ! Use dry cleanup methods
Large Bulk Fuel Storage Tanks	Plan must describe measures that prevent or minimize contamination of storm water runoff from liquid storage tanks. At a minimum, facility must consider employing the following measures or an equivalent: ! Comply with applicable State and federal laws, including Spill Prevention Control and Countermeasures (SPCC) ! Containment berms
Oil Bearing Equipment in Switchyards	Plan must describe measures to reduce the potential for storm water contamination from oil bearing equipment in switchyard areas. Facility may consider: ! Level grades and gravel surfaces to retard flows and limit the spread of spills ! Collection of storm water runoff in perimeter ditches
Oil and Chemical Spills	Plan must describe measures for an oil or chemical spill, or reference the appropriate section of their SPCC plan. At a minimum: ! The structural integrity of all above ground tanks, pipelines, pumps, or other related equipment should be visually inspected on a weekly basis ! All repairs deemed necessary based on the findings of the inspections shall be completed immediately to reduce the incidence of spills and leaks occurring from such faulty equipment
Residue Hauling Vehicles	! All residue hauling vehicles shall be inspected for proper covering over the load, adequate gate sealing, and overall integrity of the body container ! Vehicles without load covers or adequate gate sealing or with poor body or container conditions must be repaired as soon as practicable

Figure 8-12 (cont.)
Measures and Controls for Inclusion in Steam Electric Power Generating Facility SWPP Plan

Activity/Pollutant Source	Measures and Controls
Ash Loading Areas	Plant procedures shall be established to reduce and/or control the tracking of ash or residue from ash loading areas including, where practicable, requirements to clear the ash building floor and immediately adjacent roadways of spillage, debris, and excess water before each loaded vehicle departs
Areas Adjacent to Disposal Ponds or Landfills	Plan must describe measures that prevent or minimize contamination of storm water runoff from areas adjacent to disposal ponds or landfills. Facility must develop procedures to: ! Reduce ash residue which may be tracked on to access roads traveled by residue trucks or residue handling vehicles ! Reduce ash residue on exit roads leading into and out of residue handling areas
Landfills, Scrapyards, and General Refuse Sites	Plan must address landfills, scrapyards, and general refuse sites. Facility should refer to applicable BMPs for Storm Water Discharges from Landfills and Land Application Sites, and for Storm Water Discharges from Scrap and Waste Material Processing and Recycling Facilities
Maintenance Activities	For vehicle maintenance activities performed on site, facility shall consider the applicable BMPs for Storm Water Discharges from Vehicle Maintenance or Equipment Cleaning Operations at Motor Freight Transportation Facilities, Passenger Transportation Facilities, Petroleum Bulk Oil Stations and Terminals, or the United States Postal Service
Material Storage Areas	Plan must describe measures that prevent or minimize contamination of storm water from material storage areas. Facility may consider: ! Flat yard grades, ! Runoff collection in graded swales or ditches, ! Erosion protection measures at steep outfall sites, ! Covering lay down areas, ! Storing the materials indoors, ! Covering the material with a temporary covering made of polyethylene, polyurethane, polypropylene, or hapalon, or ! Minimizing storm water runon by constructing an enclosure or building a berm around the area

To evaluate compliance with basic storm water requirements, the inspector should:

! Review applicable records to assure that the SWPP is up to date and includes all required elements, and that the mill has performed all required self-monitoring and self-inspection procedures

- Evaluate the results of monitoring and inspection data to determine whether those records indicate potential compliance concerns -- if the data indicate potential problems, follow up with mill personnel to determine what corrective actions, if any, were taken in response to the monitoring/inspection results
- Observe control and prevention measures to evaluate whether good operation and maintenance practices are being used
- Verify that the mill does not have improper connections that permit non-storm water to be discharged from storm water outfalls

In addition to these basic steps, the following procedures should be used to evaluate compliance with storm water requirements that may be specifically applicable to power boiler operations:

- If the mill has coal-fired boilers, carefully review measures to control coal pile runon/runoff and to minimize fugitive dust emissions from coal piles
- For oil-fired boilers, check containment curbs and similar measures used at delivery locations and for tank storage for adequate O&M. Observe deliveries if possible to document that required procedures are used and appropriate staff are involved in fuel handling -- coordinate this evaluation with an evaluation of the mill's SPCC plan
- Check inspection reports to evaluate the mill’s compliance with the inspection requirements and adequacy of response actions to problems detected

8.5 RCRA Issues and Inspection Considerations

NOTE! See Appendix C for overview of RCRA requirements and inspection techniques for hazardous waste generator concerns.

The solid waste generated by power boiler operation is generally non-hazardous solid waste. The bottom and fly ash from combustion is either landfilled with other solid wastes or may be sold or reused as an additive. See Section 9 for a discussion of solid waste landfill issues. To the extent a mill generates specific hazardous wastes in ancillary power boiler operations, then those wastes must be handled as hazardous wastes in accordance with standard RCRA procedures. See Appendix C for an overview of the regulatory requirements that apply and appropriate inspection procedures for these generator requirements.

In addition, the Cluster Rules provide a specific exemption from RCRA for certain condensates recovered in the pulping area that contain methanol. This exemption allows the mill to burn the condensates in the power boilers without having to comply with RCRA requirements for boilers and industrial facilities. See Section 4.5 for further discussion.

8.6 EPCRA Issues and Inspection Considerations

NOTE! See Appendix D for overview of EPCRA regulations and basic assessment procedures.

General concerns. The basic regulatory requirements for EPCRA are not process-specific but rather apply on a facility-wide basis. Thus the basic requirements of EPCRA are discussed in Appendix D.

