Appendix A

Subpart B and E Facilities

Table A-1 identifies the 86 facilities regulated by the April 15, 1998 publication of the revised regulations for Subpart B - Bleached Papergrade Kraft and Soda Subcategory. Because many pulp and paper facilities operate several mills, the table displays the other subparts applicable to the facility.

Table A-1: Bleached Papergrade Kraft Mills

Facility Name	City	ST	B	C	E	F	G	I	J	K	L
Boise Cascade Corp	Jackson	AL	X								
Champion International	Courtland	AL	X							X	
International Paper Co	Mobile	AL	X							X	X
Kimberly-Clark Tissue Co.	Mobile	AL	X	X						X	X
International Paper Co	Selma	AL	X								
Container Corp. Of America	Brewton	AL	X	X							
Alabama River Pulp Co. Inc	Perdue Hill	AL	X								
Alabama Pine Pulp	Perdue Hill	AL	X								
Alliance Forest Products	Coosa Pines	AL	X				X				
Gulf States Paper Corp	Demopolis	AL	X					X			
Fort James Corp.	Pennington	AL	X								X
Georgia-Pacific Corp	Ashdown	AR	X							X	
Georgia-Pacific Corp	Crossett	AR	X								
International Paper Co	Pine Bluff	AR	X				X				
Potlatch Corp	McGehee	AR	X								
Louisiana-Pacific Corp	Samoa	CA	X								
Plainwell Shasta Paper Co.	Anderson	CA	X							X	
Georgia-Pacific Corp	Palatka	FL	X	X							
Stone Container Corp	Panama City	FL	X	X					X		
Champion International	Cantonment	FL	X								

Facility Name	City	ST	B	C	E	F	G	I	J	K	L
Florida Coast Paper Co. L.L.C.	Port St. Joe	FL	X	X					X		
Federal Paper Board Co. - Int'l Paper	Augusta	GA	X						X		X
Stone Container Corp-Savannah River Div	Port Wentworth	GA	X	X					X		
Georgia-Pacific Corp.	Brunswick	GA	X								X
Weyerhaeuser Co.	Oglethorpe	GA	X								
Gilman Paper Co	St. Marys	GA	X	X					X		
Potlatch Corp	Lewiston	ID	X								X
Westvaco Corp	Wickliffe	KY	X								
Willamette Industries Inc.	Hawesville	KY	X							X	
Georgia-Pacific Corp-Port Hudson Oper.	Zachary	LA	X								
Crown Vantage Inc.	St. Francisville	LA	X				X				
Boise Cascade Corp	DeRidder	LA	X	X			X		X		
International Paper Co	Bastrop	LA	X								
Westvaco Corp	Luke	MD	X								
SD Warren Co. - Hinckley	Skowhegan	ME	X								
S D Warren Co	Westbrook	ME	X						X	X	
International Paper Co	Jay	ME	X	X			X			X	
Mead Corp.	Rumford	ME	X				X			X	
Fort James Corp.	Old Town	ME	X								
Eastern Paper Co. Inc.	Lincoln	ME	X							X	X
Georgia-Pacific Corp	Woodland	ME	X							X	X
Champion International	Quinnesec	MI	X								
Mead Corp.	Escanaba	MI	X				X				
S D Warren Co	Muskegon	MI	X							X	X
Boise Cascade Corp	International Falls	MN	X	X						X	
Potlatch Corp	Cloquet	MN	X							X	
Georgia-Pacific Corp.	New Augusta	MS	X								
International Paper Co	Moss Point	MS	X								X
Weyerhaeuser Co.	Columbus	MS	X				X			X	
Stone Container Corp	Missoula	MT	X	X					X		
Carolina Paper	Canton	NC	X						X	X	X
Weyerhaeuser Co.	New Bern	NC	X								
Weyerhaeuser Co.	Plymouth	NC	X	X					X	X	X
Federal Paper Board Co. - Int'l Paper	Riegelwood	NC	X								

Facility Name	City	ST	B	C	E	F	G	I	J	K	L
Crown Vantage Inc.	Berlin	NH	X	X					X	X	
International Paper Co	Ticonderoga	NY	X							X	
Mead Corp.	Chillicothe	OH	X							X	
Boise Cascade Corp	St Helens	OR	X								
Fort James Corp.	Clatskanie	OR	X				X				
Pope & Talbot Inc.	Halsey	OR	X								
Willamette Industries Inc.	Johnsonburg	PA	X							X	
P. H. Glatfelter Co	Spring Grove	PA	X							X	
International Paper Co.	Erie	PA	X							X	
Appleton Papers Inc.	Roaring Spring	PA	X							X	
International Paper Co.	Eastover	SC	X								
Willamette Industries Inc.	Bennettsville	SC	X								
Bowater Incorp	Catawba	SC	X				X				
International Paper Co	Georgetown	SC	X								
Bowater Newsprint	Calhoun	TN	X				X				
Willamette Industries Inc.	Kingsport	TN	X							X	X
International Paper Co	Texarkana	TX	X				X				
Donohue Inc.	Sheldon	TX	X	X			X				X
Donohue Inc.	Lufkin	TX	X				X				X
Pasadena Paper Company	Pasadena	TX	X								
Temple-Inland Inc. - Evadale	Silsbee	TX	X	X							
Westvaco Corp	Covington	VA	X			X			X		X
St. Laurent Paper Products Corp.	West Point	VA	X	X					X		X
International Paper Co.	Franklin	VA	X								
Simpson Tacoma Kraft Co	Tacoma	WA	X	X							
Boise Cascade Corp	Wallula	WA	X	X					X		
Port Townsend Paper Corp	Port Townsend	WA	X	X					X		
Fort James Corp.	Camas	WA	X	X	X						
Longview Fibre Co	Longview	WA	X	X					X		
Weyerhaeuser Co.	Longview	WA	X			X			X	X	
Consolidated Papers Inc.	Wisconsin Rapids	WI	X								
Georgia-Pacific Corp. at Nekoosa Mill	Port Edwards	WI	X					X		X	

Table A-2 identifies the 10 facilities affected by the April 15, 1998 publication of the revised regulations for Subpart E - Papergrade Sulfite Subcategory. Because many pulp and paper facilities operate several mills, the table displays the other subparts applicable to the facility.

Table A-2: Papergrade Sulfite Mills

Facility Name	City	ST	B	C	E	G	J	K	L
Great Northern Paper Co.	Millinocket	ME			X	X		X	
Finch Pruyn & Co Inc.	Glens Falls	NY			X			X	
Procter & Gamble Paper Products Co.	Mehoopany	PA			X		X		X
Kimberly-Clark Corp.	Everett	WA			X	X	X		X
Georgia-Pacific Corp.	Bellingham	WA			X	X			
Fort James Corp.	Camas	WA	X	X	X				
Weyerhaeuser Co.	Rothschild	WI			X		X	X	
Wausau Paper Mills Co.	Brokaw	WI			X			X	
Fraser Papers Inc.	Park Falls	WI			X			X	
Georgia-Pacific Corp.	Port Edwards	WI			X			X	

Appendix B
Sample Collection Methods

B.1 BLEACH PLANT WASTEWATER

Samples of bleach plant wastewater must be analyzed for chloroform, TCDD, TCDF, and chlorinated phenolic compounds (and AOX at indirect dischargers). Six pairs of 40 milliliter vials will be filled during each 24-hour compositing period. Samples to be analyzed for TCDD, TCDF, and chlorinated phenolic compounds (CPs) may be collected as 24-hour manual composites, by collecting 1.5 liters of sample every 4 hours for 24 hours. Alternatively, samples to be analyzed for TCDD, TCDF, and CPS may be collected as continuous automatic composites.

Prior to sample collection, the following equipment should be set up at the sampling point:

- A sample cooling system, consisting of Teflon® tubing attached to a valve at one end and coiled and placed in a tub of ice and water at the other;
- A sump or other container (e.g., a bucket under the tap/valve from which the sample is collected) in which to dispose of sample that is purged from the tap/valve prior to sample collection;
- A padlocked cooler that is double-lined with large plastic bags and contains a specially-cleaned 10-liter glass storage jar in which the sample will be composited, a specially-cleaned 1-liter glass jar with which sample aliquots will be collected (the jar should be marked to show the half-full level), a specially-cleaned 500-milliliter glass jar with which field measurements will be obtained, a foam block for holding 40 milliliter glass vials, and fifteen 40-milliliter glass vials;
- Large plastic bags, twist-ties, plastic zip-lock freezer bags, and labels for each pair of glass vials;
- A pH meter or four-color pH paper, a temperature probe or thermometer, and a wash bottle filled with deionized water;

- A test kit for free chlorine (consists of a disposable pipette or eyedropper, a 40-milliliter clear glass vial, latex gloves, 1.0 N sodium thiosulfate solution, potassium iodide crystals, starch solution, and concentrated acetic acid);

- A sampling log containing field data sheets (see Figure 3-1 of this document);

- A box in which to store sampling equipment between the collection of sample aliquots during the 24-hour compositing period; and

- Ice.

