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Permit Guidance Document

Pulp, Paper and Paperboard Manufacturing Point Source Category (40 CFR §430)

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Disclaimer

This guidance is designed to help implement national policy on effluent limitations guidelines and standards for the pulp, paper, and paperboard industry. This document does not, however, substitute for the CWA or EPA's regulations, nor is it a regulation itself. Thus, it cannot impose legally binding requirements on EPA, states, or the regulated community and may not apply to a particular situation based upon these circumstances. EPA and state decisionmakers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. EPA may change this guidance in the future.

Executive Summary

On April 15, 1998, the U.S. Environmental Protection Agency (EPA) promulgated revised regulations for the pulp, paper, and paperboard category to control both effluent discharges and air emissions. The promulgation of the revised regulations marks the completion of the first of three phases of the Cluster Rules. As part of Phase I, EPA established effluent limitations guidelines and standards under 40 CFR Part 430 for the following two subcategories:

Subpart B - Bleached Papergrade Kraft and Soda; and
Subpart E - Papergrade Sulfite.

At the time of publication of this guidance manual, EPA is continuing with Phases II and III to establish revised effluent limitations and standards for the remaining subparts. Over the next several years, EPA plans to complete these phases and will update 40 CFR Part 430 after the completion of each phase.

The purpose of this guidance document is to help you, the permit writer, develop appropriate National Pollutant Discharge Elimination System (NPDES) permits and pretreatment requirements for mills with operations in Subparts B and E. The material presented is intended solely for guidance and does not alter any statutory requirements. For an overview of the NPDES and National Pretreatment Programs, you may refer to Section 2 of this document or to the *U.S. EPA NPDES Permit Writer's Manual* (EPA-833-B-96-003) for more detailed information.

The tables below summarize the April 15, 1998 promulgated regulations for Subparts B and E.

Table 1: Subpart B BAT Effluent Limitations Guidelines

Pollutant	BAT(c),(d)			
	Continuous Dischargers		Noncontinuous Dischargers Annual Average (kg/kkg)	Point of Compliance
	1-Day Maximum (kg/kkg)	Monthly Average (kg/kkg)		
TCDD	<ML (a)	(b)	NA	Bleach Plant Effluent
TCDF	31.9 pg/l	(b)	NA	Bleach Plant Effluent
Chloroform	6.92 g/kkg (d)	4.14 g/kkg (d)	NA	Bleach Plant Effluent
Trichlorosyringol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,5-Trichlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,6-Trichlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,5-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,6-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
4,5,6-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,4,5-Trichlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,4,6-Trichlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
Tetrachlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
Tetrachloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,3,4,6-Tetrachlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
Pentachlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
AOX	0.951 kg/kkg	0.623 kg/kkg	0.512	Final Effluent
COD	Reserved	Reserved	Reserved	Reserved

(a) "<ML" means less than the minimum level specified in Section 430.01(I) for that particular pollutant.

(b) This regulation doesn't specify a monthly average limitation for this pollutant; however, you may do so as appropriate.

(c) See 40 CFR 430.24(d) for additional limitations that apply to mills that use chlorophenolic biocides.

(d) For mills that certify to use TCF, refer to 40 CFR 430.24(a)(2).

NA - Not applicable for this compliance point.

Table 2: Subpart B BPT Effluent Limitations Guidelines

Pollutant	BPT Limitations (b)			
	Continuous Dischargers		Non-Continuous Dischargers	
	1-Day Maximum	Average of Daily Values for 30 Consecutive Days	Annual Average	Point of Compliance
Bleached Kraft Mills Producing Market Pulp Segment				
BOD_5	15.45 kg/kkg	8.05 kg/kkg	4.52	Final Effluent
TSS	30.4 kg/kkg	16.4 kg/kkg	9.01	Final Effluent
pH	(a)	(a)	(a)	Final Effluent
Bleached Kraft Mills Producing Paperboard, Coarse Paper, and Tissue Paper Segment				
BOD_5	13.65 kg/kkg	7.1 kg/kkg	3.99	Final Effluent
TSS	24 kg/kkg	12.9 kg/kkg	7.09	Final Effluent
pH	(a)	(a)	(a)	Final Effluent
Bleached Kraft Mills Producing Pulp and Fine Paper Segment				
BOD_5	10.6 kg/kkg	5.5 kg/kkg	3.09	Final Effluent
TSS	22.15 kg/kkg	11.9 kg/kkg	6.54	Final Effluent
pH	(a)	(a)	(a)	Final Effluent
Soda Mills Producing Pulp and Paper Segment				
BOD_5	13.7 kg/kkg	7.1 kg/kkg	3.99	Final Effluent
TSS	24.5 kg/kkg	13.2 kg/kkg	7.25	Final Effluent
pH	(a)	(a)	(a)	Final Effluent

(a) Within the range of 5.0 to 9.0 at all times.

(b) See 40 CFR 430.22(b), (c), and (d) for additional limitations that apply to mills that use wet wood yard operations.

Table 3: Subpart B PSES Effluent Limitations Guidelines

Pollutant	BAT(c),(d)			
	Continuous Dischargers		Noncontinuous Dischargers Annual Average (kg/kkg)	Point of Compliance
	1-Day Maximum (kg/kkg)	Monthly Average (kg/kkg)		
TCDD	<ML (a)	(b)	NA	Bleach Plant Effluent
TCDF	31.9 pg/l	(b)	NA	Bleach Plant Effluent
Chloroform	6.92 g/kkg	4.14 g/kkg	NA	Bleach Plant Effluent
Trichlorosyringol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,5-Trichlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,6-Trichlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,5-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,6-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
4,5,6-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,4,5-Trichlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,4,6-Trichlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
Tetrachlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
Tetrachloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,3,4,6-Tetrachlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
Pentachlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
AOX	2.64 kg/kkg	1.41 kg/kkg	NA	Bleach Plant Effluent

(a) "<ML" means less than the minimum level specified in Section 430.01(I) for that particular pollutant.
(b) This regulation doesn't specify a monthly average limitation for this pollutant; however, you may do so as appropriate.
(c) See 40 CFR 430.26(b) for additional limitations that apply to mills that use chlorophenolic biocides.
(d) For mills that disclose to the pretreatment control authority in a report submitted under 40 CFR 403.12(b) to use TCF, refer to 40 CFR 430.26(a)(2).
NA - Not applicable for this compliance point.

Table 4: BAT Effluent Limitations Guidelines for Subpart E Ammonium-Based and Specialty-Grade Sulfite Pulp Segments (d), (e)

	Continuous Dischargers		Noncontinuous Dischargers		
Pollutant	**1-Day Maximum**	**Monthly Average**	**1-Day Maximum**	**Annual Average**	**Point of Compliance**
TCDD(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
TCDF(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
Chloroform(a)	Reserved	Reserved	NA	NA	Reserved
Trichlorosyringol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
3,4,5-Trichlorocatechol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
3,4,6-Trichlorocatechol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
3,4,5-Trichloroguaiacol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
3,4,6-Trichloroguaiacol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
4,5,6-Trichloroguaiacol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
2,4,5-trichlorophenol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
2,4,6-trichlorophenol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
Tetrachlorocatechol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
Tetrachloroguaiacol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
2,3,4,6-Tetrachlorophenol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
pentachlorophenol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
AOX	Reserved	Reserved	Reserved	Reserved	Reserved
COD	Reserved	Reserved	Reserved	Reserved	Reserved

(a) These limitations do not apply to fiber lines that use a TCF bleaching process.
(b) "<ML" means less than the minimum level specified in Section 430.01(i) for that particular pollutant.
(c) This regulation does not specify monthly average limitations for this pollutant; however, you may do so as appropriate.
(d) For mills that certify to use TCF, refer to 40 CFR 430.54(a)(2)(ii) and 40 CFR 430.54(a)(3)(ii).
(e) See 40 CFR 430.54(b) for additional limitations that apply to mills that use chlorophenolic biocides.
NA - Not applicable for this compliance point.

Table 5: BAT Effluent Limitations Guidelines for Calcium-, Magnesium-, or Sodium-Based Sulfite Segments

	Final Effluent in kg/kkg (or pounds per 1,000 lbs) of Product				
	Continuous Dischargers		Noncontinuous Dischargers		
Pollutant	**1-Day Maximum**	**Monthly Average**	**1-Day Maximum**	**Annual Average**	**Point of Compliance**
AOX	<ML(a)	(b)	<ML(a)	(b)	Final Effluent
COD	Reserved	Reserved	Reserved	Reserved	Reserved

(a) "<ML" means less than the minimum level specified in Section 430.01(i) for that particular pollutant.
(b) This regulation does not specify this type of limitation; however, you may do so as appropriate.

Table 6: Subpart E BPT Effluent Limitations Guidelines(1)

Segment	Pollutant (a)	BPT Limitations in kg/kkg (or pounds per 1,000 lbs) of product			Point of Compliance
		Continuous dischargers		Noncontinuous dischargers	
		1 Day Maximum	Average of daily values for 30 consecutive days	Annual Average	
Papergrade Sulfite Mills Using Blow Pit Washing Techniques (2)	**Bisulfite liquor/surface condensers**				
	BOD_5	31.8	16.55	9.3	Final Effluent
	TSS	43.95	23.65	13	Final Effluent
	Bisulfite liquor/barometric condensers				
	BOD_5	34.7	18.05	10.14	Final Effluent
	TSS	52.2	28.1	15.44	Final Effluent
	Acid sulfite liquor/surface condensers				
	BOD_5	32.3	16.8	9.44	Final Effluent
	TSS	43.95	23.65	13	Final Effluent
	Acid sulfite liquor/barometric condensers				
	BOD_5	35.55	18.5	10.39	Final Effluent
	TSS	52.2	28.1	15.44	Final Effluent
Papergrade Sulfite Mills Using Vacuum or Pressure Drums to Wash Pulp (2)	**Bisulfite liquor/surface condensers)**				
	BOD_5	26.7	13.9	7.81	Final Effluent
	TSS	43.95	23.65	13	Final Effluent
	Bisulfite liquor/barometric condensers				
	BOD_5	29.4	15.3	8.6	Final Effluent
	TSS	52.2	28.1	15.44	Final Effluent
	Acid sulfite liquor/surface condensers				
	BOD_5	29.75	15.5	8.71	Final Effluent
	TSS	43.95	23.65	13	Final Effluent
	Acid sulfite liquor/barometric condensers				
	BOD_5	32.5	16.9	9.49	Final Effluent
	TSS	52.2	28.1	15.44	Final Effluent
Papergrade Sulfite Using Vacuum or Pressure Drums to Wash Pulp (2)	**Continuous digester**				
	BOD_5	38.15	19.85	11.15	Final Effluent
	TSS	53.75	28.95	15.91	Final Effluent

(1) See 40 CFR 430.52(b), (c), and (d) for additional limitations that apply to mills that use wet woodyard operations.

(2) Each segment includes pH limitations guidelines within the range of 5.0 to 9.0 at all times.

Table 7: PSES Effluent Limitations Guidelines for Subpart E Ammonium-Based and Specialty-Grade Sulfite Pulp Segments (d), (e)

	Continuous Dischargers		
Pollutant	**1-Day Maximum**	**Monthly Average**	**Point of Compliance**
TCDD(a)	<ML(b)	(c)	Bleach Plant Effluent
TCDF(a)	<ML(b)	(c)	Bleach Plant Effluent
Trichlorosyringol(a)	<ML(b)	(c)	Bleach Plant Effluent
3,4,5-Trichlorocatechol(a)	<ML(b)	(c)	Bleach Plant Effluent
3,4,6-Trichlorocatechol(a)	<ML(b)	(c)	Bleach Plant Effluent
3,4,5-Trichloroguaiacol(a)	<ML(b)	(c)	Bleach Plant Effluent
3,4,6-Trichloroguaiacol(a)	<ML(b)	(c)	Bleach Plant Effluent
4,5,6-Trichloroguaiacol(a)	<ML(b)	(c)	Bleach Plant Effluent
2,4,5-trichlorophenol(a)	<ML(b)	(c)	Bleach Plant Effluent
2,4,6-trichlorophenol(a)	<ML(b)	(c)	Bleach Plant Effluent
Tetrachlorocatechol(a)	<ML(b)	(c)	Bleach Plant Effluent
Tetrachloroguaiacol(a)	<ML(b)	(c)	Bleach Plant Effluent
2,3,4,6-Tetrachlorophenol(a)	<ML(b)	(c)	Bleach Plant Effluent
pentachlorophenol(a)	<ML(b)	(c)	Bleach Plant Effluent

(a) These limitations do not apply to fiber lines that use a TCF bleaching process.
(b) "<ML" means less than the minimum level specified in Section 430.01(i) for that particular pollutant.
(c) This regulation does not specify monthly average limitations for this pollutant; however, you may do so as appropriate.
(d) For mills that disclose to the pretreatment control authority in a report submitted under 40 CFR 403.12(b) to use TCF, refer to 40 CFR 430.56(a)(2)(ii) and 40 CFR 430.56(a)(3)(ii).
(e) See 40 CFR 430.56(b) for additional limitations that apply to mills that use chlorophenolic biocides.
NA - Not applicable for this compliance point.

Table 8: PSES Effluent Limitations Guidelines for Calcium-, Magnesium-, or Sodium-Based Sulfite Segments

	Final Effluent in kg/kkg (or pounds per 1,000 lbs) of Product				
	Continuous Dischargers		Noncontinuous Dischargers		
Pollutant	**1-Day Maximum**	**Monthly Average**	**1-Day Maximum**	**Annual Average**	**Point of Compliance**
AOX	<ML(a)	(b)	<ML(a)	(b)	Final Effluent

(a) "<ML" means less than the minimum level specified in Section 430.01(i) for that particular pollutant.
(b) This regulation does not specify this type of limitation; however, you may do so as appropriate.