For the power boiler area, key EPCRA issues will be to quantify releases of toxic chemicals to the air, water, or land in the annual Toxic Release Inventory (TRI) report (known as the "Form R" report), and to comply with emergency reporting requirements. The emergency reporting requirements apply under both EPCRA and CERCLA. The releases subject to these emergency reporting requirements are releases that are not federally permitted and that exceed certain reportable quantities. For certain releases that are "continuous" and "stable in quantity and rate," the mill may be able to use special reporting options so that a notice is not required after each such release. See the discussion of continuous releases in Appendix D for further detail on the differences between standard emergency reporting and reporting of continuous releases.

For this process area, the air emissions from the power boilers are one potential source of releases that could be subject to EPCRA and CERCLA emergency reporting. These emissions units generally will emit SO_2 and NO_x. Both SO_2 and NO_2 are hazardous substances subject to EPCRA emergency release reporting. The reportable quantity for these two substances is 500 and 10 pounds per 24-hour period, respectively. Also, if the power boilers are used for TRS control, the boilers may emit TRS compounds such as hydrogen sulfide or methyl mercaptan (each with a reportable quantity of 100 pounds per 24-hour period). See the list in Appendix D of other potential chemical releases associated with kraft pulp mill air emission sources.

The determination of what constitutes a "federally permitted release" can be complex. However, it is important to note that if the mill as a matter of normal operations emits an applicable pollutant in amounts that exceed the reportable quantity **and** there is no emission limit established for the pollutant, then the emergency reporting provisions likely apply. For instance, a mill should file appropriate emergency reports if no NO_x emission limit applies to a power boiler, and the unit normally emits more than 10 pounds of NO_2 in a 24-hour period. In this circumstance, the reduced continuous release reporting options likely are available, as discussed in Appendix D.

Inspection considerations. The EPCRA compliance assessment generally will focus initially on a records review. The inspector should review the following materials:

- *Emergency preparedness information*. These obligations are not process-specific, and thus the basic assessment considerations are covered for all facility operations in Appendix D to this manual.

- *TRI Form R*. Check to ensure that the form is on file and that the source has adequately considered releases associated with the power boilers and associated equipment. Also, ask to see the estimation technique being used. If the estimation technique involves an assumed reduction efficiency for control methods, make sure that the assumed efficiency is consistent with the overall efficiency that the mill is achieving. The overall assumed efficiency should account for any excess emission releases in a manner consistent with the actual percent of operating time such releases occur. Uncontrolled emission episodes or periods of reduced control efficiency can have a significant impact on the estimate of total releases.

- *Emergency notifications*. Request documentation that the mill has filed all required notices.

If an agency air inspector plans to screen for EPCRA compliance, the inspector should confirm the necessary information with the facility contact during the opening conference or just in advance of the closing conference. For an announced inspection, the inspector should ask the source to have ready EPCRA-related documentation so that the screening check can be performed without interrupting the main focus of the inspection. A screening checklist is included as part of the example assessment form in Appendix E.

In addition to a screening-type records review inspection, an EPCRA inspector may want to conduct further assessments to identify potential compliance concerns with emergency notification requirements. As one technique, the inspector first can check excess emission reports, malfunction reports, and citizen complaints since the previous inspection. The inspector then should cross-check those incidents with notification records identified in EPA's ERNS database, records on file with the State/local emergency coordinator, or records requested from the mill. If this type of investigation identifies episodes of abnormal emissions in which no notification was provided, the inspector should consider a follow-up investigation to determine if reportable quantity thresholds were exceeded.

References:

1. *Kraft Pulp Mill Inspection Guide.* Prepared for U.S. EPA under Contract No. 68-01-6310, Work Assignment No. 65, Pedco Environmental, Inc., Cincinnati, Ohio, January 1983.

2. Richards, J., *Baseline Inspection Techniques, Student Manual,* Air Pollution Training Institute Course 445, 2nd Edition, 1996.

3. *Ohio EPA's Operation and Maintenance (O&M) Guidelines for Air Pollution Control Equipment*, prepared for Ohio Environmental Protection Agency, under Contract No. 0810252, Environmental Quality Management, Inc., February 1993.

4. *Proposed Technical Development Document for the Pulp, Paper and Paperboard Category and Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards.* U.S. Environmental Protection Agency, Washington, D.C., October 1993.

5. Christman, R.C. et al., *Activities, Effects and Impacts of the Coal Fuel Cycle for a 1,000 MWe Electric Power Generating Plant*, Final report prepared for U.S. Nuclear Regulatory Commission, February 1980.

6. H.A. Simons Ltd. et al., *Water Use Reduction in the Pulp and Paper Industry 1994*, a Monograph sponsored by Fletcher Challenge Canada Limited and coordinated by Pulp and Paper Research Institute of Canada, November 1994.

This page intentionally left blank

SECTION 9: ASSESSMENT MODULE FOR WOODYARD, PAPERMAKING, AND OTHER OPERATIONS

9.1 Introduction

This section provides information for conducting a compliance assessment of the areas within the mill that generally receive little attention from agency inspectors -- including woodyard operations, papermaking activities, on-site landfills, and other general mill operations. In addition, Appendix E contains an example assessment form specifically designed to address the issues raised in this process area.