Samples must be collected as follows:

1. The sample to be analyzed for chloroform will be collected first.

2. Two 40-milliliter glass vials are required. Use bottles that are certified clean by the manufacturer. If chemical preservation is required at this sampling point, make sure that the vials have been pre-preserved in the staging area (see Section 3.5 of this document). Do not touch the inside of the bottle or the lined bottle cap.

3. Turn on the tap/valve and allow the sample to flow through the cooling system into a sump (or bucket) for 2 to 3 minutes, to purge the line.

4. Insert the Teflon® tubing into the bottom of a vial and fill it with sample while slowly withdrawing the tubing from the vial. Fill the vial to overflowing.

5. Seal the vial by placing the septum (Teflon® side down) on the convex sample meniscus and screwing down the cap. To ensure that the sample has been properly sealed, invert the sample: the absence of air bubbles indicates a proper seal.

6. If air bubbles are present, discard the vial and fill a new one. Seal the vial and test that it is hermetically sealed, as described above. (Note: if the vial was pre-preserved with chemicals, use another pre-preserved vial to collect the sample a second time).

7. Collect sample in the second vial in the same manner as used for the first vial. Close the tap/valve.

8. Place both vials in one plastic zip-lock freezer bag, along with a label identifying the pair of aliquots. Place the plastic zip-lock freezer bag in the double-lined cooler.

9. Record the date and time of sample collection on the field data sheet.

10. The remaining sample fractions must NOT be collected through the Teflon® tubing. If a three way valve has not been installed in the sample line, remove the tubing from the tap/valve and place a small plastic bag around the tip of the tubing. Then place the tubing in a large plastic bag. Close the bag with a twist-tie and place it in a box near the cooler.

11. A specially-cleaned 1-liter glass jar is required to collect the sample aliquots for the composite sample. A 500-milliliter specially-cleaned glass jar is required to collect sample to measure the pH and temperature of the sample. Use jars that

are certified clean by the manufacturer. Do not touch the inside of the jar or the lined jar cap.

12. Test the acid stage filtrate for free chlorine as follows:

- Fill the 40-milliliter clear vial to the bottom of the neck with sample;

- If the sample is not acidic (pH 3 to 4), add a few drops of acetic acid, cover the vial with a gloved hand, and mix by inverting the vial a few times;

- Add a few potassium iodide crystals and repeat the mixing step;

If the sample turns black or blue/black, residual chlorine is present and the following steps are required:

- Add one- or two-drop increments of sodium thiosulfate to the vial with mixing between additions;

- Record the number of drops of sodium thiosulfate required to clear the sample of the blue color on the field measurements data sheet. Two milliliters of sodium thiosulfate will be added to the composite for every drop required to clear the sample.

13. Fill the 500-milliliter glass jar approximately ¾ full and use the pH meter or pH paper to measure the pH. Use a temperature probe or thermometer to measure the temperature of the sample. Record this information on the field data sheet and discard the sample into a sump. The sampler should also measure and record the pH and temperature of the final composite sample.

14. Fill the 1-liter amber glass jar with sample and add 1.0 N sodium thiosulfate solution to the glass storage jar; 2 milliliters of sodium thiosulfate should be used for every drop required for the titration described in step (12). Pour this sample into the 10-liter glass storage jar. Do not touch the inside of the glass storage jar. Next, fill the 1-liter glass jar halfway full of sample (to the mark) and turn off the tap/valve. Record the volume of sodium thiosulfate added to the composite on the field measurements data sheet. Seal the glass storage jar by screwing on the lid.

15. Put the lids on the 1-liter amber glass jar and the 500-milliliter glass jar and place them in plastic zip-lock freezer bags. Seal the bags and place them back in the cooler.

16. Place ice in the cooler, outside the double lining of plastic bags. Arrange the bags of ice around the 10-liter glass storage jar. More ice should be used when temperatures are very high. Check the ice in the cooler periodically and replace it as necessary.

17. Close and lock the cooler.

18. Rinse the pH probe in deionized water before its next use. Discard rinsate into a sump.

19. Repeat the above 18 steps for each sample aliquot. Aliquots will be collected every 4 hours during the 24-hour compositing period, for a total of six sample aliquots. At the end of the 24-hour compositing period, the cooler should

contain approximately 9 liters of sample in the 10-liter glass storage jar and twelve 40-milliliter vials of samples in the VOA block.

20. Take the cooler containing the samples to the staging area. Mix the contents of the 10-liter glass storage jar using a glass stirring rod. Alternatively, carefully screw on the lid of the glass storage jar and invert it several times to thoroughly mix the contents. After the sample is thoroughly mixed, pour it from the storage jar into five 1-liter amber glass bottles using the following procedure:

    - Swirl and shake the storage jar to re-suspend settled solids;
    - Fill each sample jar to about ¼ of its empty volume;
    - Mix the remaining volume in the storage jar;
    - In reverse order, add another ¼ volume aliquot to each sample jar; and
    - Repeat until the sample jars have been filled.

21. Follow the preservation procedures discussed in B.3 of this appendix if samples are to be shipped to an off-site laboratory.

B.2 WASTEWATERS FROM THE TREATMENT SYSTEM

To demonstrate compliance with new limitations for toxic and nonconventional pollutants, samples of wastewaters from the treatment system must be analyzed for AOX. Samples to be analyzed for AOX may be collected as 24-hour manual composites, by collecting 1.5 liters of sample every 4 hours for 24 hours. Alternatively, they may be collected as continuous automatic composites.

Prior to the sample collection of manual composites, the following equipment should be set up at the sampling point:

- A sump or other container (e.g., a bucket under the tap/valve from which the sample is collected) to dispose of sample that is purged from the tap/valve prior to sample collection;
- A padlocked cooler that is double-lined with large plastic bags and contains a specially-cleaned 10-liter glass storage jar in which the sample will be composited, a specially-cleaned 1-liter glass jar with which sample aliquots will be collected (the jar should be marked to show the half-full level), a specially-cleaned 500-milliliter glass jar with which field measurements will be obtained, a VOA block, and fifteen 40-milliliter pre-preserved glass vials;
- Plastic zip-lock freezer bags and labels for each pair of glass vials;
- A pH meter or four-color pH paper, a temperature probe or thermometer, and a wash bottle filled with deionized water;
- A sampling log containing field data sheets (see Figure 3-1 of this document);
- A box in which to store sampling equipment between the collection of sample aliquots during the 24-hour compositing period; and
- Ice.

Manual composite samples should be collected as follows:

1. A 1-liter specially-cleaned glass jar is required to collect the sample aliquots for the composite sample. A 500-milliliter specially-cleaned glass jar is required to collect a sample to measure the pH and temperature of the sample. Use bottles that are certified clean by the manufacturer. Do not touch the inside of the bottle or the lined bottle cap.
2. Fill the 500-milliliter glass jar approximately ¾ full and use the pH meter or pH paper to measure the pH. Use a temperature probe or thermometer to measure the temperature of the sample. Record this information on the field data sheet and discard the sample into a sump. The sampler should also measure and record the pH and temperature of the final composite sample.
3. Fill the 1-liter glass jar with sample and pour this sample into the 10-liter glass storage jar. Do not touch the inside of the glass storage jar. Repeat, only filling

the 1-liter glass jar halfway full (to the mark) this second time and turn off the tap/valve. Seal the glass storage jar by screwing on the lid.

4. Put the lids on the 1-liter amber glass jar and the 500-milliliter glass jar and place them in plastic zip-lock freezer bags. Seal the bags and place them back in the cooler.

5. Place ice in the cooler, outside the double lining of plastic bags. Arrange the bags of ice around the 10-liter glass storage jar. More ice should be used when temperatures are very high. Check the ice in the cooler periodically and replace it as necessary.

6. Close and lock the cooler.

7. Rinse the pH probe in deionized water before its next use. Discard the rinsate into a sump.

8. Repeat the above 7 steps for each sample aliquot. Aliquots will be collected every 4 hours during the 24-hour compositing period, for a total of six sample aliquots. At the end of the 24-hour compositing period, the cooler should contain approximately 9 liters of sample in the 10-liter glass storage jar.

9. Take the cooler containing the samples to the staging area. Mix the contents of the 10-liter glass storage jar using a glass stirring rod. Alternatively, carefully screw on the lid of the glass storage jar and invert it several times to thoroughly mix the contents. After the sample is thoroughly mixed, pour it from the storage jar into seven 1-liter amber glass bottles and one 500-milliliter amber glass bottle using the following procedure:

   - Swirl and shake the storage jar to re-suspend settled solids;
   - Fill each sample jar to about ¼ of its empty volume;
   - Mix the remaining volume in the storage jar;
   - In reverse order, add another ¼ volume aliquot to each sample jar; and
   - Repeat until the sample jars have been filled.

10. Follow the preservation procedures discussed in B.3 of this appendix if samples are to be shipped to an off-site laboratory.