Table 9: Subpart B New Source Performance Standards (c), (d)

Pollutant	Bleach Plant Effluent		Final Effluent	Point of Compliance
	Continuous Dischargers		Noncontinuous Dischargers	
	1-Day Maximum	Monthly Average	Annual Average (kg/kkg)	
TCDD	<ML (a)	(b)	NA	Bleach Plant Effluent
TCDF	31.9 pg/L	(b)	NA	Bleach Plant Effluent
Chloroform	6.92 g/kkg	4.14 g/kkg	NA	Bleach Plant Effluent
Trichlorosyringol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,5-Trichlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,6-Trichlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,5-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,6-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
4,5,6-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,4,5-Trichlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,4,6-Trichlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
Tetrachlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
Tetrachloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,3,4,6-Tetrachlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
Pentachlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
AOX	0.476 kg/kkg	0.272 kg/kkg	0.208 kg/kkg	Final Effluent
BOD_5	4.52 kg/kkg	2.41 kg/kkg	1.73 kg/kkg	Final Effluent
TSS	8.47 kg/kkg	3.86 kg/kkg	2.72 kg/kkg	Final Effluent
pH	5 - 9	5-9	5 - 9	Final Effluent
COD	Reserved	Reserved	Reserved	Reserved

(a) “ML” means less than the minimum level specified in Section 430.01(I) for that particular pollutant.
(b) This regulation does not specify this type of limitation for this pollutant; however, you may do so as appropriate.
(c) See 40 CFR 430.25(a) for limitations that apply to mills that commenced discharge after June 15, 1988 and before June 15, 1998.
(d) For mills that certify to use TCF, refer to 40 CFR 430.25(b)(2).
NA - Not applicable for this compliance point.

Table 10: Subpart B Pretreatment Standards for New Sources (c), (d)

Pollutant	Bleach Plant Effluent		Final Effluent	Point of Compliance
	Continuous Dischargers		Noncontinuous Dischargers	
	1-Day Maximum	Monthly Average	Annual Average (kg/kkg)	
TCDD	<ML (a)	(b)	NA	Bleach Plant Effluent
TCDF	31.9 pg/L	(b)	NA	Bleach Plant Effluent
Chloroform	6.92 g/kkg	4.14 g/kkg	NA	Bleach Plant Effluent
Trichlorosyringol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,5-Trichlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,6-Trichlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,5-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,6-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
4,5,6-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,4,5-Trichlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,4,6-Trichlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
Tetrachlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
Tetrachloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,3,4,6-Tetrachlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
Pentachlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
AOX	1.16 kg/kkg	0.814 kg/kkg	NA	Bleach Plant Effluent
BOD_5	4.52 kg/kkg	2.41 kg/kkg	1.73 kg/kkg	Final Effluent
TSS	8.47 kg/kkg	3.86 kg/kkg	2.72 kg/kkg	Final Effluent
pH	5 - 9	5-9	5 - 9	Final Effluent
COD	Reserved	Reserved	Reserved	Reserved

(a) “ML” means less than the minimum level specified in Section 430.01(I) for that particular pollutant.
(b) This regulation does not specify this type of limitation for this pollutant; however, you may do so as appropriate.
(c) See 40 CFR 430.27(b) for additional limitations that apply to mills that use chlorophenolic biocides.
(d) For mills that disclose to the pretreatment control authority in a report under 40 CFR 403.12(b) that they use TCF, refer to 40 CFR 430.27(a)(2)).
NA - Not applicable for this compliance point.

Table 11: Subpart E New Source Performance Standards for Conventional Pollutants

Pollutant Parameter	Final Effluent		
	Kg/kkg (or pounds per 1,000 lbs) of Product		
	Continuous Dischargers		Noncontinuous Dischargers
	1 Day Maximum	Average of Daily Values for 30 Consecutive Days	Annual Average
BOD_5	4.38 exp(0.017x)	2.36exp(0.017x)	Average of daily values for 30 consecutive days divided by 1.91
TSS	5.81exp(0.017x)	3.03exp(0.017x)	Average of daily values for 30 consecutive days divided by 1.90
pH	(a)	(a)	(a)

x - Percent sulfite pulp in final product.
(a) Within range of 5 to 9.

Table 12: Pretreatment Standards for New Sources for Subpart E Ammonium-Based and Specialty-Grade Sulfite Pulp Segments (d), (e)

	Continuous Dischargers		
Pollutant	1-Day Maximum	Monthly Average	Point of Compliance
TCDD(a)	<ML(b)	(c)	Bleach Plant Effluent
TCDF(a)	<ML(b)	(c)	Bleach Plant Effluent
Trichlorosyringol(a)	<ML(b)	(c)	Bleach Plant Effluent
3,4,5-Trichlorocatechol(a)	<ML(b)	(c)	Bleach Plant Effluent
3,4,6-Trichlorocatechol(a)	<ML(b)	(c)	Bleach Plant Effluent
3,4,5-Trichloroguaiacol(a)	<ML(b)	(c)	Bleach Plant Effluent
3,4,6-Trichloroguaiacol(a)	<ML(b)	(c)	Bleach Plant Effluent
4,5,6-Trichloroguaiacol(a)	<ML(b)	(c)	Bleach Plant Effluent
2,4,5-trichlorophenol(a)	<ML(b)	(c)	Bleach Plant Effluent
2,4,6-trichlorophenol(a)	<ML(b)	(c)	Bleach Plant Effluent
Tetrachlorocatechol(a)	<ML(b)	(c)	Bleach Plant Effluent
Tetrachloroguaiacol(a)	<ML(b)	(c)	Bleach Plant Effluent
2,3,4,6-Tetrachlorophenol(a)	<ML(b)	(c)	Bleach Plant Effluent
pentachlorophenol(a)	<ML(b)	(c)	Bleach Plant Effluent

(a) These limitations do not apply to fiber lines that use a TCF bleaching process.
(b) "<ML" means less than the minimum level specified in Section 430.01(i) for that particular pollutant.
(c) This regulation does not specify monthly average limitations for this pollutant; however, you may do so as appropriate.
(d) For mills that disclose to the pretreatment control authority in a report submitted under 40 CFR 403.12(b) to use TCF, refer to 40 CFR 430.57(a)(2)(ii) and 40 CFR 430.57(a)(3)(ii).
(e) See 40 CFR 430.57(b) for additional limitations that apply to mills that use chlorophenolic biocides.
NA - Not applicable for this compliance point.

Table 13: Pretreatment Standards for New Sources for Calcium-, Magnesium-, or Sodium-Based Sulfite Segments

Pollutant	Final Effluent in kg/kkg (or pounds per 1,000 lbs) of Product		Point of Compliance
	Continuous Dischargers		
	1-Day Maximum	Monthly Average	
AOX	<ML(a)	(b)	Final Effluent

(a) "<ML" means less than the minimum level specified in Section 430.01(i) for that particular pollutant.
(b) This regulation does not specify this type of limitation; however, you may do so as appropriate.

Table 14: VATIP Effluent Limitations Guidelines and Standards

Tier	Kappa Number (Annual Average)	Filtrate Recycling	Total Pulping Area Condensate, Evaporator Condensate, and Bleach Plant Wastewater Flow (Annual Average)	End-of-Pipe AOX (kg/kkg)			
				Non-TCF (a)		TCF	
				Maximum for Any One Day	Annual Average	Maximum for Any One Day	Annual Average
Tier I	20 for SW 13 for HW	(b)	NA	0.58	0.26	<ML (c)	(d)
Tier II	NA	(b)	10 m^3/kkg	0.23	0.10	<ML (c)	(d)
Tier III	NA	(b)	5 m^3/kkg	0.11	0.05	<ML (c)	(d)

(a) Non-TCF: pertains to any fiber lines that does not use exclusively TCF bleaching processes.
(b) Complete recycling to the chemical recovery system of all filtrates generated prior to bleaching. Under Tier I, this includes all filtrates up to the point where the kappa number is measured.
(c) <ML means less than the minimum level specified in 430.01(I) for that particular pollutant.
(d) This regulation does not specify this type of limitation for this pollutant; however, you may do so as appropriate.
NA - Not applicable.

1 Introduction

On April 15, 1998, the U.S. Environmental Protection Agency (EPA) promulgated final effluent limitations guidelines and standards under 40 CFR 430 of the Clean Water Act (CWA) for the following two subcategories of the pulp, paper, and paperboard industry:

Subpart B	Bleached Papergrade Kraft and Soda
Subpart E	Papergrade Sulfite.

Mills with operations in these subparts are required to comply with the regulation by April 15, 1999, or at the time their permit is reissued, whichever is later. Permit writers and control authorities are required to issue permits and pretreatment agreements to ensure that affected mills are complying with the new regulations. **This document is specifically written to provide guidance to permitting and pretreatment control authorities in issuing NPDES permits and pretreatment agreements to pulp and paper mills which fall within the purview of these two subparts.** Therefore, the "you" throughout this document is addressed to permit writers and control authorities, as appropriate.

You, as a permitting or pretreatment control authority, will need to determine which mills fall under 40 CFR Part 430 and how to write the permits/pretreatment agreements for these mills to ensure their compliance under the new regulations. To help you in this process, EPA has addressed the following topics:

- **Section 2** presents a brief overview of the National Pollutant Discharge Elimination System (NPDES) Program and the National Pretreatment Program;
- **Section 3** presents an overview of the promulgated subcategorization of the Pulp, Paper, and Paperboard Category (40 CFR 430);
- **Section 4** discusses the pollutants regulated under 40 CFR 430 for mills with operations in Subparts B and E;
- **Section 5** discusses the technology bases for the effluent limitations guidelines and standards promulgated for mills with operations in Subparts B and E;
- **Section 6** discusses the in-process and end-of-pipe points where affected mills must demonstrate compliance with the rule;

- **Section 7** presents the effluent limitations guidelines and standards promulgated for mills with operations in Subparts B and E;

- **Section 8** walks through the process of establishing permit limits for mills with operations in Subparts B and E;

- **Section 9** discusses the requirements for establishing Best Management Practices (BMPs) permit requirements;

- **Section 10** discusses the permit requirements for mills enrolling in the Voluntary Advanced Technologies Incentives Program (VATIP);

- **Section 11** presents nine case studies as examples of establishing permits for mills with operations in Subparts B and E; and

- **Section 12** contains a list of resources for additional guidance in establishing permits for affected mills.

This guidance manual also has a number of appendices that contain additional information that may be useful to you in your permitting responsibilities. Please refer to the table of contents at the beginning of this document for more information on appendix contents.

EPA is hopeful that this manual provides guidance on issuing permits and pretreatment agreements to mills with operations in these two subparts in an easy-to-read format. While this manual attempts to address as many permitting issues and situations that may be covered by the regulation, there are other sources that you may wish to consult in issuing permits/pretreatment agreements for mills with operations in Subparts B and E. Therefore, the manual identifies and references other sources throughout the text that you can access to get additional guidance. We have also included in Section 12 a list of these and other sources and how to order them, as well as a list of EPA and other authorities to contact for more guidance.

2 Overview of NPDES Program and National Pretreatment Program

This section presents a brief overview of the NPDES Permit Program and the National Pretreatment Program. For more background information regarding EPA's programs to develop national standards for point source categories, refer to the *U.S. EPA NPDES Permit Writer's Manual* (EPA-833-B-96-003).

What is the NPDES Permit Program?

Section 301(a) of the CWA prohibits the discharge of pollutants except in compliance with CWA Section 402, among other sections. Section 402 authorizes the issuance of NPDES permits for direct dischargers (i.e., existing or new industrial facilities that discharge process wastewaters from any point source into receiving waters). You must develop NPDES permits to control these discharges, using effluent limitations guidelines and water-quality based effluent limitations.

What are Effluent Limitations Guidelines?

EPA establishes ELGs to require a minimum level of process control and treatment for industrial point sources. They are based on the demonstrated performance of model process and treatment technologies that are within the economic means of an industrial category. Although ELGs are based on the performance of model process and treatment technologies, EPA does not mandate the use of specific technologies; therefore, dischargers are free to use any available control technique to meet the limitations.

What are Water-Quality-Based Effluent Limitations (WQBELs)?

All receiving waters have ambient water quality standards that are established by the states or EPA to maintain and protect designated uses of the receiving water (e.g., aquatic life-warm water habitat, public water supply, primary contact recreation). Some of you may find that the application of the ELGs result in pollutant discharges that exceed the water quality standards in particular receiving waters. In such cases, you are required by the CWA and federal guidelines to develop more stringent WQBELs for the pollutant to ensure that the water quality standards are met. States can use the total maximum daily load (TMDL) process as one way of quantifying the allowable pollutant loadings in receiving waters, based on the relationship between pollution sources and in-stream water quality standards.

Because EPA and state permitting authorities are familiar with their respective water quality standards and knowledgeable in waste load allocations and other procedures to maintain water quality standards, these issues are not addressed in this document. To learn more about how TMDLs are developed, you should refer to *Guidance for Water-Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001). To learn how to apply water quality standards in NPDES permits, refer to the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001).

What is the National Pretreatment Program?

Section 402(b)(8) of the CWA requires that permits for certain publicly owned treatment works (POTWs) (i.e., those receiving pollutants from significant industrial sources subject to pretreatment standards under CWA Section 307(b)) must establish a pretreatment program to ensure compliance with these standards. EPA has published regulations to define the requirements of this POTW pretreatment control program.

What are National Pretreatment Standards?

Section 403.5(a)(1) generally prohibits users of a POTW (indirect dischargers) from discharging pollutants to the POTW that cause pass-through or interference. Therefore, POTWs that receive wastewater from indirect dischargers subject to categorical pretreatment standards must develop and enforce local limits to comply with the National Pretreatment Standards.

Pass-through is defined as a discharge that exits the POTW into waters of the United States in quantities or concentrations that, alone or in conjunction with a discharge or discharges from other sources, causes a violation of any requirement of the POTW's NPDES permit. Interference is defined as a discharge that, alone or in conjunction with a discharge or discharges from other sources, both: (1) inhibits or disrupts the POTW, its treatment processes, or its operations; or its sludge processes, use, or disposal; and (2) causes the POTW to violate any requirement of its NPDES permit, or prevents sewage sludge use or disposal (40 CFR §403.3).

Applicability of Effluent Limitations Guidelines and Standards

Mills that discharge waters to receiving streams or POTWs are required to meet one (or more) of the following ELG&S (as well as BMPs) established by the CWA.