CONTENTS

9.1 Introduction
9.2 Overview of Processes and Discharges
9.3 Air Issues and Inspection Considerations
9.4 CWA Requirements and Inspection Considerations
9.5 RCRA Issues and Inspection Considerations
9.6 EPCRA Issues and Inspection Considerations

9.2 Overview of Processes and Discharges

9.2.1 Description of the Process

Woodyard operations. Wood preparation entails converting wood into a form amenable to chemical pulping. Mills that receive wood in the form of logs typically cut logs to manageable lengths and then conduct the following five operations: conveying/washing logs via flume, debarking, chipping, knotting and screening, and storage and transfer. A brief description of each is provided below.[1,2]

Log flumes. Prior to debarking, water-filled channels or flumes are used by a number of mills to convey logs, as well as to provide washing. Flume water is typically recycled; however, it must occasionally be purged. Solids are commonly dredged out and landfilled or land applied.

Debarking. Because bark has very little useful fiber and contains dirt that reduces the overall pulp quality, logs (roundwood) are usually debarked before being used for pulp manufacturing. Prior to removal, the bark is softened by one of various techniques, including: spraying the logs with water, soaking the logs in ponds, or steaming the logs in special chambers. The bark is then removed either mechanically through abrasive action or hydraulically using a high pressure water jet. Once removed from the logs, the bark is

either flung from the machine or allowed to fall through openings along the base of the machine onto a conveyor situated below. If the bark is to be used as boiler fuel, any residual moisture is removed by presses.

Chipping. After the logs have been debarked, they must be reduced in size so that cooking chemicals can easily penetrate the wood fiber to separate lignin and carbohydrates from the cellulose. This is achieved by feeding the logs into chippers, which use powerful high-speed rotating knives to reduce the wood to a uniform size.

Screening. After passing through the chipper, the wood contains fines, slivers, and oversized chips. Wood chips are therefore passed over vibratory screens to remove oversized chips and fines. Oversized chips remain on the upper screen and are recycled to a chipper, slicer, or crusher. Fines drop into a collection hopper below the screens and are usually used, along with bark, as boiler fuel.

Storage and transfer. After screening, chips are generally stored in large outside piles or chip silos. The chips are typically moved to subsequent operations by conveyors or augers.

Papermaking. Kraft pulp -- wood fibers -- that is dried, baled or rolled, and sold as a finished product is known as market pulp. Some bleached kraft mills (including all mills that make dissolving grade pulp) sell market pulp. Other bleached kraft mills send pulp either as a slurry or partially dried (wet evaporated) to other mill sites. The remainder of the bleached kraft mills, and virtually all mills that produce unbleached kraft pulp, use the pulp on site to make paper and paperboard.

Paper is a felted sheet formed on a fine screen from a water suspension of fibers and non-fibrous additives.[1] Paperboard is distinguished from paper by thickness greater than 0.3 mm. Materials mixed with the pulp before it is made into paper are called wet-end additives. Materials applied to the formed paper are called coatings. Additives and coatings can contribute up to 10 to 40 percent of the weight of the finished paper. Commonly used additives and coatings are:

- Rosin and starch, sizing agents used to control penetration of liquids
- Clay, talc, and titanium dioxide, fillers that improve optical and surface properties
- Alum (aluminum sulfate) used to control pH and fix additives onto fibers
- Dyes, pigments, and brightening agents, used to color paper
- Polymer emulsions (latexes, acrylics, polyvinyl acetate) used for coatings

Although some mills manufacture market pulp only, most U.S. kraft mills produce paper or paperboard as their final product. Market pulp is typically dried on a fourdrinier-type machine or an air float dryer. Papermaking operations generally consist of the following three discrete processes:

Pulp stock preparation. Pulp stock is processed to obtain desired qualities, such as surface, opacity, strength, and feel, in the finished paper and paperboard products. Stock preparation processes include pulp mixing and dispersion, beating and refining, and the addition of wet-end additives. Softwood and hardwood pulp are frequently combined to produce paper or paperboard of desired finished properties. Beating and refining make the finished product stronger, more uniform, more dense, more opaque, and less porous.

Wet end operations. The Fourdrinier machine is the most commonly employed paper machine for the manufacture of paper and paperboard. The first two operations performed by this machine, sheet formation and pressing, are referred to as "wet end" operations. Pulp fibers in the form of a fiber slurry are distributed evenly onto a thin moving wire mesh belt ("the wire") through which excess water drains. Suction from a series of hydrofoils, vacuum boxes, and vacuum rolls further extracts water from the formed sheet. From the wire, the formed sheet passes through a series of presses designed to remove additional water and compress the fibers. Excess water containing valuable entrained fiber is captured and, after a series of thickening and cleaning steps, recycled.[1]

Dry end operations. The remaining operations performed by the Fourdrinier -- drying, calendering, reeling, winding, and application of surface treatments -- are referred to as "dry end" operations. The sheet leaves the presses and enters the dryer, where steam-heated rollers evaporate any residual water, and fibers begin to adhere to one another. The sheet is then pressed between heavy rolls in the calender that reduce the thickness of the paper and create a smooth surface. If the paper is to be finished, surface treatments such as external sizing or coating are added, and super calendering is performed. Finally, the paper is wound onto a reel for intermediate storage. On- or off-machine rewinding is later performed to cut and wind the full-size reels into smaller, more manageable rolls. At this point, the rolls are wrapped and deemed ready for distribution.[1]

General mill services and operations. Kraft pulp mills will have other ancillary operations not discussed in Sections 4 through 8. These processes include:

Solid waste landfills. In addition to landfilling wastewater treatment plant sludges (see Section 7), kraft pulp mills may use on-site landfills for other mill wastes, including fly and bottom ash from combustion sources, lime mud, and green liquor dregs. These landfills will be subject to State-specific regulations developed under Subtitle D of RCRA. The EPA guidelines for industrial landfills generally impose few requirements on States other than certain general siting criteria. State solid waste programs will require mills to obtain permits for each landfill and may impose a variety of conditions such as leachate collection, operator training, self-inspection, ground water/surface water monitoring, and similar requirements. Leachates, however, are typically routed to the wastewater treatment system.