B.3 SAMPLE PRESERVATION

After collection, all samples require some preservation to prevent the degradation of the target analytes. The sample analyses and required preservation for a water sample set are discussed below.

All samples will be stored and shipped in coolers packed with ice to maintain the sample at 4°C. Additional chemical preservation requirements are discussed below for each analytical parameter. Reagent grade chemicals will be used for preservation. Due to the corrosivity of these chemicals, personnel should always wear gloves when chemically preserving these samples. The amount of preservative added to each sample should be documented on a Preservation Log Sheet.

Chloroform

Samples of acid stage filtrate may require dechlorination using sodium thiosulfate. The acid stage filtrate is assumed to contain free chlorine, at least intermittently. These samples will be dechlorinated by adding a few sodium thiosulfate crystals (10 mg) to each 40-milliliter vial prior to sample collection. Document the amount of preservative added in a preservation log book.

By pre-preserving the vial, rather than adding preservatives after the sample has been collected, a hermetic seal can be maintained on each vial after sample collection. Some samples to be analyzed for volatile organics will have to be poured out and collected in a new vial because they were not hermetically sealed. For this reason, plan to have extra pre-preserved vials at each sampling point, rather than taking preservatives to each sampling point.

Chlorinated Dioxins and Furans

Samples of acid stage filtrate may require dechlorination using sodium thiosulfate. Mill personnel will monitor the free chlorine content of the acid stage filtrate prior to the collection of each sample aliquot. If the aliquot contains free chlorine, 1.0 N sodium thiosulfate solution will be added to 1 liter of the sample aliquot before pouring the aliquot into the glass storage jar. The determination for free chlorine and the volume of sodium thiosulfate to use is discussed in item 12, on page B-3 of this appendix.

Chlorinated Phenolic Compounds

Samples to be analyzed for chlorinated phenolic compounds will be preserved with sulfuric acid. Samples of acid stage filtrate may also require dechlorination using sodium thiosulfate. Mill personnel will monitor the free chlorine content of the acid stage filtrate prior to the collection of each sample aliquot. If the aliquot contains free chlorine, 1.0 N sodium thiosulfate solution will be added to 1 liter of the sample aliquot before pouring the aliquot into the glass storage jar. The volume of thiosulfate used will be determined by an on-site test, as described in Appendix B of this document.

After sample collection for the 24-hour compositing period is complete, the sampler will take the glass storage jar to the staging area, mix the contents of the jar, and pour the sample from the storage jar into the appropriate sample containers.

To preserve a sample to be analyzed for chlorinated phenolic compounds, use a Pasteur pipette to add a few drops of sulfuric acid to each 1-liter amber glass bottle. Document the amount of preservative added in the preservation log book. Mix the acid with the sample by drawing the sample into a second pipette and expelling this volume back into the sample jar, repeating this several times. Alternatively, the acid may be mixed with the sample by stirring with the pipette or capping the sample jar and inverting it.

After the acid is mixed with the sample, test the pH of the mixture by drawing a small volume into the pipette and placing a drop of sample on the 4-color pH test paper. Record the pH. If the pH is not between 2 to 3, add a larger dose of acid, document the amount of preservative added, mix the acid with the sample, and test and record the pH again. Repeat this procedure until either the pH is adjusted to between 2 to 3 or the volume of preservative added to the sample jar equals 5% of the sample volume (50 milliliters for a 1-liter jar).

Alternatively, samples may be preserved with sulfuric acid by adding a fixed volume of acid to the appropriate sample containers. The volume of acid to be added would be predetermined weekly, based on a titration of the composite sample with sulfuric acid. After adding the fixed volume of sulfuric acid to the sample containers, the sampler should verify that the pH of the acidified sample is between 2 to 3 and add additional sulfuric acid if needed. As discussed above, the sample should be acidified until either the pH is adjusted to between 2 to 3, or the volume of preservative added to the sample jar equals 5% of the sample volume.

AOX

Samples to be analyzed for AOX will be preserved with nitric acid. Samples of the acid stage filtrate may also require dechlorination using sodium thiosulfate. Mill personnel will monitor the free chlorine content of the acid stage filtrate prior to the collection of each sample aliquot. If the aliquot contains free chlorine, 1.0 N sodium thiosulfate solution will be added to 1 liter of the sample aliquot before pouring the aliquot into the glass storage jar. The volume of sodium thiosulfate used will be determined by an on-site test, as described in Appendix B of this document.

After sample collection for the 24-hour compositing period is complete, the sampler will take the glass storage jar to the staging area, mix the contents of the jar, and pour the sample from the storage jar into the appropriate sample containers.

To preserve a sample to be analyzed for AOX, use a Pasteur pipette to add a few drops of nitric acid to each 500-milliliter amber glass bottle. Document the amount of preservative added in the preservation log book. Mix the acid with the sample by drawing the sample into a second pipette and expelling this volume back into the sample jar, repeating this several times. Alternatively, the acid may be mixed with the sample by stirring with the pipette or capping the sample jar and inverting it.

After the acid is mixed with the sample, test the pH of the mixture by drawing a small volume into the pipette and placing a drop of sample on the 4-color pH test paper. Record the pH. If the pH is not between 2 to 3, add a larger dose of acid, document the amount of preservative added, mix the acid with the sample, and test and record the pH again. Repeat this procedure until either the pH is adjusted to between 2 to 3 or the volume of preservative added to the sample jar equals 5% of the sample volume (25 milliliters for a 500-milliliter jar).

Alternatively, samples may be preserved with nitric acid by adding a fixed volume of acid to the appropriate sample containers. The volume of acid to be added would be predetermined weekly, based on a titration of the composite sample with nitric acid. After adding the fixed volume of nitric acid to the sample containers, the sampler should verify that the pH of the acidified sample is between 2 to 3 and add additional nitric acid if needed. As discussed above, the sample should be acidified until either the pH is adjusted to between 2 to 3, or the volume of preservative added to the sample jar equals 5% of the sample volume.

Appendix C

BMP NPDES Permit Language

Appendix C presents example permit language to assist permitting authorities establish appropriate BMP requirements in NPDES permits.

PART IV

BEST MANAGEMENT PRACTICES PLAN

A. SPECIALIZED DEFINITIONS.

(1) **Action Level**: A daily pollutant loading that when exceeded triggers investigative or corrective action. Mills determine action levels by a statistical analysis of six months of daily measurements collected at the mill. For example, the lower action level may be the 75th percentile of the running seven-day averages (that value exceeded by 25 percent of the running seven-day averages) and the upper action level may be the 90th percentile of the running seven-day averages (that value exceeded by 10 percent of the running seven-day averages).

(2) **Equipment Items in Spent Pulping Liquor, Soap, and Turpentine Service**: Any process vessel, storage tank, pumping system, evaporator, heat exchanger, recovery furnace or boiler, pipeline, valve, fitting, or other device that contains, processes, transports, or comes into contact with pulping liquor, soap, or turpentine. Sometimes referred to as "equipment items."

(3) **Immediate Process Area**: The location at the mill where pulping, screening, knotting, pulp washing, pulping liquor concentration, pulping liquor processing, and chemical recovery facilities are located, generally the battery limits of the aforementioned processes. "Immediate process area" includes spent pulping liquor storage and spill control tanks located at the mill, whether or not they are located in the immediate process area.

(4) **Intentional Diversion**: The planned removal of spent pulping liquor, soap, or turpentine from equipment items in spent pulping liquor, soap, or turpentine service by the mill for any purpose including, but not limited to, maintenance, grade changes, or process shutdowns.

(5) **Mill**: The owner or operator of a direct or indirect discharging pulp, paper, or paperboard manufacturing facility subject to this section.

(6) **Senior Technical Manager**: The person designated by the mill manager to review the BMP Plan. The senior technical manager shall be the chief engineer at the mill, the manager of pulping and chemical recovery operations, or other such responsible person designated by the mill manager who has knowledge of and responsibility for pulping and chemical recovery operations.

(7) **Soap**: The product of reaction between the alkali in kraft pulping liquor and fatty acid portions of the wood, which precipitate out when water is evaporated from the spent pulping liquor.

(8) **Spent Pulping Liquor**: For kraft and soda mills "spent pulping liquor" means black liquor that is used, generated, stored, or processed at any point in the pulping and chemical recovery processes. For sulfite mills "spent pulping liquor" means any intermediate, final, or used chemical solution that is used, generated, stored, or processed at any point in the sulfite pulping and chemical recovery processes (e.g., ammonium-, calcium-, magnesium-, or sodium-based sulfite liquors). **[Note: permitting authorities may consider green liquor, white liquor or fresh sulfite pulping liquor as a spent pulping liquor and require mills to include management of these materials in the BMPs.]**

(9) **Turpentine**: A mixture of terpenes, principally pinene, obtained by the steam distillation of pine gum recovered from the condensation of digester relief gases from the cooking of softwoods by the kraft pulping process. Sometimes referred to as sulfate turpentine.