Guideline or Standard for the control of:	Is:	Acronym
toxic and conventional pollutants at an existing direct discharger	best practicable control technology currently available	BPT
conventional pollutants at an existing direct discharger	best conventional pollutant control technology	BCT
toxic and nonconventional pollutants at an existing direct discharger	best available technology economically achievable	BAT
conventional, toxic, and nonconventional pollutants at a new source, direct discharger	new source performance standards	NSPS
toxic and nonconventional pollutants at an existing indirect discharger	pretreatment standards for existing sources	PSES
toxic and nonconventional pollutants at a new source, indirect discharger	pretreatment standards for new sources	PSNS
losses and spills from process equipment	best management practices	BMP

With the April 15, 1998 promulgation of the regulation, EPA has established new BAT, NSPS, PSES, PSNS, and BMPs in addition to the BPT, BCT, BAT, NSPS, PSES, and PSNS already established for the pulp, paper, and paperboard category.

Note that although this document focuses on these new ELG&S and BMPs, all previous ELG&S remain in effect.
Table 2-1 summarizes the applicability of these ELG&S.

Table 2-1: Effluent Limitations Guidelines and Standards Applicable to Each Program

Program	Type of Discharger	Existing or New Source?	Applicable ELG&S Previously Established	Additional ELG&S (from 4/15/98 Rule)
NPDES Permit Program	Direct Discharger	Existing Source	BCT BPT BAT	BAT BMP
		New Source	NSPS	NSPS BMP
National Pretreatment Program	Indirect Discharger	Existing Source	PSES	PSES BMP
		New Source	PSNS	PSNS BMP

3 Overview of 40 CFR §430

The pulp, paper, and paperboard category was reorganized by the promulgated rule (April 15, 1998). As part of the reorganization of the category, EPA revised the subcategorization scheme. This section presents the new subcategorization scheme that EPA adopted, explains how it is different from the previous subcategorization scheme, and, most importantly, describes how to determine the subcategories applicable to each mill. Appendix A lists the mills that are subject to ELG&S under the reorganized Subparts B and E.

What is the New Subcategorization Scheme?

In the original rule, EPA established 26 subcategories defined by the products manufactured at a mill. In the revised rule, EPA reorganized these 26 subcategories into 12 subcategories by grouping mills with similar processes. EPA only promulgated additional ELG&S for reorganized Subparts B and E. Table 3-1 presents the final subparts and how they relate to the previous subcategories.

As Table 3-1 shows, under the new subcategorization scheme, Subpart B is comprised of four segments which used to be Subparts G, H, I, and P under the previous subcategorization scheme. Subpart E includes former Subparts U and J, and has been reorganized into three segments (calcium-, magnesium-, and sodium-based; ammonium-based; and specialty-grade segments).

Table 3-1: Revised Subcategorization Scheme (with Previous Subparts Noted)

Final Codified Subpart	Revised Subcategorization Scheme	Previous Subcategorization Scheme (With Previous Subparts Noted)
A	Dissolving Kraft	Dissolving Kraft (F)
B[(a)]	Bleached Papergrade Kraft and Soda Digester	Market Bleach Kraft (G) Bleached Kraft (H) - including paperboard, coarse paper, and tissue. Fine Bleached Kraft (I) Soda (P)
C	Unbleached Kraft	Unbleached Kraft (A) ■ Linerboard Segment ■ Bag and Other Products Segment
D	Dissolving Sulfite	Dissolving Sulfite (K) ■ Nitration Segment ■ Viscose Segment ■ Cellophane Segment ■ Acetate Segment
E[(a)]	Papergrade Sulfite ■ Calcium-, Magnesium-, and Sodium-based Segment ■ Ammonium-based Segment ■ Specialty grade	Papergrade Sulfite - Drum Wash (U) ■ Bisulfite liquor/surface Condensers Segment ■ Bisulfite liquor/barometric Condensers Segment ■ Acid sulfite/surface Condensers Segment ■ Acid sulfite/barometric Condensers Segment ■ Continuous Digester Segment Papergrade Sulfite - Blow Pit Wash (J) ■ Bisulfite liquor/surface Condensers Segment ■ Bisulfite/barometric Condensers Segment ■ Acid/surface Condensers Segment ■ Acid/barometric Condensers Segment
F	Semi-Chemical	Semi-Chemical (B) ■ Ammonia Segment ■ Sodium Segment
G	Mechanical Pulp	Groundwood-Thermo-Mechanical (M), Groundwood-Coarse, Molded, News (N) Groundwood-Fine Papers (O) Groundwood-Chemi-Mechanical (L)
H	Non-Wood Chemical Pulp	Miscellaneous mills not covered by a specific subpart
I	Secondary Fiber Deink	Deink Secondary Fiber (Q) ■ Fine Papers ■ Tissue Papers ■ Newsprint J Secondary Fiber Non-Deink Tissue from Wastepaper (T) Paperboard from Wastepaper (E) ■ Corrugating medium ■ Non-Corrugating Medium Wastepaper-Molded Products (W) Builders' Paper and Roofing Felt (40 CFR Part 431 Subpart A)

Final Codified Subpart	Revised Subcategorization Scheme	Previous Subcategorization Scheme (With Previous Subparts Noted)
K	Fine and Lightweight Papers from Purchased Pulp	Nonintegrated Fine Papers (R) ■ Wood Fiber Furnish ■ Cotton Fiber Furnish Nonintegrated Lightweight Papers (X) ■ Lightweight Papers ■ Lightweight Electrical PapersL Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp Nonintegrated ■ Tissue Papers(S) ■ Filter and Non-Woven (Y) ■ Paperboard (Z)
L	Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp	Nonintegrated ■ Tissue Papers (S) ■ Filter and Non-Woven (Y) ■ Paperboard (Z)

(a) EPA has promulgated ELG&S for Subparts B and E. EPA intends to revise ELG&S as appropriate for the remaining subparts over the next few years.

To issue or reissue permits or pretreatment agreements, you must be aware not only of the reorganization of the subcategories covered under 40 CFR 430, but also which ELG&S apply to mills in the pulp and paper category. **Mills with operations in Subparts B and E are subject to not only the ELG&S promulgated on April 15, 1998, but previously established guidelines and standards for this category as well.** Below are a few examples showing the ELG&S that apply to mills with operations covered by Subparts B and E.

Example 1: Mill A is an existing direct discharger which falls under Subpart B. The mill produces market pulp and tissue. The mill is subject to which effluent guidelines and standards?

Answer: As a existing direct discharger, Mill A is subject to BMP and to revised BAT, as well as previously established BAT and BPT for the Market Bleached Kraft Segment (former Subpart G) and the Bleached Kraft (including paperboard, coarse paper, and tissue) Segment (former Subpart H).

Subpart	Discharge Status	Mill Subject to Previously Established ELG&S	Also Subject to the Following under April 15, 1998 ELG&S
Subpart B - Bleached Papergrade Kraft and Soda	Direct Discharger	**BPT** and **BAT** for Market Bleached Kraft Segment (former Subpart G)	**BAT** **BMP**
		BPT and **BAT** for Bleached Kraft Segment (former Subpart H)	

Example 2: Mill B is an existing indirect discharger that falls under Subpart B. The mill produces market pulp and fine paper. The mill is subject to which effluent guidelines and standards?

Answer: As an existing indirect discharger, Mill B is subject to BMP and to revised PSES. In addition, because Mill B falls under two segments for the previously established PSES, you must apply PSES for the Market Bleached Kraft Segment (former Subpart G) and the Fine Bleached Kraft Segment (former Subpart I).

Subpart	Direct or Indirect Discharger	Mill Subject to Previously Established ELG&S	Also Subject to the Following under April 15, 1998 ELG&S
Subpart B - Bleached Papergrade Kraft and Soda	Indirect Discharger	**PSES** for Market Bleached Kraft Segment (former Subpart G)	**PSES** **BMP**
		PSES for Fine Bleached Kraft Segment (former Subpart I)	

4 What are the New Pollutants Regulated by the Rule?

In the April 15, 1998 rule, EPA established ELG&S for toxic and nonconventional pollutants that are characteristic of Subpart B and E mills that bleach pulp with chlorine-containing compounds. Table 4-1 shows which pollutants are regulated for mills with operations in Subpart B and E. Each of these pollutants is discussed below.

Table 4-1: Pollutants Regulated Under 40 CFR 430

Pollutants	Subpart B	Subpart E		
		NH_4-Based Segment	Na-,Ca-, Mg-Based Segment	Specialty-Grade Segment
Chloroform (a)	✓	Reserved	No requirement	Reserved
2,3,7,8-TCDF	✓	✓	No requirement	✓
2,3,7,8-TCDD	✓	✓	No requirement	✓
12 Chlorinated Phenolic Compounds	✓	✓	No requirement	✓
AOX (a)	✓	Reserved	✓	Reserved
COD	Reserved	Reserved	Reserved	Reserved

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 (though, some of the chloroform remains with the pulp). Any chloroform found in bleach plant effluent that is not emitted to the air prior to reaching the wastewater treatment plant is volatilized and degraded during secondary treatment.

2,3,7,8-TCDD (Dioxin) and 2,3,7,8-TCDF (Furan). The dioxin congener consists of two benzene rings connected by two oxygen bridges. There are eight positions where substitution of hydrogen atoms by other atoms or by organic or inorganic radicals can occur. 2,3,7,8-TCDD is one of 75 dioxin congeners and is the most toxic. The chlorinated dibenzofurans have similar

structure, but have only one oxygen bridge rather than two. 2,3,7,8-TCDF is the most toxic of 135 chlorinated dibenzofurans.

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 either to sludge or pass 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 established effluent limitations guidelines and pretreatment standards for the following 12 chlorinated phenolic compounds:

- 4-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

Secondary treatment can generally achieve about 50% removal of these compounds.

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 the effluent of Subpart B and E mills, essentially all of the AOX is 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.

Chemical Oxygen Demand (COD). COD is a measure of the quantity of chemically oxidizable material present in wastewater. Sources of COD include the pulping area, recovery area, bleaching area, and papermaking area. A portion of COD is readily biodegradable while the rest is resistant to biodegradation (i.e., “refractory”). The refractory portion is derived from spent pulping liquor (i.e., kraft mill “black liquor” or sulfite mill “red liquor”), thus, COD biodegradability indicates the degree to which spent pulping liquor is recovered from brown stock pulp. Wastewater COD loads also correlate with discharges of toxic organic pollutants that are not readily biodegraded. (Note: EPA has not established COD ELG&S; however, EPA plans to do so in a future rulemaking.).

5 What are the Regulatory Bases for Effluent Limitations Guidelines and Standards for Subparts B and E?

EPA established numerical ELGs and pretreatment standards for Subparts B and E based on model process technologies and wastewater treatment technologies. Although you must apply the ELGs in the NPDES permit or pretreatment control agreement, mills with operations in Subpart B and E are not required to implement the specific process and/or technologies upon which they are based. Mill owners and operators may use any combination of process technologies and in-process or end-of-pipe wastewater treatment technologies to comply with the permit limits.

What are the Model Process Technologies and Treatment Systems?

This section outlines the model technologies that form the regulatory bases of the ELG&S presented in Section 4. This discussion is broken out by subpart.

Subpart B - Bleached Papergrade and Kraft and Soda Mills

For direct dischargers, the model technology basis of BAT for the Bleached Papergrade Kraft and Soda Subcategory is conventional pulping followed by complete substitution of chlorine dioxide for elemental chlorine, as well as the nine elements identified below:

1. Adequate chip thickness control;

2. Closed brown stock pulp screen room operation (i.e., screening filtrates are returned to the recovery cycle);

3. Effective brown stock washing (i.e., washing that achieves a soda loss of less than or equal to 10 kg Na_2SO_4 per air dried metric ton (ADMT) of pulp (equivalent to 99% recovery of pulping chemicals from the pulp);

4. Use of TCDD- and TCDF-precursor-free defoamers (water-based defoamers or defoamers made with precursor-free oils);

5. Elimination of hypochlorite (i.e., replacing hypochlorite with equivalent bleaching power, such as adding peroxide and/or oxygen to the first extraction stage and/or additional chlorine dioxide in final brightening stages);

6. Use of strategies to minimize kappa factor and TCDD- and TCDF-precursors in brown stock pulp;

7. High-shear mixing to ensure adequate mixing of pulp and bleaching chemicals;

8. Oxygen and peroxide enhanced extraction, which allows mills to eliminate hypochlorite and/or use a lower kappa factor in the first bleaching stage; and

9. Efficient biological wastewater treatment, removing 90% or more of influent five-day biochemical oxygen demand (BOD_5).

The technology basis of NSPS is equivalent to that of BAT with the addition of extended delignification (oxygen delignification and/or extended cooking). For the purpose of estimating effluent pollutant reductions, EPA defines extended delignification as the operation of such equipment to a kappa number of 20 or less for softwoods and less than 13 for hardwoods.

For indirect dischargers, the technology bases of PSES and PSNS are equivalent to that of BAT and NSPS technologies, respectively, except without efficient biological wastewater treatment. POTWs are expected to perform efficient biological wastewater treatment.

Subpart E - Papergrade Sulfite Mills

As discussed in Section 3, EPA reorganized Subpart E for BAT, PSES, NSPS, and PSNS into the following three segments:

- **Calcium-, magnesium-, or sodium-based sulfite segment:** Papergrade sulfite mills where pulp and paper are produced using calcium, magnesium, or sodium sulfite acidic cooking liquors, unless those mills are specialty-grade sulfite mills.

- **Ammonium-based sulfite segment:** Papergrade sulfite mills where pulp and paper are produced using an ammonium sulfite acidic liquor, unless those mills are specialty-grade sulfite mills.

- **Specialty-grade sulfite segment:** Papergrade sulfite mills that produce at least 25% pulp with a high percentage of alpha cellulose and high enough brightness to produce end products such as plastic molding compounds, saturating and laminating products, and photographic papers. The specialty-grade segment also includes mills that produce most of their pulp at 91 ISO brightness and above.

For each papergrade sulfite segment, BAT and NSPS are equivalent. Table 5-1 presents the technology bases for BAT and NSPS for each segment of the Papergrade Sulfite Subcategory.