Industrial refrigeration. Kraft mills may operate customized industrial refrigeration equipment for certain mill activities, especially related to bleach plant

operations. Because of the use of chlorofluorocarbons in this type of equipment, there are certain stratospheric ozone protection regulations that may apply.

Laboratories. Kraft mills operate laboratories to test the properties of their raw materials, pulp, finished paper products and wastewater. Some of the wastes generated by laboratories are hazardous wastes, which mills generally dispose of off-site, using a waste disposal service. Laboratory wastewaters are treated in the mill wastewater treatment plant.

Water supply treatment. Water sources for pulp and paper mills are categorized as either surface water or ground water. Surface water sources from lakes, rivers and reservoirs contain varying amounts of inorganic and organic contaminants. Groundwater taken from springs and wells usually contain relatively high concentrations of dissolved mineral matter. It is necessary to treat the raw water to reduce impurities to a level that will not adversely affect equipment operation or product quality. Depending on specific requirements, water treatment may employ a combination of sedimentation, filtering, and coagulation. Supplemental processes include chlorination, aeration, de-aeration, demineralization, and fine filtration. Water treatment may generate sludges that are disposed in on-site landfills. In addition, as with on-site laboratories, water treatment may involve chemical handling. However, water treatment operations generally are not a significant compliance concern.

General maintenance/shop/fueling facilities. As with any large facility, pulp mills will have a number of ancillary maintenance, shop and fueling operations that service the needs of the facility. These operations will trigger waste handling requirements and may raise storm water concerns as well.

9.2.2 Air Pollutant Emissions

Wood handling. Most of the air emissions from a woodyard, except those from pneumatic conveying systems, are fugitive. Common sources of these fugitive emissions include haul roads, debarkers, and chips that are received dry (shaving and saw dust). In general, control measures consist of containment of sources and watering (or paving) haul roads and other traveled areas. Water may also be used on the debarkers to reduce dust and to wash the logs, as well as on shaving and saw dust to reduce fugitive emissions at transfer points. Emissions from the pneumatic conveying cyclone are generally controlled by the use of water sprays, which can reduce cyclone emissions by 95 percent.[2]

Papermaking. Air emissions from papermaking consist mainly of water with little or no particulate matter emitted by the dryers.[4] Some particulate matter emissions may occur as a result of raw material storage and handling activities, such as starch silos. Emissions of volatile organic compounds, including hazardous air pollutants, may derive from:

- Pulp stock
- Recycled whitewater
- Additives

As part of the Cluster Rules development, EPA considered whether standards should be set for papermaking activities. To make this determination, EPA evaluated several test results from kraft pulp mills. The following pollutants were the primary HAPs identified in these tests:

- Methanol
- Acetaldehyde
- MEK
- Tetrachloroethylene
- Propionaldehyde

These analyses documented that the additives contributed little to the total HAP emissions.[3] Because the additives tend to have high boiling points, very small quantities are likely to volatilize and result in air emissions.[4] Furthermore, EPA determined that the control techniques for HAP emissions from paper machine vents are impractical based on the cost per ton of pollutant removed.[3]

Other activities. Air emissions from other miscellaneous activities generally are not regulated and do not raise significant concerns, although some air emission control requirements for solvent parts washers may apply. In addition, general fugitive dust and nuisance requirements likely apply. For the on-site landfills, odorous air emissions and fugitive dust may raise concerns in some situations. Finally, stratospheric ozone protection requirements may apply to certain industrial refrigeration units used at a mill (such as chlorine dioxide chillers).

9.2.3 Water Pollutant Discharges

Wood handling. Wastewater sources in the wood handling area of a kraft mill include:

- Wet barking
- Log washing or chip washing
- Log flumes or log ponds

In the 1970s, wet wood handling contributed up to 25 percent of the BOD_5 load discharged by mills that employed these practices. Wastewater regulations for conventional pollutants include specific allowances for discharges from wet wood handling operations only for mills that employ them. Over the past 20 years, use of wet woodyard operations has declined. In EPA's 1990 survey of the industry, of the total wastewater flow generated by kraft mills, only one to two percent originated in wood preparation operations.[5] Storm water discharges from wood yards also are subject to CWA regulation

and are specifically addressed in EPA's multi-sector general permit (MSGP) developed for kraft mills. Storm water issues are discussed in more detail in Section 9.4, as well as in Appendix B.

Papermaking. Papermaking accounts for a significant portion (25 to 35 percent by volume) of the wastewater discharges generated by kraft mills.[5] Pollutants discharged from the papermaking processes consist primarily of BOD_5 and TSS. These pollutants are treated in the mill's wastewater treatment plant prior to discharge. There are no specific regulatory concerns associated with the wastewater from papermaking. To the limited extent a mill uses outdoor material handling and storage areas for papermaking operations, this process may also contribute to a mill's storm water discharge. Storm water issues are discussed in more detail in Section 9.4, as well as in Appendix B.

Other activities. Under 40 CFR 430.01(m), leachate from unbleached kraft pulp mill solid waste landfills is considered process wastewater where these leachate wastewaters are commingled with other process wastewaters. Leachates typically constitute a very small proportion of the total volume treated in the mill wastewater treatment plant. In addition, a mill's landfill permit may include monitoring requirements to evaluate potential contamination of ground or surface waters. Surface water runoff from the landfill area also will be subject to storm water requirements. Other miscellaneous industrial activities conducted onsite (miscellaneous shop, maintenance and storage facilities) may also be subject to general storm water requirements and be covered by a mill's storm water pollution prevention plan.