B. REQUIREMENT TO IMPLEMENT BEST MANAGEMENT PRACTICES.

The permittee must implement the Best Management Practices (BMPs) specified in paragraphs **B.**(1) through **B.**(10) (below). BMPs must be developed according to best engineering practices and must be implemented in a manner that takes into account the specific circumstances at each mill. The BMPs are as follows:

(1) The permittee return spilled or diverted spent pulping liquors, soap, and turpentine to the process to the maximum extent practicable as determined by the mill, recover such materials outside the process, or discharge spilled or diverted material at a rate that does not disrupt the receiving wastewater treatment system.

(2) The permittee must establish a program to identify and repair leaking equipment items. This program must include:

(I) Regular visual inspections (e.g., once per day) of process areas with equipment items in spent pulping liquor, soap, and turpentine service;

(ii) Immediate repairs of leaking equipment items, when possible. Leaking equipment items that cannot be repaired during normal operations must be identified, temporary means for mitigating the leaks must be provided, and the leaking equipment items repaired during the next maintenance outage;

(iii) Identification of conditions under which production will be curtailed or halted to repair leaking equipment items or to prevent pulping liquor, soap, and turpentine leaks and spills; and

(iv) A means for tracking repairs over time to identify those equipment items where upgrade or replacement may be warranted based on frequency and severity of leaks, spills, or failures.

(3) The permittee must operate continuous, automatic monitoring systems that the mill determines are necessary to detect and control leaks, spills, and intentional diversions of spent pulping liquor, soap, and turpentine. These monitoring systems should be integrated with the mill process control system and may include, e.g., high level monitors and alarms on storage tanks; process area conductivity (or pH) monitors and alarms; and process area sewer, process wastewater, and wastewater treatment plant conductivity (or pH) monitors and alarms.

(4) The permittee must establish a program of initial and refresher training of operators, maintenance personnel, and other technical and supervisory personnel who have responsibility for operating, maintaining, or supervising the operation and maintenance of equipment items in spent pulping liquor, soap, and turpentine service. The refresher training must be conducted at least annually and the training program must be documented.

(5) The permittee must prepare a brief report that evaluates each spill of spent pulping liquor, soap, or turpentine that is not contained at the immediate process area and any intentional diversion of spent pulping liquor, soap, or turpentine that is not contained at the immediate process *area. The report must describe the equipment items involved, the circumstances leading to the incident, the effectiveness of the corrective actions taken to contain and recover the spill or intentional diversion, and plans to develop changes to equipment and operating and maintenance practices as necessary to prevent recurrence.* Discussion of the reports must be included as part of the annual refresher training.

(6) The permittee must establish a program to review any planned modifications to the pulping and chemical recovery facilities and any construction activities in the pulping and chemical recovery areas before these activities commence. *The purpose of such review is to prevent leaks and spills of spent pulping liquor, soap, and turpentine during the planned modifications, and to ensure that construction and supervisory personnel are aware of possible liquor diversions and of the requirement to prevent leaks and spills of spent pulping liquors, soap, and turpentine during construction.*

(7) The permittee must install and maintain secondary containment (i.e., containment constructed of materials impervious to pulping liquors) for spent pulping liquor bulk storage tanks equivalent to the volume of the largest tank plus sufficient freeboard for precipitation. An annual tank integrity testing program, if coupled with other containment or diversion structures, may be substituted for secondary containment for spent pulping liquor bulk storage tanks.

(8) The permittee must install and maintain secondary containment for turpentine bulk storage tanks.

(9) The permittee must install and maintain curbing, diking or other means of isolating soap and turpentine processing and loading areas from the wastewater treatment facilities.

(10) The mill must conduct wastewater monitoring to detect leaks and spills, to track the effectiveness of the BMPs, and to detect trends in spent pulping liquor losses. *Such monitoring must be performed in accordance with paragraph **H.***

C. REQUIREMENT TO DEVELOP A BMP PLAN

(1) The permittee must prepare and implement a BMP Plan. The BMP Plan must be based on a detailed engineering review as described in paragraphs **C**.(2) and **C**.(3) (below). The BMP Plan must specify the procedures and the practices required for each mill to meet the requirements of paragraph **B**., the construction the mill determines is necessary to meet those requirements including a schedule for such construction, and the monitoring program (including the statistically derived action levels) that will be used to meet the requirements of paragraph **H**. The BMP Plan also must specify the period of time that the mill determines the action levels established under paragraph **G** may be exceeded without triggering the responses specified in paragraph **H.**

(2) The permittee must conduct a detailed engineering review of the pulping and chemical recovery operations -- including but not limited to process equipment, storage tanks, pipelines and pumping systems,

loading and unloading facilities, and other appurtenant pulping and chemical recovery equipment items in spent pulping liquor, soap, and turpentine service -- for the purpose of determining the magnitude and routing of potential leaks, spills, and intentional diversions of spent pulping liquors, soap, and turpentine during the following periods of operation:

(I) Process start-ups and shut downs;
(ii) Maintenance;
(iii) Production grade changes;
(iv) Storm or other weather events;
(v) Power failures; and
(vi) Normal operations.

(3) As part of the engineering review, the permittee must determine whether existing spent pulping liquor containment facilities are of adequate capacity for collection and storage of anticipated intentional liquor diversions with sufficient contingency for collection and containment of spills. The engineering review must also consider:

(I) The need for continuous, automatic monitoring systems to detect and control leaks and spills of spent pulping liquor, soap, and turpentine;

(ii) The need for process wastewater diversion facilities to protect end-of-pipe wastewater treatment facilities from adverse effects of spills and diversions of spent pulping liquors, soap, and turpentine;

(iii) The potential for contamination of storm water from the immediate process areas; and

(iv) The extent to which segregation and/or collection and treatment of contaminated storm water from the immediate process areas is appropriate.

D. AMENDMENT OF BMP PLAN.

(1) The permittee must amend its BMP Plan whenever there is a change in mill design, construction, operation, or maintenance that materially affects the potential for leaks or spills of spent pulping liquor, turpentine, or soap from the immediate process areas.

(2) The permittee must complete a review and evaluation of the BMP Plan five years after the first BMP Plan is prepared and, except as provided in paragraph **D**.(1) (above), once every five years thereafter. As a result of this review and evaluation, the permittee must amend the BMP Plan within three months of the review if the mill determines that any new or modified management practices and engineered controls are necessary to reduce significantly the likelihood of spent pulping liquor, soap, and turpentine leaks, spills, or intentional diversions from the immediate process areas, including a schedule for implementation of such practices and controls.

E. REVIEW AND CERTIFICATION OF BMP PLAN.

The BMP Plan, and any amendments, must be reviewed by the senior technical manager at the mill and approved and signed by the mill manager. Any person signing the BMP Plan or its amendments must certify to **[Name of the Permitting Authority]** under penalty of law that the BMP Plan (or its amendments) has been prepared in accordance with good engineering practices and in accordance with this regulation. The mill is not required to obtain approval from the **[Name of the Permitting Authority]** of the BMP Plan or any amendments. **[Note: Permitting authorities have discretion to review/approve BMP Plan if they choose.]**

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F. RECORD KEEPING REQUIREMENTS

(1) The permittee must maintain on its premises a complete copy of the current BMP Plan and the records specified in paragraph **F**.(2) (below) and must make such BMP Plan and records available to **[Name of the Permitting Authority]** or his or her designee for review upon request.

(2) The mill must maintain the following records for three years from the date they are created:

(I) Records tracking the repairs performed in accordance with the repair program described in paragraph **B**.(2);

(ii) Records of initial and refresher training conducted in accordance with paragraph **B**.(4);

(iii) Reports prepared in accordance with paragraph **B**.(5) of this section; and

(iv) Records of monitoring required by paragraphs **B.**(10) and **H**.

G. **ESTABLISHMENT OF WASTEWATER TREATMENT SYSTEM INFLUENT ACTION LEVELS**.

(1) The permittee must conduct a monitoring program, described in paragraph **G**.(2), for the purpose of defining wastewater treatment system influent characteristics (or action levels), described in paragraph **G**.(3), that will trigger requirements to initiate investigations on BMP effectiveness and to take corrective action.

(2) The permittee must employ the following procedures in order to develop the required action levels:

(I) Monitoring parameters. The permittee must collect 24-hour composite samples and analyze the samples for a measure of organic content (e.g., Chemical Oxygen Demand (COD) or Total Organic Carbon (TOC)). Alternatively, the permittee may use a measure related to spent pulping liquor losses measured continuously and averaged over 24 hours (e.g., specific conductivity or color). **[Note: Permitting authorities may specify monitoring parameter, if they choose.]**

(ii) Monitoring locations. 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. For the purposes of this requirement, the permittee may select alternate monitoring point(s) in order to isolate possible sources of spent pulping liquor, soap, or turpentine from other possible sources of organic wastewaters that are tributary to the wastewater treatment facilities (e.g., bleach plants, paper machines and secondary fiber operations).