Table 5-1: BAT and NSPS Technology Bases for Papergrade Sulfite Subcategory

Technology Basis for:		
Calcium-, Magnesium-, and Sodium-Based Segment is:	**Ammonium Sulfite Segment is:**	**Specialty-Grade Sulfite Segment is:**
1. Totally chlorine-free bleaching (bleaching with peroxide);	1. Complete substitution of chlorine dioxide for chlorine;	1. Complete substitution of chlorine dioxide for chlorine;
2. Use of TCDD- and TCDF-precursor-free defoamers (water-based defoamers or defoamers made with precursor-free oils);	2. For mills with ECF bleaching, elimination of hypochlorite (i.e., replacing hypochlorite with equivalent bleaching power, such as adding peroxide to the first extraction stage and/or additional chlorine dioxide in final brightening stages);	2. For mills with ECF bleaching, elimination of hypochlorite (i.e., replacing hypochlorite with equivalent bleaching power, such as adding peroxide and/or oxygen to the first extraction stage and/or additional chlorine dioxide in final brightening stages);
3. Oxygen and peroxide enhanced extraction;	3. Use of TCDD- and TCDF-precursor-free defoamers (water-based defoamers or defoamers made with precursor-free oils);	3. Use of TCDD- and TCDF-precursor-free defoamers (water-based defoamers or defoamers made with precursor-free oils);
4. Improved pulp cleaning; and	4. Peroxide enhanced extraction;	4. Oxygen and peroxide enhanced extraction;
5. Efficient biological wastewater treatment.	5. High-shear mixing; and	5. High-shear mixing; and
	6. Efficient biological wastewater treatment.	6. Efficient biological wastewater treatment.

The technology bases of PSES and PSNS for each segment include all the model BAT and NSPS technologies except for efficient biological wastewater treatment, because POTWs are expected to perform efficient biological wastewater treatment.

For a complete description of each technology element, refer to the *Supplemental Technical Development Document for the Pulp, Paper, and Paperboard Category Effluent Limitations Guidelines and Standards, and New Source Performance Standards* (EPA-821-R-97-011, October 1997, www.epa.gov/ost/pupppaper/jd/stdd-v4.pdf).

6 Where Are Mills Required to Demonstrate Compliance?

This section discusses EPA's determination of points at which mills with operations in Subparts B and E must show compliance with the rule. The regulation requires mills to demonstrate compliance with limitations at the point where wastewater leaves the bleach plant, as well as at the point where they discharge their treated effluent to the receiving stream (for direct dischargers). The following subsections discuss the rationale for establishing the bleach plant compliance point; for a more complete discussion of the legal basis for requiring monitoring of in-process streams, refer to Section 8.2.3 of the Supplemental Technical Development Document (EPA 821-R-97-011, October 1997 www.epa.gov/OST/pulppaper/jd/stdd-v4.pdf).

Table 6-1 summarizes the compliance points for each pollutant regulated by the rule.

Direct Dischargers

Under 40 CFR 430, a direct discharger must demonstrate compliance with the limits for TCDD, TCDF, 12 chlorinated phenolic pollutants, and chloroform at the point where the wastewater containing these pollutants leaves the bleach plant from each individual fiber line before being combined with process wastewaters or noncontact cooling water from other operations. (EPA refers to these in-process limits as "bleach plant effluent limits"). EPA determined that bleach plant effluent limits are necessary for these pollutants because chemical pulp bleaching is the principal source of these pollutants; the effluent from a mill's bleach plant is typically combined with other process wastewater and noncontact cooling water prior to treatment and discharge. Because of this, you would not be able to accurately assess compliance at the final mill effluent due to dilution with other mill wastewaters. In addition, bleach plant limits for chloroform are necessary because there is potential for volatilization and loss in mill sewer systems. For AOX, however, direct discharge mills must comply with end-of-pipe limits at the point where the final mill process wastewater effluent is discharged to receiving waters (i.e., at the end of the pipe).

> *Note: Some mills operate several individual fiber lines and associated bleach plants. As a result, these mills must meet limits for pollutants with bleach plant effluent limits for each individual fiber line bleaching plant.*

Indirect Dischargers

Indirect dischargers must also demonstrate compliance with bleach plant effluent limits for TCFF, TCDF, 12 chlorinated phenolic pollutants, and, for mills with operations in Subpart B only, chloroform. EPA also established bleach plant effluent limits for AOX, rather than final effluent limits, because POTWs cannot achieve, through wastewater treatment alone, the degree of AOX removal achieved by the in-process technologies that form the basis of BAT. For more discussion on AOX bleach plant limits, refer to the Supplemental Technical Development Document.

Table 6-1: Compliance Points for Each Regulated Pollutant

Pollutant	Subpart B	Subpart E		
		Ammonium-Based Segment	Calcium-, Sodium-, Magnesium-Based Segment	Specialty-Grade Segment
TCDD	Bleach Plant	Bleach Plant	No requirement	Bleach Plant Effluent
TCDF	Bleach Plant	Bleach Plant	No requirement	Bleach Plant Effluent
Chloroform	Bleach Plant	Reserved	No requirement	Reserved
12 chlorinated phenolic pollutants	Bleach Plant	Bleach Plant	No requirement	Bleach Plant Effluent
AOX	Final Effluent (Directs) Bleach Plant Effluent (Indirects)	Reserved	Final Effluent (Directs) Bleach Plant (Indirects)	Reserved
COD	Reserved	Reserved	Reserved	Reserved

7 What are the Effluent Limitations Guidelines and Standards for Subparts B and E?

This section discusses the numerical ELGs and standards that EPA has promulgated for mills with operations in Subparts B and E. For a discussion of BMP regulations, which apply to all mills with operations covered by Subparts B and E, see Chapter 9. Figures 7-1 through 7-4 summarize the rule for these subparts in four flowcharts:

- Subpart B direct dischargers;
- Subpart B indirect dischargers;
- Subpart E direct dischargers; and
- Subpart E indirect dischargers.

Direct Dischargers

BAT and BPT/BCT

This subsection discusses the BAT and BPT/BCT ELGs promulgated for direct dischargers with operations in Subparts B and E. As noted in Section 2, EPA did not revise BPT ELGs for conventional pollutants. As a result, you must establish permit limits based on the revised BAT ELGs and the BPT ELGs that were previously established.

Subpart B - Bleached Papergrade Kraft and Soda

BAT

40 CFR 430.24 establishes BAT effluent limitations guidelines for AOX, TCDD, TCDF, chloroform, and 12 chlorinated phenolic pollutants. Mills are subject to the ELGs for the chlorinated pollutants listed in Table 7-1 unless the mill certifies that they use a totally chlorine free (TCF) bleaching process (see 40 CFR 430.24(a)(2)). Note that there are additional BAT ELGs for mills that use chlorophenolic biocides (see 40 CFR 430.24(d)); however, many mills, if not all, certify they do not use these compounds. (Refer to Section 10 for discussions of developing permits for mills enrolling in VATIP.)