9.2.4 Solid/Hazardous Waste Discharges

Woodyard, papermaking and other miscellaneous operations identified in this section typically will generate some solid wastes. Bark and other wood wastes constitute the largest residual waste stream at most facilities.[6] However, much of this wood waste will be used as power boiler fuel; any remaining wastes that require disposal generally would constitute non-hazardous solid waste. Papermaking operations also generate a number of solid waste residuals, such as fibers, fillers and broke from the paper machine, coating residue and broke from finishing operations, and cleaner and junker rejects from wastepaper processing.[7] In addition, some of the papermaking wastes may have to be handled as hazardous wastes depending on the type of additives used. Used oil, certain solvents, spent fluorescent light bulbs, and similar wastes may have to be handled as hazardous wastes to the extent generated by the other miscellaneous activity areas at the mill.

9.2.5 EPCRA Chemicals and Reportable Releases

Wood handling. The EPCRA issues for woodyard operations are relatively minor. See Appendix D for a general discussion of EPCRA issues and inspection procedures, as well as a list of chemicals that may be located in the woodyard that would be subject to EPCRA inventory and other emergency preparedness requirements.

Papermaking. The papermaking process involves the manufacture, processing, and use of a significant number of reportable hazardous chemicals. Kraft pulp mills engaged in paper and paperboard production must provide information on hazardous chemicals used in the papermaking process to State and local emergency agencies in order to satisfy EPCRA's emergency preparedness provisions. Appendix D contains a process-based list of chemicals that may be covered in an inventory for a typical mill. In addition to the listed items, mills generally will have a number of additional specific chemicals that will vary from mill to mill depending on the additives used by a particular mill. On-site air and land releases, including land disposals, of toxic chemicals associated with the papermaking process and off-site transfers of waste containing these toxic chemicals may also have to be accounted for in TRI Form R reports; and EPCRA/CERCLA emergency reporting could apply for off-site releases that are not federally permitted and that exceed a certain reportable quantity. Section 9.6 and Appendix D discuss these issues.

Other activities. The emergency release requirements under EPCRA are not expected to raise significant concerns with respect to the other activity areas addressed in this Section 9, although miscellaneous material handling spills and other accidental releases may trigger emergency notification requirements. In addition, the emergency preparedness requirements do not raise specific process-based concerns, although the chemical inventory and TRI reporting obligations may apply for various chemicals associated with these miscellaneous mill activity areas.

9.3 Air Issues and Inspection Considerations

Wood handling. Although some permits may include specific work practice standards for woodyard operations, generally the only applicable requirements are generic opacity standards, general nuisance provisions, or general requirements for proper operation and maintenance of a facility. Consistent with these types of requirements, the inspector should:

- Conduct a visual evaluation of fugitive dust sources. If fugitive dust sources appear high in comparison to other mills, interview plant personnel about the mill's procedures for reducing fugitive emissions and note this information for subsequent evaluation against other mills' procedures.

- Verify that the mill is conducting any control measures or work practices that are required by permit or regulation. If water spray systems are used, verify the location of spray nozzles and visually determine if the water spray pattern is adequate. The water flow rate should be recorded along with the water supply pressure for each system. Compare these data to design or other baseline values for the water spray system.

In addition, the inspector should determine whether there have been any modifications to the woodyard operations that could allow for increased production (and

emissions) in other areas of the mill. If so, the increased emissions in the other process areas that are associated with the ability to increase production may trigger new source review (NSR) permit requirements. Document how the mill addressed NSR issues when making the woodyard modifications.

Papermaking. As with the woodyard operations, there generally are no specific air regulations that apply to the papermaking operations. There may be some small controls in place, such as cyclones on fine paper finishing vents or filter systems on starch silos. The inspector may conduct a visual screening check for visible emissions in this area.

In addition, as with woodyard operations, NSPS or NSR requirements for other process areas may be triggered if papermaking improvements allow for increased production (and emissions) in those other process areas. For instance, EPA has previously noted these concerns in advising a State agency in the context of a planned papermaking press replacement.[8] The agency noted that the papermaking modification would increase mill production capacity and would likely increase TRS and particulate matter emissions from units outside the papermaking area that are the types of units affected under NSPS Subpart BB (such as digesters and washer systems). These emission increases potentially could trigger NSPS and/or NSR applicability. In this determination, the Agency noted a key distinction in determining whether NSPS or NSR requirements are triggered:

- Because the NSPS do not apply to the papermaking operations, the NSPS would be triggered only if the increase in production allowed by the press modification required a capital expenditure on a unit of the type subject to the NSPS (e.g., a digester)

- For PSD, the entire mill is considered the affected source, so any "significant" emission increase (as defined in the applicable NSR program) from the mill as a whole would trigger NSR review

The inspector should determine what, if any improvements have been made or are scheduled for the papermaking operations and then interview plant personnel to determine how the mill addressed (or plans to address) NSPS and NSR concerns associated with the modification(s).

Industrial refrigeration. Owners and operators of complex customized refrigeration appliances used in various industries, including pulp and paper, are required to follow service practices that maximize recovery and recycling during the service and disposal of industrial process refrigeration equipment that contains chlorofluorocarbons (CFCs). Where the same system is used as both industrial process refrigerant equipment and comfort-cooling equipment, the appliance is considered industrial process refrigeration equipment if at least 50 percent of its capacity is used in an industrial process refrigeration application.