(3) By the date prescribed in paragraph **I**.(1)(iii) the permittee must complete an initial six-month monitoring program using the procedures specified in paragraph **G**.(2) and must establish initial action

levels based on the results of that program. A wastewater treatment influent action level is a statistically determined pollutant loading determined by a statistical analysis of six months of daily measurements. The action levels must consist of a lower action level, which if exceeded will trigger the investigation requirements described in paragraph **H,** and an upper action level, which if exceeded will trigger the corrective action requirements described in paragraph **H.**

(4) By the date prescribed in paragraph **I.**(1)(vi), the permittee must complete a second six-month monitoring program using the procedures specified in paragraph **G**.(2) of this section and must establish revised action levels based on the results of that program. The initial action levels shall remain in effect until replaced by revised action levels.

(5) Action levels developed under this paragraph must be revised using six months of monitoring data after any change in mill design, construction, operation, or maintenance that materially affects the potential for leaks or spills of spent pulping liquor, soap, or turpentine from the immediate process areas.

*[Note: By the date prescribed in paragraph **I.**(2) of this section, each new source must complete a six-month monitoring program using the procedures specified in paragraph **G**.(2) and must develop a lower action level and an upper action level based on the results of that program.]*

H. MONITORING, CORRECTIVE ACTION, AND REPORTING REQUIREMENTS.

(1) The permittee must conduct daily monitoring of the influent to the wastewater treatment system in accordance with the procedures described in paragraph **G**.(2) for the purpose of detecting leaks and spills, tracking the effectiveness of the BMPs, and detecting trends in spent pulping liquor losses.

(2) Whenever monitoring results exceed the lower action level for the period of time specified in the BMP Plan, the permittee must conduct an investigation to determine the cause of such exceedance. Whenever monitoring results exceed the upper action level for the period of time specified in the BMP Plan, the permittee must complete corrective action to bring the wastewater treatment system influent mass loading below the lower action level as soon as practicable.

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(3) Although exceedances of the action levels will not constitute violations of **[make specific for mill being permitted]**, failure to take the actions required by paragraph **H**.(2) as soon as practicable will be a violation.

(4) The permittee must report to **[Name of the Permitting Authority]** the results of the daily monitoring conducted pursuant to paragraph **H**.(1). Such reports must include a summary of the monitoring results, the number and dates of exceedances of the applicable action levels, and brief descriptions of any corrective actions taken to respond to such exceedances. Submission of such reports shall be at **[specify desired frequency but in no case less than once per year]**.

I. COMPLIANCE DEADLINES.

(1) The permittee is subject to this section to meet the following deadlines:

(I) Prepare BMP Plans and certify to the permitting or pretreatment authority that the BMP Plan has been prepared in accordance with this regulation not later than April 15, 1999;

(ii) Implement all BMPs specified in paragraph **B** that do not require the construction of containment or diversion structures or the installation of monitoring and alarm systems not later than April 15, 1999.

(iii) Establish initial action levels required by paragraph **G**.(3) not later than April 15, 1999.

(iv) Commence operation of any new or upgraded continuous, automatic monitoring systems that the mill determines to be necessary under paragraph **B.**(3) (other than those associated with construction of containment or diversion structures) not later than April 15, 2000.

(v) Complete construction and commence operation of any spent pulping liquor, collection, containment, diversion, or other facilities, including any associated continuous monitoring systems, necessary to fully implement BMPs specified in paragraph **B** not later than April 15, 2001.

(vi) Establish revised action levels required by paragraph **G**.(4) of this section as soon as possible after fully implementing the BMPs specified in paragraph **B**, but not later than January 15, 2002.

Note: new sources must meet the deadlines set forth below:

*(2) New Sources. Upon commencing discharge, new sources must implement all of the BMPs specified in paragraph **B**, prepare the BMP Plan required by paragraph **C**, and certify to the permitting or pretreatment authority that the BMP Plan has been prepared in accordance with this regulation as required by paragraph **E**., except that the action levels required by paragraph **G**.(5) must be established not later than 12 months after commencement of discharge, based on six months of monitoring data obtained prior to that date in accordance with the procedures specified in paragraph **G**.(2).*

Appendix D
Glossary

Adsorbable organic halides (AOX) - A bulk parameter that measures the total mass of chlorinated organic matter in water and wastewater.

Average monthly discharge limitation - The highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during the calendar month divided by the number of "daily discharges" measured during the month.

Biocide - Toxic material for microbiological control.

Black liquor - Spent pulping liquor from the digester prior to its incineration in the recovery furnace of a sulfate (kraft) recovery process. It contains dissolved organic wood substances and residual active alkali compounds from the pulping process.

Bleach plant - All process equipment used for bleaching beginning with the first application of bleaching agents (e.g., chlorine, chlorine dioxide, ozone, sodium or calcium hypochlorite, or peroxide), each subsequent extraction stage, and each subsequent stage where bleaching agents are applied to the pulp. For mills in Subpart E producing specialty grades of pulp, the bleach plant includes process equipment used for the hydrolysis or extraction stages prior to the first application of bleaching agents. Process equipment used for oxygen delignification prior to the application of bleaching agents is not part of the bleach plant.

Bleach plant effluent - The total discharge of process wastewaters from the bleach plant from each physical bleach line operated at the mill, comprising separate acid and alkaline filtrates or the combination thereof.

Bleach sequence - Sequence in which chemicals are used to bleach pulp.

Bleached pulp - Pulp that has been purified or whitened by chemical treatment to alter or remove coloring matter and has taken on a higher brightness characteristic.

Bleaching - The process of further delignifying and whitening pulp by chemically treating it to alter the coloring matter and to impart a higher brightness.

Bleaching chemicals - A variety of chemicals used in the bleaching of pulp such as chlorine (Cl_2), sodium hypochlorite (NaOCl), calcium hypochlorite ($Ca(OCl)_2$), chlorine dioxide (ClO_2), peroxide (H_2O_2), oxygen (O_2), ozone (O_3), and others. Also referred to as bleaching chemical.

Bleaching stage - One of the unit process operations in which a bleaching chemical or combination of chemicals is added in the sequence of a continuous system of bleaching pulp.

Boiler - Any enclosed combustion device that extracts useful energy in the form of steam and is not an incinerator.

Brightness - As commonly used in the paper industry, the reflectivity of a sheet of pulp, paper, or paperboard for specified light measured under standardized conditions, relative to a magnesium oxide standard.

Brown stock - Pulp, usually kraft sulfite or groundwood, not yet bleached or treated other than in the pulping process.

Chemical oxygen demand (COD) - A bulk parameter that measures the oxygen-consuming capacity of organic and inorganic matter present in water or wastewater. It is expressed as the amount of oxygen consumed from a chemical oxidant in a specific test.

Continuous digester - A wood-cooking vessel in which chips are reduced to their fiber components using suitable chemicals under controlled temperature and pressure in a continuous operation.

Continuous discharge - Discharge that occurs without interruption throughout the operating hours of the facility.

Conventional pollutants - The pollutants identified in sec. 304(a)(4) of the CWA and the regulations thereunder (biochemical oxygen demand (BOD_5), total suspended solids (TSS), oil and grease, fecal coliform, and pH).

Daily discharge - The discharge of a pollutant measured during any calendar day or any 24-hour period that reasonably represents a calendar day. For pollutants with limitations expressed as mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the daily discharge is calculated as the average measurement of the pollutant over the day.

Defoamer - Surface-active agent that inhibits the formation of foam or acts on foam or entrapped air to cause the bubbles to break and allow air to escape.

Deinked Pulp - Fiber reclaimed from wastepaper by removing ink, coloring materials, and fillers.

Delignification - The process of degrading and dissolving away lignin and/or hemicellulose.

Digester - A pressure vessel used to chemically treat chips and other cellulosic fibrous materials such as straw, bagasse, rags, etc., under elevated temperature and pressure in order to separate fibers from each other.

Direct discharger - A facility that discharges or may discharge treated or untreated process wastewaters, non-contact cooling waters, or non-process wastewaters (including stormwater runoff) into waters of the United States.

Effluent limitation - Any restriction, including schedules of compliance, established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean.

Elemental chlorine-free (ECF) - Any process for bleaching pulps in the absence of elemental chlorine and hypochlorite that uses exclusively chlorine dioxide as the only chlorine-containing bleaching agent.

Emission - Passage of air pollutants into the atmosphere via a gas stream or other means.

Emission point - Any location within a source from which air pollutants are emitted, including an individual process vent, opening within a wastewater collection and treatment system, or an open piece of process equipment.

End of the pipe - The point at which final mill effluent is discharged to waters of the United States or introduced to a POTW.

Existing effluent quality (EEQ) - The level at which the pollutants identified in Section 403.24(a)(1) are present in the effluent of a mill "enrolled" in the Voluntary Advanced Technology Incentives Program.

Extended delignification - A process that enables a mill to lower the Kappa number of the pulp entering the bleach plant further than is possible with traditional pulping technology. Extended delignification can be in the form of extended cooking or oxygen delignification.

Furnish - Raw materials (hardwood or softwood) used to manufacture market pulp, paper, or paperboard.