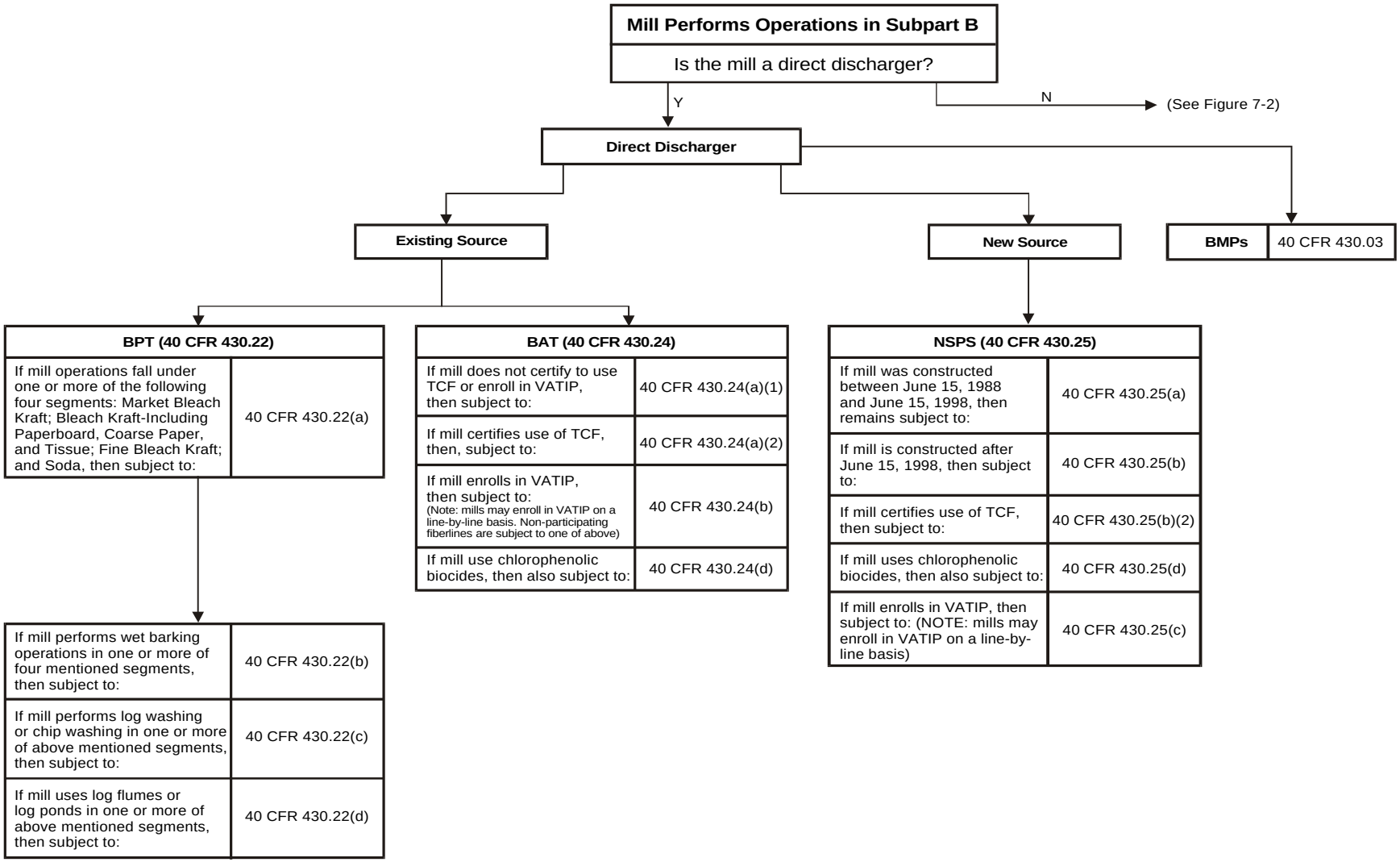


Figure 7-1: Applicability of Subpart B ELG&S

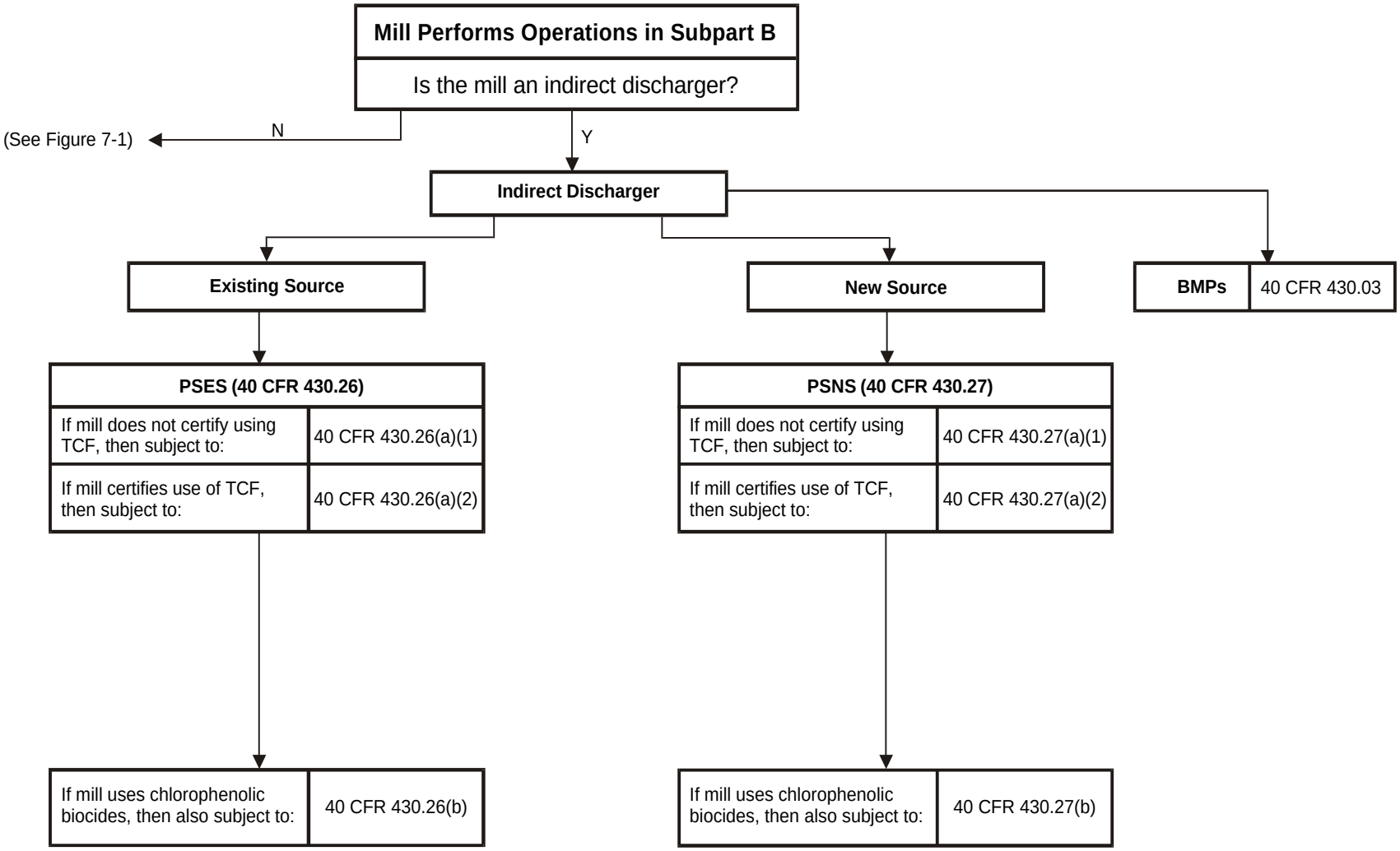


Figure 7-2: Applicability of Subpart B ELG&S

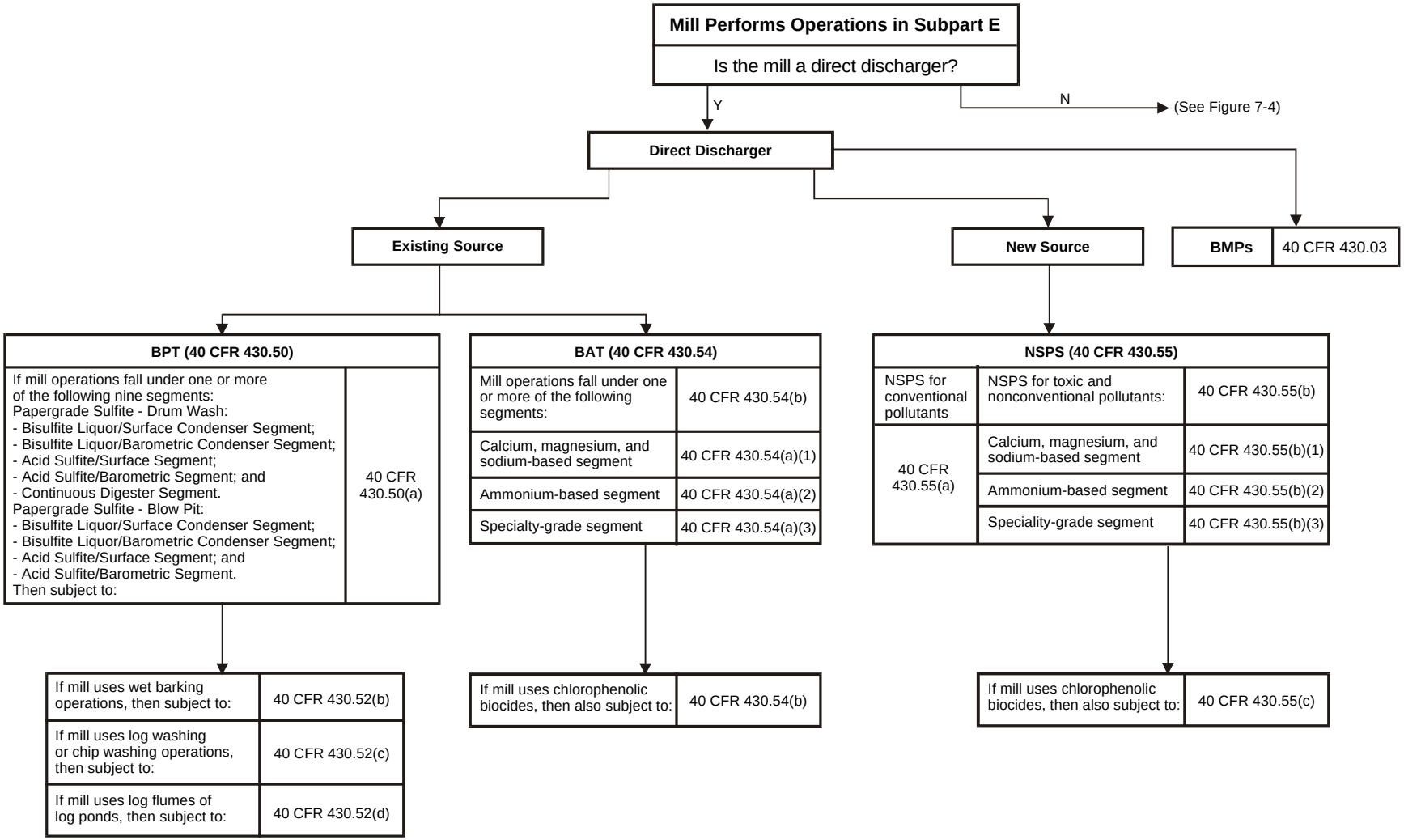


Figure 7-3: Applicability of Subpart E Standards

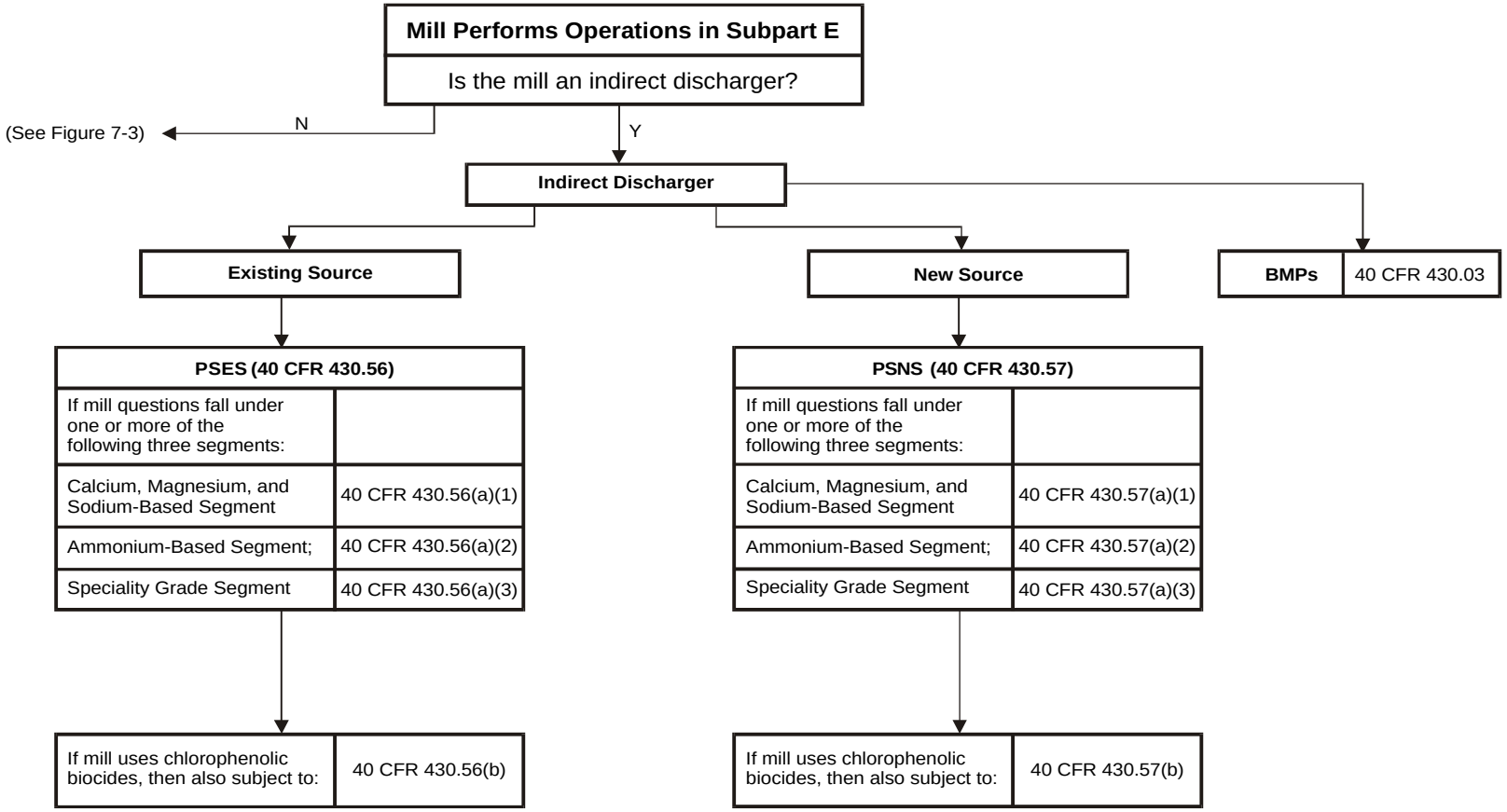


Figure 7-4: Applicability of Subpart E Standards

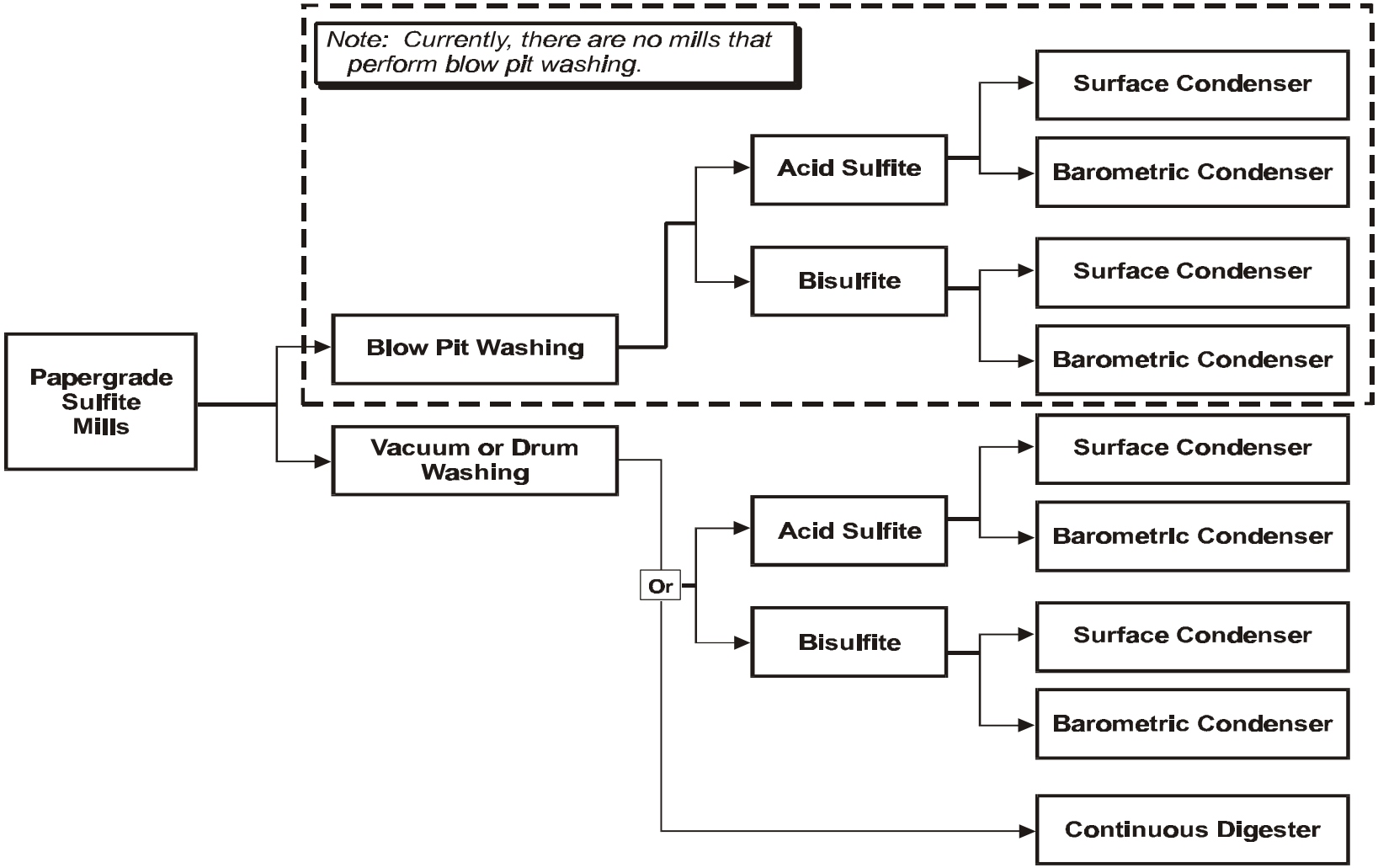


Figure 7-5: Diagram of Subpart E BPT Segments

BPT

40 CFR 430.22 establishes BPT ELGs for BOD_5, TSS, and pH. You must establish permit limits based on the products manufactured (and pulping process in the case of soda mills) at the mill. Mills may be subject to BPT ELGs for one or more of the following four segments:

Note: EPA plans to promulgate discharge limits for COD in a future rulemaking. In the interim, COD limits and COD monitoring should be based on Best Professional Judgement (BPJ).

1. Production of market pulp using a bleached kraft pulping process;
2. Integrated production of paperboard, coarse paper, and tissue paper from pulp made using a bleached kraft pulping process;
3. Integrated production of fine paper from pulp made using a bleached kraft pulping process; and
4. Production of market pulp and fine paper using a soda pulping processes.

Mills that perform wet woodyard operations are subject to additional BPT ELGs; however, few mills, if any, continue to perform such operations (refer to 40 CFR 430.22(b), (c), and (d)).

Subpart E - Papergrade Sulfite

BAT

40 CFR 430.54 establishes BAT effluent limitations guidelines for the three segments of Subpart E (calcium-, magnesium-, and sodium-based, ammonium-based, and specialty-grade pulp). Tables 7-3 and 7-4 list the ELGs for each pollutant regulated for the three segments. Note that there are additional BAT ELGs for mills that use chlorophenolic biocides (see 40 CFR 54(b)); however, many mills, if not all, certify they do not use these compounds.

Note: BPJ should be used to establish permit limits for pollutants that have reserved ELGs.

BPT

40 CFR 430.52 establishes the BPT ELGs for BOD_5, TSS, and pH. You must establish permit limits based on mill process operations. Mills are subject to one of the following. The nine BPT segments are defined as "papergrade sulfite mills where":

1. Blow pit washing techniques are used (bisulfite liquor/surface condensers);
2. Blow pit washing techniques are used (bisulfite liquor/barometric condensers);
3. Blow pit washing techniques are used (acidic liquor/surface condensers);
4. Blow pit washing techniques are used (acidic liquor/barometric condensers);
5. Vacuum or pressure drums are used to wash pulp (bisulfite liquor/surface condensers);

6. Vacuum or pressure drums are used to wash pulp (bisulfite liquor/barometric condensers);
7. Vacuum or pressure drums are used to wash pulp (acidic liquor/surface condensers);
8. Vacuum or pressure drums are used to wash pulp (bisulfite liquor/barometric condensers); and
9. Vacuum or pressure drums are used to wash pulp (continuous digester).