Persons servicing or disposing of this equipment must be properly certified, and certified equipment and required service practices must be used. Also, because almost all of these appliances normally contain more than 50 pounds of refrigerant, specific leak

repair requirements must be followed. The leak repair requirements are triggered when refrigerant is found to be leaking at a rate that would exceed 35 percent of the total charge in a 12-month period. The owner or operator must either repair such leaks within thirty days from the date the leak was discovered, or develop a dated retrofit/retirement plan within thirty days and complete actions under that plan within one year from the plan's date. However, under certain circumstances, additional time may be available.

These requirements are contained in 40 CFR Part 82 Subpart F, the regulations promulgated under section 608 of the Clean Air Act. The basic regulatory provisions include:

- Specific servicing requirements at § 82.156, including the leak repair requirements at § 82.156(i)
- Technician certification requirements at § 82.161
- Recordkeeping and reporting requirements at § 82.166, including the leak repair requirements at § 82.166(n) and (o)

In addition, there are a number of resources available from the Stratospheric Protection Division's Hotline ((800) 296-1996) or the EPA Website (*www.epa.gov/docs/ozone*). For the CFC program, EPA has developed various fact sheets, a Compliance Guidance, Self-Audit Checklist, and Training Module For Industrial Process Refrigeration Leak Repair Regulations Under Section 608, and an inspector's checklist. Applicability determinations for questions about the coverage of these regulations can be found at the ADI Website (see *http://www.epa.gov/oeca*).

Based on experience with the program to date, the inspector should focus on whether persons operating industrial refrigeration have failed to:

- Employ properly certified technicians for refrigerant recovery
- Use certified equipment for refrigerant recovery
- Repair substantial leaks
- Retrofit or retire equipment properly
- Submit information regarding leak repair or retrofit/retirement requirements

The example assessment form in Appendix E includes a checklist of appropriate questions that EPA has developed as part of its inspection guidance materials for the section 608 CFC program.

9.4 CWA Requirements and Inspection Considerations

9.4.1 NPDES Permit Review and Physical Inspection of the Woodyard

The inspector should review the permit application and permit limit calculations and determine if the existing permit limits include

NOTE! Only mills employing wet woodyard operations should have permit allowances for such operations.

allowances for discharges from wet wood handling operations. During the on-site inspection, the inspector should examine the woodyard to determine if wet woodyard operations are occurring. If an inconsistency is found, the inspector should consult with the permit writer and determine if a permit modification is required.

9.4.2 Storm Water Requirements

The CWA requires an NPDES permit for storm water discharges associated with industrial activity. As discussed in Appendix B, many permits are issued as "general" permits to authorize discharges from a group of similar facilities, although site-specific "individual" permits also may be used. The main permit elements are to develop and comply with a storm water pollution prevention (SWPP) plan and conduct certain limited monitoring (quarterly visual examinations of grab samples and, in some cases, analytical tests for certain pollutants).

Wood handling is likely to contribute to storm water runoff and is a focal point for storm water management at a mill. Wood handling activities such as log washing, bark removal, and chipping/sawing generate large quantities of wood chips, sawdust, and other debris. If exposed to storm water, these activities may contribute total suspended solids (TSS) and biochemical oxygen demand (BOD_5) to a mill's storm water discharge. On-site landfills also may contribute pollutants to storm water discharges. Storm water discharges from landfills frequently contain high TSS levels because of extensive land disturbance activities.

The EPA has established a multi-sector general permit (MSGP) for jurisdictions in which EPA is the NPDES permitting authority. State permit requirements vary but generally will include requirements comparable to the MSGP requirements. Because the MSGP is organized by various sectors, there is the possibility that a single mill will be subject to different sector portions of the MSGP. One example of this type of co-located MSGP coverage are the sectors for general kraft pulp mill operations (including woodyard, papermaking and other miscellaneous mill operations) and for landfill (or land application) operations. Figures 9-1 and 9-2 summarize the applicable best management practices (BMPs) that EPA has identified for these operations.

Figure 9-1
Suggested BMPs for Paper and Allied Product Manufacturing Facilities

Activity	Suggested BMPs
Outdoor loading and unloading	! Confine loading/unloading activities to a designated response and control area ! Avoid loading/unloading material in the rain ! Cover loading/unloading area or conduct these activities indoors ! Develop and implement spill plans ! Use berms or dikes around area ! Inspect containers for leaks or damage prior to loading ! Use catch buckets, drop cloths, and other spill prevention measures where liquid materials are loaded/unloaded ! Provide paved areas to enable easy collection of spilled materials
Raw and/or waste material storage areas	! Confine storage to a designated area ! Store materials inside ! Cover storage areas with a roof or tarp ! Use dikes or berms for storage tanks and drum storage ! Cover dumpsters used for waste paper and other materials ! Store materials on concrete pads to allow for recycling and spills of leaks ! Expedite recycling process for exposed scrap paper ! Develop and implement spill plans ! Provide good housekeeping (i.e., dust and debris collection) where cyclones are utilized ! Divert storm water around storage areas with ditches, swales, and/or berms
Log, lumber, and other wood product storage areas	! Practice good housekeeping measures such as frequent removal of debris ! Line storage areas with crushed rock or gravel or porous pavement to promote infiltration, minimize discharge, and provide sediment and erosion control ! Use ponds for collection, containment, and recycle for log spraying operations
Maintenance activities	For vehicle maintenance activities performed on site, facility shall consider the applicable BMPs for Storm Water Discharges from Vehicle Maintenance or Equipment Cleaning Operations at Motor Freight Transportation Facilities, Passenger Transportation Facilities, Petroleum Bulk Oil Stations and Terminals, or the United States Postal Service