Fiber line - A series of operations employed to convert wood or other fibrous raw material into pulp. If the final product is bleached pulp, the fiber line encompasses pulping, de-knotting, brownstock washing, pulp screening, centrifugal cleaning, and multiple bleaching and washing stages.

Final effluent - Pulp or paper mill wastewater discharges to receiving waters including streams, lakes, and other waters of the U.S.

Fine papers - High-quality writing, printing, and cover-type papers having excellent pen and ink writing surface characteristics.

Green liquor - A solution made by dissolving the sodium and sulfur-containing smelt from the kraft recovery process prior to causticizing.

Hardwood - Pulpwood from broad-leaved dicotyledonous deciduous trees, such as birch, aspen, oak, etc.

Hypochlorite - Reducing-type of bleaching chemical, usually in the form of calcium hypochlorite ($Ca(OCl)_2$) or sodium hypochlorite ($NaOCl$), used in the bleaching of chemical pulps.

Indirect discharger - A facility that discharges or may discharge wastewaters into a publicly owned treatment works or a treatment works not owned by the discharging facility.

Influent - Mill wastes, water, and other liquids, which can be raw or partially treated, flowing into a treatment plant, reservoir, basin, or holding pond.

Integrated mill - A mill that produces pulp and may use none, some, or all of that pulp (often in combination with purchased pulp) to produce paper or paperboard products.

Kappa number -A value obtained by a laboratory test procedure (TAPPI method T-236) for indirectly indicating the lignin content, usually with pulp yields of 70 percent or less.

Kraft process - Sulfate chemical pulping process.

Lignin - A brown-colored organic substance which acts as an interfiber bond in woody materials. It is chemically separated from cellulose during the chemical cooking process to form pulp, and is removed along with other organic materials in the spent cooking liquor during subsequent washing and bleaching stages.

Market pulp - Bleached or unbleached pulp in the form of bales or sheets for transfer or sale off site.

Maximum daily discharge limitation - The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents a calendar day.

Mechanical pulp - Pulp produced by reducing pulpwood logs and chips into their fiber components by the use of mechanical energy (at CMP or CTMP mills, also with the use of chemicals or heat), via grinding stones or refiners.

Metric ton - One thousand (10^3) kilograms (abbreviated as kkg), or one megagram. A metric ton is equal to 2,204.5 pounds.

Minimum level (ML) - The level at which the analytical system gives recognizable signals and an acceptable calibration point.

New source -(1) Notwithstanding the criteria codified at 40 CFR 122.29(b)(1) and 403.3(k), a source subject to Subpart B or E is a "new source" if it meets the definition of "new source" at 40 CFR 122.2 and (i) It is constructed at a site at which no other source is located; or (ii) It totally replaces the process or production equipment that causes the discharge of pollutants at an existing source, including the total replacement of a fiber line that causes the discharge of pollutants at an existing source, except as provided in paragraph (j)(2) of this section; or (iii) Its processes are substantially independent of an existing source at the same site. In determining whether these processes are substantially independent, the Director shall consider such factors as the extent to which the new facility is integrated with the existing plant; and the extent to which the new facility is engaged in the same general type of activity as the existing source. (2) The following are examples of changes made by mills subject to Subparts B or E that alone do not cause an existing mill to become a "new source": (i) Upgrades of existing pulping operations; (ii) Upgrades or replacement of pulp screening and washing operations; (iii) Installation of extended cooking and/or oxygen delignification systems or other post-digester, pre-bleaching delignification systems; (iv) Bleach plant modifications including changes in methods or amounts of chemical applications, new chemical applications, installation of new bleaching towers to facilitate replacement of sodium or calcium hypochlorite, and installation of new pulp washing system; or (v) Total replacement of process or production equipment that causes the discharge of pollutants at an existing source (including a replacement fiber line), but only if such replacement is performed for the purpose of achieving limitations that have been included in the dischargers' NPDES permit pursuant to 430.24(b).

Non-continuous discharge - Discharge that occurs only during specific periods of time (seasons, or operating shift variations). Does not apply to treatment plant or process upset conditions; periods of no discharge are at least 24 hours in duration.

Nonconventional pollutants - Pollutants that are neither conventional pollutants nor priority pollutants (see 40 CFR Section 401.15 and Part 423, Appendix A).

NPDES - National Pollutant Discharge Elimination System. The NPDES program is authorized by the Clean Water Act and requires permits for the discharge of pollutants from any point source into waters of the United States.

Off-machine metric tons (OMMT) - Mass of final product, including coatings where applicable, at the off-machine moisture content. For market pulp, the off-machine moisture content is defined to be 10 percent moisture. OMMT is the production normalizing parameter for end-of-pipe limitations for BOD_5 and TSS.

Oven dry (OD) - Moisture-free conditions of pulp and paper and other materials used in the pulp and paper industry. It is usually determined by drying a known sample to a constant weight in a completely dry atmosphere at a temperature of 100°C to 105°C (212°F to 221°F). Also called bone dry (BD).

Outfall - The mouth of conduit drains and other conduits from which a mill effluent discharges into receiving waters.

Oxygen delignification - An extended delignification process used after pulping and brown stock washing and prior to bleaching. In this process, which can be used on both kraft and sulfite pulps, oxygen gas is used in an alkaline environment to delignify pulp. Because oxygen delignification typically precedes the application of chlorine, oxygen delignification wastewaters can be rerouted to the pulping liquor recovery cycle.

Paper machine - The primary machine in a paper mill on which slurries containing fibers and other constituents are formed into a sheet by the drainage of water, pressing, drying, winding into rolls, and sometimes coating.

Peroxide - A short name for hydrogen peroxide (H_2O_2) or sodium peroxide (Na_2O_2).

POTW - Publicly-owned treatment works as defined at 40 CFR 403.3(o).

Pretreatment standard - A regulation addressing industrial wastewater effluent quality required for discharge to a POTW.

Process wastewater - For Subparts B and E only, process water is any water that, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. For purposes of Subparts B and E, process wastewater includes boiler blowdown; wastewaters from water treatment and other utility operations; blowdowns from high rate (e.g., greater than 98 percent) recycled non-contact cooling water systems to the extent they are mixed and co-treated with other process wastewaters; wastewater, including leachates, from landfills owned by pulp and paper mills subject to Subparts B or E if the wastewater is commingled with wastewater from the mill's manufacturing or processing facility; and storm waters from the immediate process Areas to the extent they are mixed and co-treated with other process wastewaters. Contaminated groundwaters from on-site or off-site groundwater remediation projects are not process wastewater.

Process water - Water used to dilute, wash, or carry raw materials, pulp, and any other materials used in the manufacturing process.

Production for chloroform and AOX - The annual unbleached pulp production entering the first stage of the bleach plant divided by the number of operating days during that year. Unbleached pulp production shall be measured in air-dried-metric-tons (10% moisture) of brownstock pulp entering the bleach plant at the stage during which chlorine or chlorine-containing compounds are first applied to the pulp. In the case of bleach plants that use totally chlorine free bleaching processes, unbleached pulp production shall be measured in air-dried-metric tons (10% moisture) of brownstock pulp entering the first stage of the bleach plant from which wastewater is discharged. Production shall be determined for each mill based upon past production practices, present trends, or committed growth.

Production for conventional pollutants - The annual off-the-machine production (including off-the-machine coating where applicable) divided by the number of operating days during that year. Paper and paperboard production shall be measured at the off-the-machine moisture content, except for Subpart C (as it pertains to pulp and paperboard production at unbleached kraft mills including linerboard or bag paper and other mixed products, and to pulp and paperboard production using the unbleached kraft neutral sulfite semi-chemical (cross recovery process), and Subparts F and J (as they pertain to paperboard production from wastepaper from noncorrugating medium furnish or from corrugating medium furnish) where paper and paperboard production shall be measured in air-dry-tons (10% moisture content). Market pulp shall be measure in air-dry tons (10% moisture). Production shall be determined for each mill based upon past production practices, present trends, or committed growth.

Pulp - A fibrous material produced by mechanically or chemically reducing woody plants into their component parts from which pulp, paper, and paperboard sheets are formed after proper slushing and treatment, or used for dissolving purposes (dissolving pulp or chemical cellulose) to make rayon, plastics, and other synthetic products.

Pulp bleaching - The process of further delignifying and whitening pulp by chemically treating it to alter the coloring matter and to impart a higher brightness.

Pulp washer - A piece of pulp mill equipment designed to separate soluble, undesirable components in a pulp slurry from the acceptable fibers, usually by some type of screening method combined with diffusion and displacement with wash liquors, utilizing vacuum or the natural force of gravity.

Red liquor - Sulfite pulping liquor.

Screen - A device that removes oversized particles from the pulp slurry after the pulp washer system and prior to the papermaking equipment. Equipment used to remove oversized particles prior to the pulp washer system is considered knotters.

Screen room - The area in a pulp mill where unwanted particles called rejects or tailing are separated from the accepted fibers with the use of equipment such as knotters, rifflers, refiners, separators, thickeners, and flat or rotary screens. Closed screen room operation, or screen room closure, refers to the elimination of wastewater discharge from knotting and screening operations. It is generally accomplished through reusing the wastewater (screen decker filtrates) as pulp dilution water ahead of the screens, or as wash liquor on a preceding stage of washing.