Figure 7-5 presents a diagram of the Subpart E BPT segments. Table 7-5 lists the BPT limitations for each Subpart E segment. Mills that perform wet woodyard operations are subject to additional BPT ELGs; however, few mills, if any, perform such operations (see 40 CFR 430.52(b), (c), and (d)).

NSPS

The NSPS promulgated under Subparts B and E apply to any mill subject to those subparts that is a "new source" as defined in 40 CFR 430.01(j), such as any newly constructed direct discharger (i.e., greenfield mill) that is located at a site where no other source is located, or an existing mill that extensively modifies its fiber line(s), or constructs a new fiberline.

Note: See 40 CFR 430.01(j) for the definition of New Source as it relates to Subparts B and E.

Mills modifying their fiber lines or adding new fiber lines are likely to be the most common trigger of NSPS. In this case, NSPS are applicable to the modified fiber line only; the remainder of the mill remains an existing source subject to BAT. Section 430.01(j) of the rule outlines the following types of changes to existing mills to which you must apply NSPS (this discussion also applies to PSNS described later in this section):

1. The modified fiber line completely replaces an existing source. This definition *does not* include fiber lines enrolled in the Voluntary Advanced Technology Incentives Program or fiber lines modified to comply with baseline BAT (see Section 9).

   Note that the following changes *do not* cause an existing fiber line to be considered a new source:

   - Upgrades of existing pulping operations;
   - Upgrades or replacement of pulp screening and brown stock pulp washing operations;
   - Upgrading bleach plant unit operations;

- Installation of extended cooking and/or oxygen delignification systems or other post-digester, pre-bleaching delignification systems;
- Changes in methods or amounts of bleaching chemical applications;
- Changes in the types of bleaching chemicals used;
- Installation of new bleaching towers to facilitate replacement of sodium or calcium hypochlorite; and
- Installation of new bleached pulp washing systems.

2. The modified fiber line is substantially independent of an existing source at the same site (i.e., an existing mill builds and operates an entirely new fiber line that supplements the capacity of an existing fiber line).

A mill is considered a new source under NSPS if it meets the two requirements above and if it begins discharging after June 15, 1998.

Subpart B - Bleached Papergrade Kraft and Soda Subcategory

40 CFR 430.25 establishes NSPS for AOX, TCDD, TCDF, chloroform, 12 chlorinated phenolic pollutants, BOD_5, TSS, and pH for new mills with operations in Subpart B. Table 7-6 lists the limits for each pollutant regulated by NSPS for Subpart B. Mills are subject to the standards for chlorinated pollutants unless the mill certifies that they use TCF bleaching processes (see 40 CFR 430.25(b)(2)). (Refer to Section 10 for discussion of developing permits for mills enrolling in VATIP.)

Subpart E - Papergrade Sulfite

40 CFR 430.55 establishes NSPS for TCDD, TCDF, 12 chlorinated phenolic pollutants, BOD_5, TSS, and pH for new mills with operations in Subpart E. NSPS for toxic and nonconventional pollutants are equivalent to the BAT guidelines (see Table 7-3 and 7-4). EPA did not revise NSPS for conventional pollutants; therefore, you must use the standards for BOD_5, TSS, and pH established in 1982. Table 7-7 presents these previously established NSPS.

Indirect Dischargers

PSES and PSNS

This section discusses PSES and PSNS for existing and new indirect dischargers with operations in Subparts B and E. Refer to above discussion of new sources for a definition of mills subject to PSNS, and refer to 40 CFR 430.1 (j) and 403.3 (k).

If an existing indirect discharger "commences construction" of a new fiber line or other installation that would fall within the Part 430 definition of "new source," and if it commences construction after December 17, 1993 (see 40 CFR 403.3(k)), that post-1993 installation would be subject to PSNS.

Subpart B - Bleached Papergrade Kraft and Soda

40 CFR 430.26 and 430.27 establish PSES and PSNS for AOX, TCDD, TCDF, chloroform, and 12 chlorinated phenolic pollutants. EPA has made no pass-through determination for COD; therefore, there are no COD pretreatment standards for Subpart B at this time. PSES are equivalent to BAT guidelines for all pollutants except AOX (see Table 7-1).

Table 7-8 lists the PSES and PSNS for AOX. Note that indirect discharge mills must assess compliance with AOX limitations at the bleach plant.

Subpart E - Papergrade Sulfite

40 CFR 430.56 and 430.57 establish PSES and PSNS for each segment of Subpart E. PSES and PSNS are equivalent to BAT guidelines for all pollutants, except chloroform, AOX, and COD. Under BAT, EPA has reserved ELGs for these pollutants. For PSES and PSNS, however, EPA has made no pass-through determination for chloroform or AOX in the ammonium and specialty-grade segments (nor for COD for all of Subpart E). As a result, there are no pretreatment standards for chloroform or AOX for the ammonium and specialty-grade segments or COD for any Subpart E segment. At this time, EPA has insufficient data to characterize the performance of the model BAT technologies for chloroform, AOX, and COD for Subpart E and to subsequently conduct a pass-through analysis. When these data become available, EPA will make pass-through determinations and (if warranted) will set pretreatment standards for these pollutants.

Table 7-1: Subpart B BAT Effluent Limitations Guidelines

Pollutant	BAT(c),(d)			
	Continuous Dischargers		Noncontinuous Dischargers Annual Average (kg/kkg)	Point of Compliance
	1-Day Maximum (kg/kkg)	Monthly Average (kg/kkg)		
TCDD	<ML (a)	(b)	NA	Bleach Plant Effluent
TCDF	31.9 pg/l	(b)	NA	Bleach Plant Effluent
Chloroform	6.92 g/kkg (d)	4.14 g/kkg (d)	NA	Bleach Plant Effluent
Trichlorosyringol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,5-Trichlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,6-Trichlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,5-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,6-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
4,5,6-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,4,5-Trichlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,4,6-Trichlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
Tetrachlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
Tetrachloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,3,4,6-Tetrachlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
Pentachlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
AOX	0.951 kg/kkg	0.623 kg/kkg	0.512	Final Effluent
COD	Reserved	Reserved	Reserved	Reserved

(a) "<ML" means less than the minimum level specified in Section 430.01(I) for that particular pollutant.

(b) This regulation doesn't specify a monthly average limitation for this pollutant; however, you may do so as appropriate.

(c) See 40 CFR 430.24(d) for additional limitations that apply to mills that use chlorophenolic biocides.

(d) Mills that certify to use TCF are not subject to the ELGs. Refer to 40 CFR 430.24(a)(2).

NA - Not applicable for this compliance point.

Table 7-2: Subpart B BPT Effluent Limitations Guidelines

Pollutant	BPT Limitations (b)			
	Continuous Dischargers		Non-Continuous Dischargers	
	1-Day Maximum	Average of Daily Values for 30 Consecutive Days	Annual Average	Compliance Point
Bleached Kraft Mills Producing Market Pulp Segment				
BOD_5	15.45 kg/kkg	8.05 kg/kkg	4.52	Final Effluent
TSS	30.4 kg/kkg	16.4 kg/kkg	9.01	Final Effluent
pH	(a)	(a)	(a)	Final Effluent
Bleached Kraft Mills Producing Paperboard, Coarse Paper, and Tissue Paper Segment				
BOD_5	13.65 kg/kkg	7.1 kg/kkg	3.99	Final Effluent
TSS	24 kg/kkg	12.9 kg/kkg	7.09	Final Effluent
pH	(a)	(a)	(a)	Final Effluent
Bleached Kraft Mills Producing Pulp and Fine Paper Segment				
BOD_5	10.6 kg/kkg	5.5 kg/kkg	3.09	Final Effluent
TSS	22.15 kg/kkg	11.9 kg/kkg	6.54	Final Effluent
pH	(a)	(a)	(a)	Final Effluent
Soda Mills Producing Pulp and Paper Segment				
BOD_5	13.7 kg/kkg	7.1 kg/kkg	3.99	Final Effluent
TSS	24.5 kg/kkg	13.2 kg/kkg	7.25	Final Effluent
pH	(a)	(a)	(a)	Final Effluent

(a) Within the range of 5.0 to 9.0 at all times.

(b) See 40 CFR 430.22(b), (c), and (d) for additional limitations that apply to mills that use wet wood yard operations.

Table 7-3: BAT Effluent Limitations Guidelines for Subpart E Ammonium-Based and Specialty-Grade Sulfite Pulp Segments

	Continuous Dischargers		Noncontinuous Dischargers		
Pollutant	**1-Day Maximum**	**Monthly Average**	**1-Day Maximum**	**Annual Average**	**Point of Compliance**
TCDD(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
TCDF(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
Chloroform(a)	Reserved	Reserved	NA	NA	Reserved
Trichlorosyringol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
3,4,5-Trichlorocatechol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
3,4,6-Trichlorocatechol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
3,4,5-Trichloroguaiacol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
3,4,6-Trichloroguaiacol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
4,5,6-Trichloroguaiacol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
2,4,5-trichlorophenol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
2,4,6-trichlorophenol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
Tetrachlorocatechol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
Tetrachloroguaiacol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
2,3,4,6-Tetrachlorophenol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
pentachlorophenol(a)	<ML(b)	(c)	NA	NA	Bleach Plant Effluent
AOX	Reserved	Reserved	Reserved	Reserved	Reserved
COD	Reserved	Reserved	Reserved	Reserved	Reserved

(a) These limitations do not apply to fiber lines that use a TCF bleaching process.
(b) "<ML" means less than the minimum level specified in Section 430.01(I) for that particular pollutant.
(c) This regulation does not specify monthly average limitations for this pollutant; however, you may do so as appropriate.
NA - Not applicable for this compliance point.

Table 7-4: BAT Effluent Limitations Guidelines for Calcium-, Magnesium-, or Sodium-Based Sulfite Segments

	Final Effluent in kg/kkg (or pounds per 1,000 lbs) of Product				
	Continuous Dischargers		Noncontinuous Dischargers		
Pollutant	**1-Day Maximum**	**Monthly Average**	**1-Day Maximum**	**Annual Average**	**Point of Compliance**
AOX	<ML(a)	(b)	<ML(a)	(b)	Final Effluent
COD	Reserved	Reserved	Reserved	Reserved	Reserved

(a) "<ML" means less than the minimum level specified in Section 430.01(I) for that particular pollutant.
(b) This regulation does not specify this type of limitation; however, you may do so as appropriate.

Table 7-5: Subpart E BPT Effluent Limitations Guidelines(1)

Segment	Pollutant (a)	BPT Limitations in kg/kkg (or pounds per 1,000 lbs) of product			Point of Compliance
		Continuous dischargers		Noncontinuous dischargers	
		1 Day Maximum	Average of daily values for 30 consecutive days	Annual Average	
Papergrade Sulfite Mills Using Blow Pit Washing Techniques (2)	**Bisulfite liquor/surface condensers**				
	BOD_5	31.8	16.55	9.3	Final Effluent
	TSS	43.95	23.65	13	Final Effluent
	Bisulfite liquor/barometric condensers Kg/kkg (or pounds per 1,000 lb) of product				
	BOD_5	34.7	18.05	10.14	Final Effluent
	TSS	52.2	28.1	15.44	Final Effluent
	Acid sulfite liquor/surface condensers				
	BOD_5	32.3	16.8	9.44	Final Effluent
	TSS	43.95	23.65	13	Final Effluent
	Acid sulfite liquor/barometric condensers				
	BOD_5	35.55	18.5	10.39	Final Effluent
	TSS	52.2	28.1	15.44	Final Effluent
Papergrade Sulfite Mills Using Vacuum or Pressure Drums to Wash Pulp (2)	**Bisulfite liquor/surface condensers)**				
	BOD_5	26.7	13.9	7.81	Final Effluent
	TSS	43.95	23.65	13	Final Effluent
	Bisulfite liquor/barometric condensers				
	BOD_5	29.4	15.3	8.6	Final Effluent
	TSS	52.2	28.1	15.44	Final Effluent
	Acid sulfite liquor/surface condensers				
	BOD_5	29.75	15.5	8.71	Final Effluent
	TSS	43.95	23.65	13	Final Effluent
	Acid sulfite liquor/barometric condensers				
	BOD_5	32.55	16.9	9.49	Final Effluent
	TSS	52.2	28.1	15.44	Final Effluent
Papergrade Sulfite Using Vacuum or Pressure Drums to Wash Pulp (2)	**Continuous digester**				
	BOD_5	38.15	19.85	11.15	Final Effluent
	TSS	53.75	28.95	15.91	Final Effluent

(1) See 40 CFR 430.52(b), (c), and (d) for additional limitations that apply to mills that use wet woodyard operations.

(2) Each segment includes pH limitations guidelines within the range of 5.0 to 9.0 at all times.

Table 7-6: Subpart B New Source Performance Standards

Pollutant	Bleach Plant Effluent		Final Effluent	Point of Compliance
	Continuous Dischargers		Noncontinuous Dischargers	
	1-Day Maximum	Monthly Average	Annual Average (kg/kkg)	
TCDD	<ML (a)	(b)	NA	Bleach Plant Effluent
TCDF	31.9 g/L	(b)	NA	Bleach Plant Effluent
Chloroform	6.92 g/kkg	4.14 (d)	NA	Bleach Plant Effluent
Trichlorosyringol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,5-Trichlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,6-Trichlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,5-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
3,4,6-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
4,5,6-Trichloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,4,5-Trichlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,4,6-Trichlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
Tetrachlorocatechol	<ML(a)	(b)	NA	Bleach Plant Effluent
Tetrachloroguaiacol	<ML(a)	(b)	NA	Bleach Plant Effluent
2,3,4,6-Tetrachlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
Pentachlorophenol	<ML(a)	(b)	NA	Bleach Plant Effluent
AOX	0.476 kg/kkg	0.272 kg/kkg	0.208 kg/kkg	Final Effluent
BOD_5	4.52 kg/kkg	2.41 kg/kkg	1.73 kg/kkg	Final Effluent
TSS	8.47 kg/kkg	3.86 kg/kkg	2.72 kg/kkg	Final Effluent
pH	5 - 9		5 - 9	Final Effluent
COD	Reserved	Reserved	Reserved	Reserved

(a) "ML" means less than the minimum level specified in Section 430.01(I) for that particular pollutant.
(b) This regulation does not specify this type of limitation for this pollutant; however, you may do so as appropriate.
NA - Not applicable for this compliance point.