Figure 9-2
Potential Sources of Pollution and General Storm Water BMPs for Landfills

Potential Pollutant Sources	BMPs
Erosion from: ! Exposed soil from excavating cells/trenches ! Exposed stockpiles of cover materials ! Inactive cells with final cover but not yet finally stabilized ! Daily or intermediate cover placed on cells or trenches ! Erosion from haul roads (including vehicle tracking of sediments)	! Stabilize soils with temporary seeding, mulching, and geotextiles; leave vegetative filter strips along streams ! Implement structural controls such as dikes, swales, silt fences, filter berms, sediment traps and ponds, outlet protection, pipe slope drains, check dams, and terraces to convey runoff, to divert storm water flows away from areas susceptible to erosion, and to prevent sediments from entering water bodies ! Frequently inspect all stabilization and structural erosion control measures and perform all necessary maintenance and repairs ! Stabilize haul roads and entrances to landfill with gravel or stone ! Construct vegetated swales along road ! Clean wheels and body of trucks or other equipment as necessary to minimize sediment tracking (but contain any wash waters [process wastewaters]) ! Frequently inspect all stabilization and structural erosion control measures and perform all necessary maintenance and repairs
Application of fertilizes, pesticides, and herbicides	! Observe all applicable Federal, State, and local regulations when using these products ! Strictly follow recommended application rates and methods (i.e., do not apply in excess of vegetative requirements) ! Have materials such as absorbent pads easily accessible to clean up spills
Exposure of waste at open face	! Minimize the area of exposed open face as much as is practicable ! Divert flows around open face using structural measures such as dikes, berms, swales, and pipe slope drains ! Frequently inspect erosion and sedimentation controls
Waste tracking onsite and haul roads, solids transport on wheels and exterior of trucks or other equipment (common with incinerator ash)	! Clean wheels and exterior of trucks or other equipment as necessary to minimize waste tracking (but contain any wash waters [process wastewaters])
Uncontrolled leachate	! Frequently inspect leachate collection system and landfill for leachate leaks
General sources	! Maintain landfill cover and vegetation ! Maintain leachate collection system

In the MSGP, EPA has established specific discharge monitoring requirements for paperboard mills, and landfills and land application sites (see Figure 9-3). These requirements are in addition to the quarterly visual checks required for all MSGP-permitted facilities.

Figure 9-3
Monitoring Requirements for Paperboard Mills and Landfill/ Land Application Sites

Facility/Pollutant	Monitoring Requirements
Landfills (and Land Application Sites)/ Total Suspended Solids (TSS)	! In 2nd year of permit, conduct quarterly monitoring ! Calculate average concentration for TSS -- if > 100 mg/L, then conduct same quarterly sampling in 4th year of permit ! In 4th year of permit, also conduct quarterly TSS monitoring if landfill/land application activities or SWPP plan have been altered such that the storm water discharges will be adversely affected
Landfills (and Land Application Sites)/ Total Recoverable Iron	! In 2nd year of permit coverage, conduct quarterly monitoring ! Calculate average Total Recoverable Iron concentration -- if > 1.0 mg/L, then conduct same quarterly sampling in 4th year of permit ! In 4th year of permit, also conduct quarterly Total Recoverable Iron monitoring if landfill/land application activities or SWPP plan have been altered such that the storm water discharges will be adversely affected
Paperboard Mills/Chemical Oxygen Demand (COD)	! In 2nd year of permit coverage, conduct quarterly monitoring ! Calculate average COD -- if > 120 mg/L, then conduct same quarterly sampling in 4th year of permit ! In 4th year of permit, also conduct quarterly COD monitoring if paperboard mill operations or SWPP plan have been altered such that the storm water discharges will be adversely affected

9.4.3 Storm Water Inspection Considerations

To evaluate compliance with basic storm water requirements, the inspector should:

- Review applicable records to assure that the SWPP is up to date and includes all required elements, and that the mill has performed all required self-monitoring and self-inspection procedures
- Evaluate the results of monitoring and inspection data to determine whether those records indicate potential compliance concerns -- if the data indicate potential problems, follow up with mill personnel to determine what corrective actions, if any, were taken in response to the monitoring/inspection results
- Observe control and prevention measures to evaluate whether good operation and maintenance practices are being used
- Verify that the mill does not have improper connections that permit non-storm water to be discharged from storm water outfalls

As a guide, the inspector should consider the example checklists included in EPA's *NPDES Compliance Inspection Manual* (EPA 300-B-9-014). The lists identify appropriate elements to cover in reviewing records and conducting visual observations of control and prevention measures. The inspector should also consider the following in

investigating the possibility of improper cross connections of storm water and process wastewaters:[5]

- Evaluate results of any testing of storm water outfalls for indicators of non-storm water being discharged (such as results of pH testing)
- Determine whether storm water outfalls continue to have discharges during periods without rainfall
- Observe the storm water outfalls for indications of possible non-storm water discharges -- is there discoloration, odor, residues, floatables, affected vegetation, or structural damage such as peeling paint or corroded metal?
- Interview plant personnel about floor drains, boiler blowdown waters, and non-contact cooling waters -- does the mill have documentation to show that these sources are not connected to a storm water handling system?
- Focus especially on older facilities/process units

9.5 RCRA Issues and Inspection Considerations

NOTE! See Appendix C for detailed overview of RCRA hazardous waste regulations and basic assessment procedures.