Seal tank - A receiving tank located beneath vacuum-type washers and filters. Wash water drops into it through a pipe and forms a seal to create a vacuum in the sheet-forming cylinder portion of the unit. Sometimes referred to as a seal pit.

Secondary fiber - Furnish consisting of recovered material. For the purposes of this preamble, secondary fiber does not include broke but does include recycled paper or paperboard known commonly as "post-consumer" recycled material. The term secondary fiber is used both for the raw material (wastepaper, old corrugated containers, etc.) and the pulp produced from the wastepaper and board.

Soda process - A chemical pulping process that consists of the reduction of chips to their individual fiber components by use of cooking liquor made up of caustic soda (NaOH) solution, the recovery and preparation of this liquor, or the treatment of pulp and paper produced from it.

Sodium hydroxide (NaOH) - A strong alkali-type chemical used in making up cooking liquor in alkaline pulp mills. It is commonly referred to in the mill as caustic or caustic soda.

Softwood - Pulpwood obtained from evergreen, cone-bearing species of trees, such as pine, spruce, hemlock, etc., which are characterized by having needles.

Spent liquor - Used cooking liquor in a chemical pulp mill which is separated from the pulp after the cooking process. Spent liquor from kraft pulping is called black liquor. Spent liquor from sulfite pulping is called red liquor.

Sulfate process - An alkaline pulp manufacturing process in which the active chemicals of the liquor used in cooking (digesting) wood chips to their component parts in a pressurized vessel (digester) are sodium sulfide (Na_2S) and sodium hydroxide (NaOH) with sodium sulfate (Na_2SO_4) and lime (CaO) being used to replenish these chemicals in recovery operations. Also referred to as the kraft process.

Sulfate pulp - Fibrous material used in pulp, paper, and paperboard manufacture, produced by chemically reducing wood chips into their component parts by cooking in a vessel under pressure using an alkaline cooking liquor. This liquor consists of sodium sulfide (Na_2S) and sodium hydroxide (NaOH). Also referred to as kraft pulp.

Sulfite process - An acid pulp manufacturing process in which chips are reduced to their component parts by cooking (digesting) in a pressurized vessel using a liquor of calcium, sodium, magnesium or ammonia salts of sulfurous acid.

TCDF - 2,3,7,8-tetrachlorodibenzo-p-furan.

Totally chlorine-free (TCF) bleaching - Pulp bleaching operations that are performed without the use of chlorine, sodium hypochlorite, calcium hypochlorite, chlorine dioxide, chlorine monoxide, or any other chlorine-containing compound.

Unbleached pulp - Pulp that has not been treated in a bleaching process.

Variability factor - The daily variability factor is the ratio of the estimated 99th percentile of the distribution of daily values divided by the expected value, or mean, of the distribution of the daily data. The monthly variability factor is the estimated 95th percentile of the monthly averages of the data divided by the expected value of the monthly averages.

Voluntary Advanced Technology Incentives Program (VATIP) - The program established under Section 430.24(b) (for existing direct dischargers) and Section 430.25(c) (for new direct dischargers) whereby participating mills agree to accept enforceable effluent limitations and conditions in their NPDES permits that are more stringent than the "baseline BAT limitations or NSPS" that would otherwise apply, in exchange for regulatory- and enforcement-related rewards and incentives.

Washer - Pulp mill equipment designed to separate soluble, undesirable components in a pulp slurry from the acceptable fibers. It usually consists of some type of screening method combined with diffusion and displacement with wash liquid, utilizing vacuum, or the natural force of gravity.

Wastewater - Water carrying waste materials from a mill. It is a mixture of water, and dissolved and suspended pollutants.

Waters of the United States - As defined in 40 CFR §122.2. This definition includes all waters that are currently used, may be used in the future, or were used in the past, in interstate or foreign commerce (including all waters subject to the ebb and flow of the tide) and adjacent wetlands.

Wet barking - Wet barking operations include hydraulic barking operations and wet drum barking operations which are those drum barking operations that use substantial quantities of water in either water sprays in the barking drums or in a partial submersion of the drums in a "tub" of water.

White liquor - A solution of kraft pulping liquor chemicals. White liquor can be made by re-causticizing green liquor, produced in the kraft recovery cycle, with slaked lime.

Appendix E

Existing Effluent Quality (EEQ) Calculation Procedures

For those mills that enroll all or some fiber lines in VATIP, and whose existing effluent quality (EEQ) is of poorer quality than baseline BAT, you must establish Stage 1 permit limits for chlorinated pollutants equivalent to EEQ or the technology-based limits in the mill's last permit, whichever is more stringent for each chlorinated pollutant.

Background

Although expressed in the regulation in narrative form, EPA intends that you calculate numeric EEQ limitations for each participating mill on a case-by-case basis. You must establish "Stage 1" limitations for TCDD, TCDF, chloroform, AOX, and 12 chlorinated phenolic pollutants that, for each pollutant, are equivalent to the more stringent of either the technology-based limit on that pollutant in the mill's last permit or the mill's current effluent quality with respect to that pollutant. EEQ for AOX must be determined at the end of the pipe based on loadings attributable to that fiber line; for all other pollutants, such as dioxin, EEQ must be determined at the point where the wastewater containing those pollutants leaves the bleach plant. These "Stage 1" BAT limits represent the first step in the VATIP and are enforceable against the participating mill as soon as they are placed in the mill's NPDES permit.

The purpose of the "Stage 1" BAT limits is to ensure that, at a minimum, EEQ is maintained while the mill moves toward achieving the ultimate VATIP performance requirements for the tier selected by the mill. As permits are reissued for Tier II or Tier III mills, updated "Stage 1" limitations must be established to reflect the improving effluent quality of that mill.

EEQ permit limits should be expressed as mass/day (not concentrations or mass per unit production). EPA suggests mass/day values rather than concentration-based permit limits or production normalized mass-based permit limits for the following reasons:

1. Many mills enrolling in VATIP will have measurable concentrations of TCDD, TCDF, and chlorinated phenolic pollutants in their bleach plant effluent. When developing ELG&S, EPA established concentration-based limitations for TCDD, TCDF, and the 12 chlorinated phenolic compounds because the model process technologies result in concentrations that are less than or slightly above the ML for the appropriate test method. When mills enroll in VATIP, however,

they may not initially operate model process technologies and may be discharging measurable concentrations of these pollutants.

In addition, as mills install advanced technologies, they will reduce their wastewater discharges, resulting in increased pollutant concentrations. In this situation, mass limits are more equitable than concentration limits.

2. Mass/day limits are consistent with the way permits are typically established and assume production remains constant. Therefore, if a mills makes significant changes in production, you should reestablish EEQ.

You should calculate EEQ permit limits by using mill sampling results, estimating a "long-term average" for each pollutant, and multiplying the long-term average (LTA) by a variability factor. EPA developed ELG&S using sampling data from mills that use the model process technologies that are the basis of BAT and NSPS. Using these sampling results, EPA calculated an LTA to represent the typical performance of the technology. EPA also developed variability factors from which the daily maximum limitations and 30-day average limitations are calculated. EPA recommends that you follow a similar procedure, using mill-supplied sampling results and EPA's variability factors. Note that although the variability factor for TCDF was used to determine concentration-based ELG&S, EPA believes it is reasonable to apply the variability factor to the mass/day LTA for TCDF. EPA also believes it is reasonable to use the TCDF variability factor for TCDD and the 12 chlorinated phenolic compounds because these pollutants are all generated during the same process.

To calculate permit limits based on EEQ, follow these procedures:

1. Collect wastewater samples;
2. Review wastewater sampling data;
3. Calculate mass/day for each sampling result;
4. Calculate LTAs for each pollutant;
5. Calculate EEQ permit limits by applying variability factors (VFs); and
6. Compare permit limits based on EEQ with existing permit limits.

These steps are discussed in detail below.

Step 1 - Collect Wastewater Samples

You must require mills to perform wastewater sampling for each chlorinated pollutant. Make sure mills measure wastewater flows for each sample collected. Table E-1 presents the total number of samples EPA recommends collecting for each chlorinated pollutant. The mill should collect samples to be analyzed for AOX from its permitted discharge point, and collect samples for the other chlorinated pollutants from each bleach plant they are enrolling in VATIP. You should recommend that mills use the sampling procedures outlined in Section 8.

Table E-1 - Number of Samples for Each Pollutant

Pollutant	Number of Samples
AOX	≥30
TCDD	≥3
TCDF	≥3
Chloroform	≥7
12 Chlorinated Phenolic Compounds	≥3

Note the following special sampling considerations:

1. Effluent samples should represent the mill's full range of products and processes. For that reason, samples should not be collected on consecutive days (exception for AOX), unless mill operations during the sampling period represent the full range of bleaching operations.