Table 7-7: Subpart E New Source Performance Standards for Conventional Pollutants

Pollutant Parameter	Final Effluent		
	Kg/kkg (or pounds per 1,000 lbs) of Product		
	Continuous Dischargers		Noncontinuous Dischargers
	1 Day Maximum	Average of Daily Values for 30 Consecutive Days	Annual Average
BOD_5	4.38 exp(0.017x)	2.36exp(0.017x)	Average of daily values for 30 consecutive days divided by 1.91
TSS	5.81exp(0.017x)	3.03exp(0.017x)	Average of daily values for 30 consecutive days divided by 1.90
pH	(a)	(a)	(a)

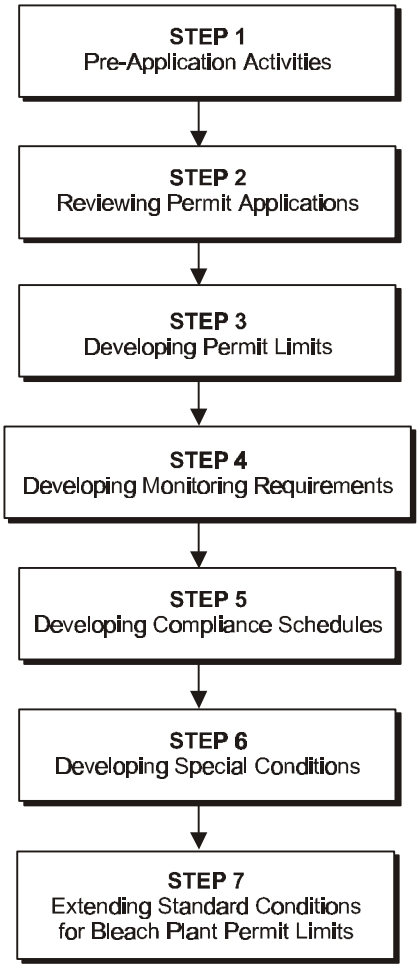
x - Percent sulfite pulp in final product.
(a) Within range of 5 to 9.

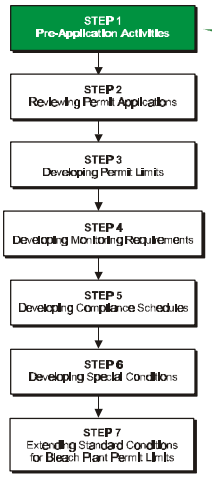
Table 7-8: Subpart B Pretreatment Standards for AOX

Regulation	Pollutant	Bleach Plant Effluent	
		1-Day Maximum (kg/kkg)	Monthly Average (kg/kkg)
PSES	AOX	2.64	1.41
PSNS	AOX	1.16	0.814

8 How Do I Develop Permits for Mills with Operations in Subparts B and E?

This section discusses the step-by-step process of establishing permit limits using ELG&S for mills with operations in Subparts B and E. The discussion covers the following topics to aid you in establishing permits:





STEP 1: Pre-Application Activities

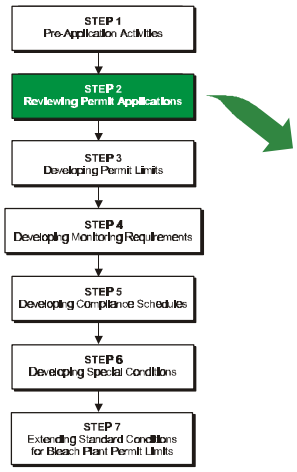
Pre-Application Activities

Before a permit application is submitted by a mill, the permit writer should work to become familiar with the mill's situation, its personnel, and its compliance status. These pre-application activities could include the following:

1. Reviewing the mill's current NPDES permit, supporting record, and compliance history.

2. Developing an effective relationship with mill personnel and corporate officials who complete the application and provide supplemental information needed to finish a draft permit. This can be started by setting up meetings with mill officials before an application for a permit is submitted to discuss the mill's current compliance, current mill operations, and new standards or limitations that will be incorporated in the new permit. These meetings will be critical in supporting a timely completion of the draft permit and in Agency preparation for any legal response that may be expected from the applicant if the permit conditions are not to their liking.

3. If an Agency lacks permit experience, then a mill visit by the permit writer is strongly suggested so that the site operations are understood "first hand" and so that information from the visit can be used by the permit writer in the permit preparation.



STEP 2: Reviewing Permit Applications

Reviewing Permit Applications

All mills that discharge process wastewaters into receiving streams must submit the following forms when applying for an NPDES permit:

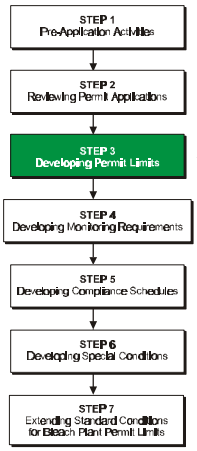
1. Form 1, which includes basic mill information and the SIC codes for the products manufactured; and

2. Form 2C (existing sources) or Form 2D (new sources), which includes outfall information, flow information or projections, and production information or projections.

These forms, if completed properly, should provide most of the information necessary for establishing NPDES permits for mills. The two forms, however, are generic for all facilities with manufacturing, commercial, mining and silvacultural operations (see the U.S. EPA NPDES Permit Writer's Manual (EPA-833-B-96-003) for more information about NPDES permit application forms). For pulp and paper mills, you may need additional information to issue appropriate permits. Two issues that you must be aware of when reviewing permit applications include:

1. 40 CFR 430 has been reorganized so the subparts address similar processes, and not by products manufactured (see Section 3). On the permit applications, however, mills note SIC codes of the products manufactured, not mill processes. If the mill's processes are difficult to identify, you may need to contact the facility to accurately identify process operations. To help you identify the applicable ELG&S for existing direct dischargers, you may refer to Appendix A which lists all existing mills with operations in Subparts B and E (the appendix also indicates whether the mill performs operations that are covered under other subparts).

2. The amount of final product manufactured is not sufficient for establishing some permit limits. Required production information is described in more detail below.



STEP 3: Developing Permit Limits

- What are the Two Types of ELG&S?
- How Do I Use Production Information to Develop Permit Limits?
- What Production Definition Must Be Used to Calculate AOX and Chloroform Limits?
- What Production Definition Must Be Used to Calculate Conventional Pollutant Limits?
- How Do I Calculate the Production Rate?
- How Do I Determine Whether the Mill is Subject to the Specialty-Grade Segment of Subpart E?
- Should the Permit Include Limits Based on ELGs or WQBELs?

Developing Permit Limits

As part of the permit process, you must apply the ELG&S developed by EPA to establish numerical permit limits for mills. Note that permits may also include WQBELs (see section 2); however, this document focuses on the development of permit limits based on ELG&S for the pulp and paper industrial category.

What are the Two Types of ELG&S?

After reviewing the permit application and determining the application is complete, you must establish numerical permits limits for pollutants regulated by ELG&S. Some of the ELG&S are mass-based while others are concentration-based (see Table 8-1). Concentration-based ELG&S are simply the allowable pollutant concentration in a regulated effluent stream, and are independent of a mill's production. For those pollutants that are concentration-based, you must include the concentration value of the ELG&S for the pollutant as the permit limit. Mass-based ELG&S are expressed as an allowable mass of pollutant discharge per unit of production and are directly related to a particular mill's production.

Alert! It is important to obtain accurate production information to establish permit limits for mass-based ELG&S.

Table 8-1
Concentration- or Mass-Based ELG&S

Pollutants	Units	Concentration-Based	Mass-Based
2,3,7,8-TCDD	pg/L	✓	
2,3,7,8-TCDF	pg/L	✓	
Chloroform	g/kkg		✓
12 chlorinated phenolic pollutants	ug/L	✓	
AOX	kg/kkg		✓
COD	Reserved	Reserved	Reserved
BOD_5 (for direct dischargers)	kg/kkg		✓
TSS (for direct dischargers)	kg/kkg		✓
pH (for direct dischargers)	pH units	NA	NA

NA = Not applicable for this pollutant

How Do I Use Production Information to Develop Permit Limits?

For pollutant limits that have mass-based ELG&S, you must first identify the mill's appropriate production rate, and then multiply that rate by the mass-based limit to determine the permit limits (the allowable mass of pollutant in a mill's bleach plant or final effluent). Note that there are two production definitions, one used to determine permit limits for AOX and chloroform and another used to determine permit limits for conventional pollutants. This section discusses the difference between the two production definitions and demonstrates how to determine appropriate production rates.

> **Alert!** Production is defined as off machine tons for BOD_5 and TSS limits, but as air-dried tons of unbleached pulp entering the bleach plant for AOX and chloroform limits.

What Production Definition Must Be Used to Calculate AOX and Chloroform Limits?

For AOX and chloroform, EPA defines production as ". . . the annual unbleached pulp 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 (air-dried means 10% moisture) of brown stock pulp entering the bleach plant at the stage where chlorine or chlorine-containing compounds (i.e., chlorine dioxide) are first added. For mills that use TCF bleaching, unbleached pulp production must be measured as the amount of brown stock pulp entering the first stage of the bleach plant from which wastewater is discharged (see 40 CFR 430.01(n)).

Note that mills typically measure the *amount of bleached pulp* that exits the bleach plant, and not the *amount of brown stock pulp* that enters the first stage of the bleach plant. These are two

different values; the amount of pulp leaving the bleach plant is less than the amount of pulp entering the bleach plant because a certain amount of pulp is lost during the bleaching process. This pulp loss is known as bleaching "shrinkage." Bleaching shrinkage depends on the fiber furnish (i.e., hardwood versus softwood), bleaching process operations (i.e., oxygen delignification, types of bleaching chemicals) and chemical application rate (i.e., greater amount of chemical use results in greater shrinkage).

Most mills know the bleaching shrinkage value associated with their process. You may require the mill to report the amount of brownstock pulp entering the bleach plant, or use the bleaching shrinkage value provided by the mill to calculate that amount. If the mill doesn't know the bleaching shrinkage, you can estimate bleaching shrinkage by referring to Table 8-2, which presents bleaching shrinkage values used by paper industry engineers for design and analysis. Mills will typically measure bleached pulp in terms of air-dried metric tons (ADMT) or air-dry tons (ADT), standard units of measure in the pulp and paper industry defined as 10% moisture. Therefore, you will not have to adjust the production to 10% moisture content.

Table 8-2: Typical Bleaching Shrinkage Factors*

General Bleaching Process	Hardwood	Softwood
Chlorine-Based or Chlorine Dioxide-Based Bleaching Sequence	4%	8%
Oxygen Delignification + Chlorine-Based or Chlorine Dioxide-Based Bleaching Sequence	4%	8%
Extended Cooking + Chlorine-Based or Chlorine Dioxide-Based Bleaching Sequence	2%	4%
Extended Cooking + Oxygen Delignification + Chlorine-Based or Chlorine Dioxide-Based Bleaching Sequence	2%	4%

*Source: BAT Cost Model Support Document. Prepared by Radian Corporation for EPA, 1996. Pulp, Paper, and Paperboard Rulemaking, Section 23.1.2, DCN 13593.

What Production Definition Must Be Used to Calculate Conventional Pollutant Limits?

For conventional pollutants, production is defined as ". . . the annual off-the-machine production (including off-the-machine coating where applicable)." Note that coatings and other additives (e.g., clay, pigments, sizing, strengthening agents) may account for 10 to 40% of a final paper product's weight. The production definition for conventional pollutants *includes* the weight contributed by coatings and additives. For those mills that produce pulp as the final product (i.e., "market" pulp), the definition of production for conventional pollutants is that amount of pulp ". . . measured in air-dry tons (10% moisture)" (see 40 CFR Part 430.01(n)).

As part of business operations as well as permit requirements, mills record production of all final products. Paper products are typically measured in OMMT or OMT, which is consistent with the production definition for conventional pollutants. Mills that manufacture market pulp typically measure this product in terms of ADT with 10% moisture content, which is consistent with the

production definition for conventional pollutants. You may find that some mills report market pulp production with variable moisture content. If so, you must either obtain the pulp moisture content information from the mill, and then normalize the pulp production to 10% moisture content, or require the mill to do so.

Table 8-3 lists production measures common to the pulp and paper industry.

Note: You should review product information submitted by existing direct discharges because you may find they have increased or decreased production or they manufacture new products.

Table 8-3: Common Production Measures in the Pulp and Paper Industry

Production Measure	Metric Units	Notes
Off-the-machine	OMMT	Used when measuring final paper product. Regulatory definition does not specify standard moisture content. Moisture content is variable for final paper products. Typical moisture content is 7% (±2%).
Air-dry	ADMT	Standard industry term, defined as 10% moisture content. Typically used when measuring market pulp or bleached pulp production.
Oven-dry	ODMT	Standard industry term, defined as 0% moisture content.
Bone-dry	BDMT	Old term for oven-dry.

T - English ton.
MT - metric ton.
Note: 1 ton = 0.907 metric ton.

How Do I Calculate the Production Rate?

The production rate is determined by dividing the annual production in metric tons by the number of operating days during that annual period.

EPA has established general permitting regulations at 40 C.F.A. §122.45(b) that specify a production rate calculation method that you may use to determine permit limits for pollutants that have mass-based EG&S. Applying that method, however, may result in different permit limits than those derived using the method outlined in the definition of production described above. Because the general permitting regulations serve a general purpose, you should use the definitions described above, which specifically refer to establishing permit limits for pulp and paper mills.[1]

[1]Applying the production rate calculation method in 40 CFR Part 430, instead of the analogous provisions in Part 122 in this situation, is consistent with the principle of statutory and regulatory construction that the more specific requirements takes precedence over the more general one. Moreover, 40 CFR §122.44(a) specifically requires each NPDES permit to include permit limits based on ELG&S promulgated by EPA under CWA Section 301 (e.g., BAT) and CWA Section 306 (e.g., NSPS). The ELG&S in Part 430 are premised on the use of the term "production" as defined in 40 CFR §430.01(n). Therefore, calculating permit limits for pollutants with mass-based ELG&S using §122.45(b) instead of §430.01(n) would be inconsistent with both Part 430 and, by extension, §122.44(a).