The woodyard operations, papermaking, and other general mill processes generate various miscellaneous solid waste streams. Some of these wastes are hazardous, such as spent solvents from parts degreasing. The inspector should review the basic hazardous waste generator (and used oil) requirements and assessment procedures outlined in Appendix C. A RCRA screening checklist is also included in Appendix E.

In addition, non-hazardous solid waste discharges may be handled in on-site solid waste landfills. Although the requirements for a landfill are highly State and source-specific, the inspector should consider at least the following with respect to RCRA compliance at these solid waste landfills:

- Verify that the mill properly excludes hazardous waste from the landfill -- document the waste streams that are landfilled on-site, and determine what methods were used to characterize the waste and make the non-hazardous waste determination
- Check to make sure that only permissible wastes are received for disposal
- Confirm that any required training, inspection and recordkeeping requirements are up to date and meet State regulatory/permit requirements
- Review any required monitoring data for evidence of potential contaminant leaks from the landfill site. Sampling and contaminant limits may be outlined in the solid waste permit

- Observe the landfill site to document any obvious problems with operation and maintenance, and check for obvious signs of spills and improper unloading practices
- Leachate control and handling should be reviewed at unbleached kraft mills. If the leachate is sent to the wastewater treatment plant or a stormwater outfall, consider whether such handling is allowed under the mill's NPDES permit(s). Also identify any requirements for leachate handling that are included in the solid waste permit

9.6 EPCRA Issues and Inspection Considerations

NOTE! See Appendix D for overview of EPCRA regulations and basic assessment procedures.

General concerns. The basic regulatory requirements for EPCRA are not process-specific but rather apply on a facility-wide basis. Thus the basic requirements of EPCRA are discussed in Appendix D. For the woodyard, papermaking, and other miscellaneous activities covered in this Section 9, the key EPCRA issues will be to quantify releases of applicable listed toxic chemicals in the Toxic Release Inventory (TRI) report (known as the "Form R" report). In addition, spills of raw materials handled in these process areas, or air emissions from papermaking operations, potentially could result in off-site releases that exceed applicable reportable quantities that would require emergency notification under EPCRA and parallel provisions of CERCLA.

Inspection considerations. The EPCRA compliance assessment generally will focus initially on a records review. The inspector should review the following materials:

- *Emergency preparedness information*. These obligations are not process-specific, and thus the basic assessment considerations are covered for all facility operations in Appendix D to this manual.

- *TRI Form R*. Check to ensure that the form is on file and that the source has adequately considered releases associated with these process areas. For papermaking activities, EPA has prepared guidance to assist facilities with TRI reporting.[7] Also, ask to see the estimation technique being used. If the estimation technique involves an assumed reduction efficiency for control methods, make sure that the assumed efficiency is consistent with the overall efficiency that the mill is achieving. The overall assumed efficiency should account for any excess emission/discharge releases in a manner consistent with the actual percent of operating time such releases occur. Uncontrolled emission/discharge episodes or periods of reduced control efficiency can have a significant impact on the estimate of total releases.

- *Emergency notifications*. Request documentation that the mill has filed all required notices.

If an air, water or RCRA inspector plans to screen for EPCRA compliance, the inspector should confirm the necessary information with the facility contact during the opening conference or just in advance of the closing conference. For an announced inspection, the inspector should ask the source to have ready EPCRA-related documentation so that this screening check can be performed without interrupting the main focus of the inspection. A screening checklist is included as part of the example assessment form in Appendix E.

In addition to a screening-type records review inspection, an EPCRA inspector may want to conduct further assessments to identify potential compliance concerns with emergency notification requirements. As one technique, the inspector first can check general mill upset reports and citizen complaints since the previous inspection. The inspector then should cross-check those incidents with notification records identified in EPA's ERNS database, records on file with State/local emergency officials, or records requested from the mill. If this type of investigation identifies episodes of abnormal releases in which no notification was provided, the inspector should consider a follow-up investigation to determine if reportable quantity thresholds were exceeded. For the process areas covered by this section, significant accidental releases from raw material or waste storage and handling would be the most likely areas of concern.

References:

1. Smook, G.A., *Handbook for Pulp and Paper Technologists*, Joint Textbook Committee of the Paper Industry. TAPPI, 1982.

2. *Kraft Pulp Mill Inspection Guide*. Prepared for U.S. EPA under Contract No. 68-01-6310, Work Assignment No. 65, Pedco Environmental, Inc., Cincinnati, Ohio, January 1983.

3. Leatherwood, C. (Eastern Research Group, Inc.) to Lassiter, P. (U.S. EPA), Memorandum re: Maximum Achievable Control Technology (MACT) Determination for Papermaking Systems, September 10, 1997.

4. Buonicore, A.J and Davis, W.T., eds., *Air Pollution Engineering Manual*, Air and Waste Management Association, 1992.

5. *Proposed Technical Development Document for the Pulp, Paper and Paperboard Category and Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards.* U.S. Environmental Protection Agency, Washington, D.C., October 1993.

6. *Profile of the Pulp and Paper Industry* (EPA/310-R-95-015), EPA Office of Compliance Sector Notebook Project, U.S. Environmental Protection Agency, September 1995.

7. *Title III Section 313 Release Reporting Guidance -- Estimating Chemical Releases from Paper and Paperboad Production*, U.S. Environmental Protection Agency, Office of Pesticides and Toxic Substances, EPA 560/4-88-004k, February 1988.

8. U.S. EPA Applicability Determination Index (ADI): Document Control #NR124.

This page intentionally left blank