2. For those mills that continue to bleach with chlorine and/or hypochlorite, at least one sample to be analyzed for TCDD, TCDF, chloroform, and the 12 chlorinated phenolic compounds should be collected during such "worst case" bleaching operations (see Section 8 "When Should Mills Collect Samples?"). Remember, although mills will most likely convert to full chlorine dioxide substitution to comply with VATIP limitations, they may initially bleach with chlorine and/or hypochlorite. Sampling during "worst case" bleaching operations is particularly important for characterizing chloroform in bleach plant effluent because chloroform is generated in significant quantities during chlorine and hypochlorite bleaching.

3. EPA suggests the mill collect a minimum of seven samples for chloroform analysis. EPA recommends collecting more samples of chloroform than of the other pollutants because chloroform's high volatility may lead to losses during sampling and handling. Remember, specific chloroform sampling procedures should be followed to prevent losses during sampling and handling (see Section 8).

Step 2 - Review Wastewater Sampling Data

Once all the samples have been collected and analyzed using the specified test method (see Section 8), you must review the data to:

1. Confirm that the correct method was used for each sample.

2. Confirm that QC requirements were performed and were in an acceptable range.

3. Ensure the mill reported sampling point flow measurements for each sample.

4. Make sure the mills reported production information. For AOX, make sure the mill reported the amount of unbleached kraft pulp entering ***each*** bleach plant during sampling. This is important for determining the AOX load attributable to only the fiber line(s) enrolling in VATIP. (For the remaining chlorinated pollutants, you need only review the amount of unbleached kraft pulp entering the bleach plant of the fiber line enrolling.)

   Production information is also important for determining whether sampling occurs during periods representative of the mill's production. You should confirm that the production information is consistent with any value(s) specified in the mill's permit.

5. Make sure sampling occurs during periods representative of the mill's bleach plant operation. You should confirm that at least one sample was collected during "worst case" bleaching operations by reviewing chemical application rates and product records (higher-brightness products may indicate higher chlorine use). See Section 8 for more details on determining "worse case."

Step 3 - Calculate Mass/Day for Each Sampling Result

For each pollutant, calculate the mass as the product of the wastewater flow and the concentration. Before calculating the mass, look for the following:

1. Results reported as less than a detection limit. If some results are reported as not detected, you should use the analytical method's ML to represent the concentration of the sample. For example, if a TCDF result is reported as "<7 pg/L," use 10 pg/L to calculate the TCDF mass in the sample, since the Method 1613 ML for TCDF is 10 pg/L. See Section 8 for a listing of the minimum levels for each test method.

2. Multiple measurements. Some mills may submit more than one concentration measurement for samples collected on the same day. If you receive multiple measurements, you should count them as one data point by averaging the values.

The text box below demonstrates how to calculate mass/day.

Example 1. Calculate the mass/day for the following TCDD sampling results. In this case, TCDD results were reported in µg/L and bleach plant flow was reported in L/day. The following conversion is used:

(57 µg/L of TCDD) × (25,000 L/day of flow) ÷ (µg/1,000,000 pg) = 1.4 µg/day

Data Point	Sample Date	TCDD Concentration	Average or Adjusted Concentrations	Bleach Plant Flow	Mass/Day
1	4/15/99	54 µg/L	57 µg/L	25,000 L/day	1.4 µg/day
1A	4/15/99	60 µ/L			
2	4/21/99	32 µg/L	NA	28,000 L/day	0.9 µg/day
3	4/28/99	<6 µg/L	10 µg/L	30,000 L/day	0.3 µg/day

NA - not applicable

Step 4 -Calculate Long-Term Average (LTA) for Each Pollutant

Calculate the LTA as the arithmetic average of the mass/day values. The text box below presents an example.

Example 2. Using the results from Example 1, calculate the LTA for TCDD.

Average all data points, treating Data Point (1 + 1A) ÷ 2 as one point.

Data Point	Mass/Day
(1 + 1A) ÷ 2	1.4 µg/day
2	0.9 µg/day
3	0.3 µg/day
LTA	**0.9 µg/day**

Step 5 - Calculate EEQ Permit Limits by Applying Variability Factors (VFs)

To calculate an EEQ permit limit, multiply the LTA by a variability factor to account for the variability associated with process and treatment operations. In developing ELG&S for chlorinated pollutants, EPA calculated variability factors for AOX, chloroform, and TCDF. EPA did not calculate variability factors for TCDD and the 12 chlorinated phenolic compounds because the ELG&S for these pollutants are concentrations that are less than their test method's ML (refer to the *Statistical Support Document for the*

Pulp and Paper Industry: Subpart B for more detail regarding statistical development of ELG&S). You should use the EPA-developed variability factors presented in Table E-2.

Table E-2 Variability Factors for AOX, Chloroform, and TCDF

Analyte	Variability Factors Used to Develop Mass-Based ELG&S for Chlorinated Pollutants		
	1-day VF	**4-day VF**	**30-day VF**
AOX	1.86	n/a	1.22
Chloroform	2.24	1.34	n/a
TCDF (a)	2.75	n/a	n/a

(a) Use the TCDF variability factor to calculate EEQ permit limits for TCDF, TCDD, and the 12 chlorinated phenolic compounds.

The text box below presents an example of calculating an EEG limit:

> Example 3. Using the LTA calculated in Example 2, apply the appropriate variability factors to determine EEQ permit limits.
>
> TCDD daily maximum limitation = (LTA) × (1-day variability factor) = 0.9 µg/day × 2.75 = 2.5 µg/day

(Note: Because once per month is the minimum monitoring frequency for TCDD, TCDF, and the chlorinated phenolic compounds, there is no 3-day variability factor for these pollutants. Also, there are no 3-day average limits.)

Step 6 - Comparing EEQ with existing permit limits.

You may find that permits for some mills include limits for some chlorinated pollutants. Compare limits for any of the 15 regulated chlorinated pollutants to the permit limit calculated in Step 5. Whichever value is more stringent (lower) must be used in the reissued permit.

Some permits may include limits for chlorinated pollutants in final effluent whereas EEQ limits for all chlorinated pollutants (except AOX) must be established in bleach plant effluent. For example, the State of Maine requires all mills that chemically bleach pulp to meet nondetect permit limits for TCDD and TCDF in final effluent. In this case, the reissued permit must contain nondetect permit limits for TCDD and TCDF in final effluent, as required by law, as well as EEQ permit limits for these pollutants in bleach plant effluent.

Appendix F
Bleach Plant Flow Measurements

Mills with operations in Subparts B and E have been subject to E.G.&S that limit pollutant discharges in final effluent (i.e., end-of-pipe) for direct dischargers and in influent to POTWs for indirect dischargers. You will find that many, if not all, mills have flow measurement devices or established methods for measuring their total mill discharge. As specified in the regulation, mills must also comply with bleach plant effluent limits. For many mills, accurately measuring these streams will be a new task. Mills that do not currently measure bleach plant effluent flow should install a continuous flow measurement device. This appendix focuses on:

- Characteristics of bleach plant effluent flow; and
- Various flow measurement devices and methods.

What are the Characteristics of Bleach Plant Effluent Flow?

There are two types of wastewater flows: open channel flow and closed channel flow. Open channel flow is flow in any channel in which the liquid flows with a free surface. Partially filled pipes, not under pressure, are also classified as open channel flows. Final effluent is typically discharged in an open channel. Closed channel flow occurs under pressure in a conduit filled with liquid (e.g., a pipe). Bleach plant effluent discharges are typically closed channel flow/pressurized pipes. Usually, the sampling location is a tap or valve on the pressurized pipe.

What are the Types of Flow Measurement Devices and Methods?

EPA strongly recommends mills use flow measurement devices (meters) to ensure accurate bleach plant effluent flows. These devices range from relatively simple devices to complex automated devices. Typical devices used to measure closed channel flow include:

Note: EPA strongly recommends that mills that operate more than one bleach plant be equipped with measurement devices that monitor the effluent flow from each bleach plant.

- Venturi meters,
- Pitot tubes,

- Paddle wheels,
- Electromagnetic flowmeters, and
- Ultrasonic flowmeters.

In general, the devices measure the velocity of the flow and then multiply the velocity by the cross-sectional area of the pipe to calculate the flow rate.

Typical devices used to measure open channel flow include:

- Flumes, and
- Weirs.

To accurately measure open channel flow, flumes and weirs must be coupled with floats, ultrasonic transducers, or bubblers. The coupled device measures the flow's liquid depth in a flume or a weir to calculate a flow rate, using established mathematical relationships.

Important Caution When Specifying Flow Measurement Device Location

When establishing an appropriate location for flow measurement devices, you must select a location that is adjacent to the sampling point (tap or valve) but not so close that sample collection interferes with flow measurement. Refer to flow meter specifications for more detail.

References

1. NPDES Compliance Inspection Manual (EPA 300-B-94-014)
2. Brater, Ernest F. and Horace Williams King. *Handbook of Hydraulics for the Solution of Hydraulic Engineering Problems*. McGraw-Hill, Inc. 1976.