Using the definitions of production specified in 40 CFR 430.01(n), you must determine production rate based on "past production practices, present trends, or committed growth." This means that the production rate should be based on past and/or projected mill data. As a part of their permit applications, mills should be asked to provide monthly production and the corresponding number of operating days data for the five years prior to the expiration of their current permit. If monthly production data is not available, you can also use the annual production data and the corresponding number of operating days for the five years prior to the expiration of their current permit.

The pulp and paper industry operates 24 hours per day, seven days per week. Most mills only have shut downs during scheduled maintenance periods or if market conditions require a mill to stop production for a period of time. Scheduled maintenance shut downs typically occur once or twice a year. Therefore, the number of operating days per year to use in determining production rate is the number of days during the year minus maintenance shut downs and any special market-driven shut downs (e.g., a typical mill's operating days per year will be about 350).

You should calculate permit limits based on the maximum 12-month production demonstrated by the facility over the last five years. The maximum 12-month production can be calculated either as the maximum rolling 12-month production over the last five years or as the maximum yearly production over the last five years. If a facility has papermaking operations that are completely independent of pulp operations, then there may be cases where you would calculate permit limits using different 12-month maximum production dates.

You must ensure that the mill provides (or calculates using bleaching shrinkage) unbleached kraft pulp production for each bleach plant, in order to establish the appropriate permit limits for chloroform (and AOX for indirect dischargers). You may find that some complex mills operate as many as four bleach plants. In this case, you must use four production rates, one for each bleach plant.

In certain circumstances, you will find that evaluating the production rate using the suggested method is not appropriate. Some mills may have recently changed operations (e.g., a mill installed a new paper machine within six months of permit reissuance). In these cases, you should only use data that reflect recent operation. Other mills may plan to change operation during the term of the permit (e.g., a mill plans to reduce or increase bleaching operations or to retire or add a paper machine). For those mills, you may establish multiple sets of limits based on tiered production values that reflect current and projected mill operation.

Three examples of how to determine production are presented below.

Example 1: Mill A produces bleached kraft pulp to manufacture fine papers. The mill operates one bleach plant to produce the bleached pulp and one paper machine to manufacture fine papers. Upon reviewing the mill's production data, you find that over the past five years, the sum of their bleached kraft production and fine paper production peaked between June 1996 and May 1997. The raw data during this time period is as follows:

Date	Bleached Kraft Pulp Production (ADMT/mo)	Fine Paper Production (OMMT/mo)
June 1996	22,900	27,900
July 1996	23,000	27,800
August 1996	23,200	28,000
September 1996	22,700	27,700
October 1996	29,400	27,600
November 1996	29,000	27,600
December 1996	12,000	27,300
January 1997	22,800	28,100
February 1997	22,300	27,900
March 1997	22,900	29,000
April 1997	22,600	27,350
May 1997	23,000	27,300
Total (ADMT or OMMT/ year)	**275,800**	**333,500**
Total Operating Days/Year	**350**	**350**
Total (ADMT or OMMT/day)	**788**	**953**

Mill A provided an 8% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. Based on this information, calculate the production rate for AOX and chloroform as follows:

788/(1-0.08) = 857 ADMT of unbleached papergrade kraft pulp entering the bleach plant.

The production rates for Mill A are as follows:

Production Rate for AOX and Chloroform	857 ADMT
Production Rate for Conventional Pollutants that Result from Fine Paper Manufacturing	953 OMMT

Example 2: Mill B produces bleached kraft pulp to manufacture fine papers and tissue. The mill operates two bleach plants to produce the bleached pulp and two paper machines to manufacture fine papers and tissue. After reviewing the previous five years of data, you find that the sum of bleached kraft pulp, fine papers, and tissue production peaked during the following time period:

Date	Bleach Plant #1 (ADMT/mo)	Bleach Plant #2 (ADMT/mo)	Combined Bleach Plant (ADMT/mo)	Fine Paper (OMMT/mo)	Tissue (OMMT/mo)
1/97	12,500	18,000	30,500	16,000	22,900
2/97	12,700	18,300	31,000	15,750	23,100
3/97	12,300	18,200	30,500	15,400	23,000
4/97	12,300	17,600	29,900	15,300	23,400
5/97	12,900	18,150	31,050	15,800	23,500
6/97	12,100	18,700	30,800	15,650	23,500
7/97	11,800	17,600	29,400	15,750	23,000
8/97	13,000	19,000	32,000	15,100	24,000
9/97	12,500	18,500	31,000	15,950	23,200
10/97	12,700	18,500	31,200	16,250	23,600
11/97	12,900	18,300	31,200	15,800	22,400
12/97	13,150	18,600	31,750	16,250	22,300
Total (ADMT or OMMT/yr)	**150,850**	**219,450**	**370,300**	**189,000**	**277,900**
Total Op. days/yr	**350**	**350**	**350**	**350**	**350**
Total (ADMT or OMMT/dy)	**431**	**627**	**1,058**	**540**	**794**

In their permit application, Mill B provided an 8% and a 4% shrinkage factor for the bleached kraft pulp production data for Bleach Plants #1 and #2, respectively. Based on this information, calculate the production rates for AOX and chloroform as follows:

Bleach Plant #1 = 431/(1-0.08) = 468 ADMT of unbleached papergrade kraft pulp
Bleach Plant #2 = 627/(1-0.04) = 653 ADMT of unbleached papergrade kraft pulp
Combined Bleach Plants = 468 + 653 = 1,121 ADMT of unbleached papergrade kraft pulp

The production rates for Mill B are as follows:

Production Rate for combined bleach plants (for AOX permit limits in final effluent)	1,121 ADMT
Production Rate for chloroform for Bleach Plant #1	468 ADMT
Production Rate for chloroform for Bleach Plant #2 (for chloroform permit limits in bleach plant effluent)	653 ADMT
Production Rate of fine paper that results in the maximum conventional pollutants permit limits	540 OMMT
Production Rate of tissue that results in the maximum conventional pollutants permit limits	794 OMMT

Example 3: Mill C produces bleached kraft pulp to manufacture bleached market pulp and fine papers. The mill operates one bleach plant to produce the bleached pulp and one paper machine to manufacture fine papers. The mill has plans to begin operation of a new paper machine in September 2000 to manufacture an additional 200 OMMT of fine paper. At that time, the mill will decrease market pulp manufacture by approximately 20% so that the bleached kraft pulp can be used to increase fine paper production. After reviewing the previous five years of data, you find that the sum of bleach kraft pulp, fine paper, and market pulp production peaked during the following time period:

Date	Bleached Kraft Pulp (ADMT/mo)	Fine Paper (OMMT/mo)	Market Pulp (ADMT/mo)
7/97	26,750	7,900	20,000
8/97	25,800	8,000	20,100
9/97	25,900	8,100	20,350
10/97	26,100	8,000	20,550
11/97	26,015	8,090	20,300
12/97	26,000	8,100	20,415
1/98	25,800	8,300	19,900
2/98	25,700	8,350	20,100
3/98	25,800	8,550	20,400
4/98	25,500	8,100	20,600
5/98	25,600	7,900	20,500
6/98	25,500	7,900	20,700
Total (ADMT or OMMT/year)	**309,465**	**97,290**	**243,915**
Total Op. Days/yr	**345**	**345**	**345**
Total (ADMT or OMMT/day)	**897**	**282**	**707**

Mill C provided an 8% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. Based on this information, calculate the production rate for AOX and chloroform as follows:

897/(1-0.08) = 975 ADMT of unbleached papergrade kraft pulp entering the bleach plant.

The production rates for Mill C for the noted time period are as follows:

	From Permit Reissuance to 9/00	From 9/00 to Expiration of Permit
Production rate for AOX and Chloroform	975 ADMT	975 ADMT
Production rate of fine papers that results in maximum conventional pollutants permit limits	282 OMMT	482 OMMT
Production rate of market pulp that results in maximum conventional pollutants permit limits	707 ADMT	566 ADMT

How Do I Determine Whether the Mill is Subject to the Specialty-Grade Segment of Subpart E?

To determine whether a mill is subject to ELG&S for the specialty-grade sulfite segment of Subpart E, you must review mill production information. Papergrade sulfite mills subject to ELG&S for the specialty-grade segment produce pulp characterized by a high percentage of alpha cellulose and high brightness sufficient to produce end products such as plastic molding compounds, saturating and laminating products, and photographic papers. (EPA considers a significant portion of production to be 25% or more.) Mills subject to BAT limitations for the specialty-grade segment also include those mills where a major portion (e.g., greater than 50%) of the production is 91 ISO brightness and above. Mills that do not meet these criteria are subject to BAT limitations for the ammonium-based segment or the calcium-, magnesium-, and sodium-based segment, depending on the mill's pulping process. Figure 8-1 illustrates how you must determine a papergrade sulfite mill's appropriate segment.

You should consider the expected production mix at the mill over the full term of the permit. For mills that plan to begin to manufacture products that would require the mill to comply with limitations for the specialty-grade segment, you should establish permit limits that reflect operations for the full permit term. For example, if a mill states that they wish to be considered part of the specialty grade segment but will not meet the production criteria until the last year of a 5-year permit, then they must meet limitations for the appropriate non-specialty grade segment until conversion to specialty grade operations.

Should the Permit Include Limits Based on ELGs or WQBELs?

All receiving waters have water quality standards that are established by the states or EPA that protect the designated uses of the receiving water. After determining the allowable limits based on ELGs, you must compare them to the receiving water's WQBELs. If limits based on ELGs for a particular pollutant result in discharges that exceed the WQBELs for the receiving water, you must establish permit limits that are based on WQBELs (see Section 2 for more information regarding WQBELs).

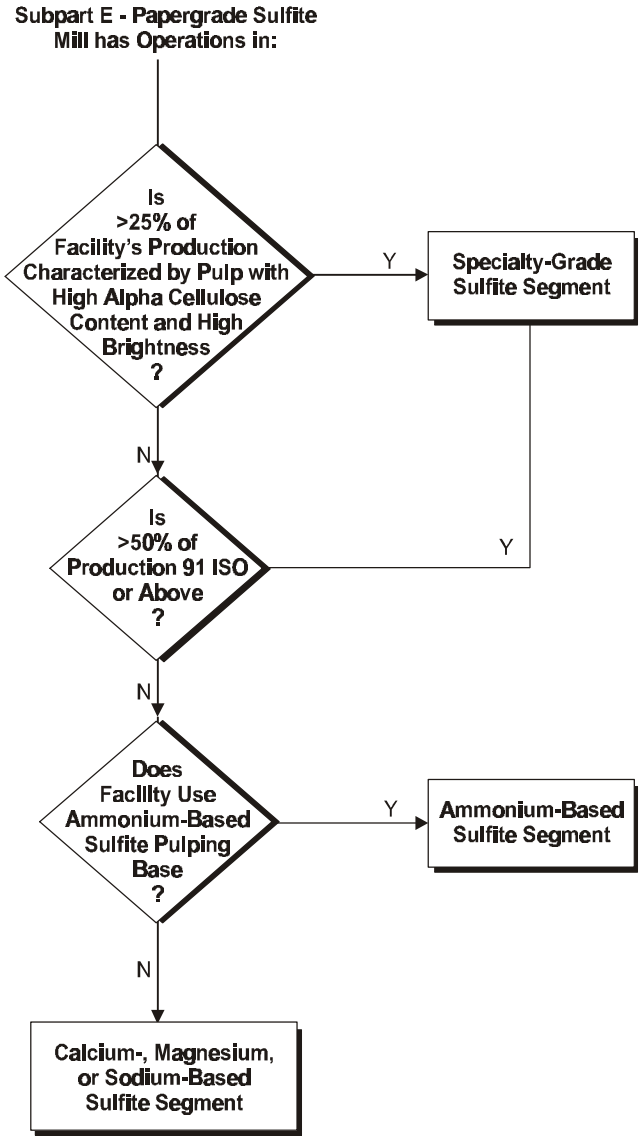
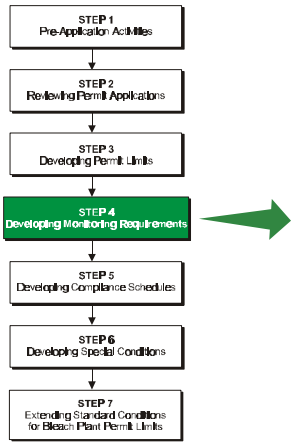


Figure 8-1. Papergrade Sulfite Facility Segment Identification



STEP 4: Developing Monitoring Requirements

- What are the Monitoring Locations?
- What are the Monitoring Frequencies?
- During What Bleaching Conditions Should Mills Collect Samples?
- Should Mills be Required to Measure Bleach Plant Flows?
- What are Appropriate Sample Collection Methods?
- What are the Appropriate Analytical Methods?
- What is the Minimum Level of Detection?
- What are Reporting and Recordkeeping Requirements?
- When May Mills Certify to Use of Certain Processes in Lieu of

Developing Monitoring Requirements

One of your responsibilities is to establish monitoring requirements for mills with operations subject to Subparts B and E. NPDES permits require dischargers to monitor their effluent to ensure that they are complying with permit limitations. As specified in 40 CFR 122.41, 122.44, and 122.48, all NPDES permits must specify requirements for using, maintaining, and installing (if appropriate) monitoring equipment; monitoring frequencies; analytical methods; and reporting and recordkeeping. This section focuses on the following unique aspects of the revised rule:

- How do you specify appropriate in-process monitoring locations?
- What are the required minimum monitoring frequencies?
- What are the required analytical methods and the minimum levels of detection of each method?
- What other process parameters must be monitored to demonstrate that samples are representative?

Note that the mandatory BMPs also have monitoring requirements. These requirements are discussed in Section 9. In addition, those mills enrolling in VATIP have reduced monitoring requirements. The VATIP requirements are presented in Section 10.

What are the Monitoring Locations?

You must require mills to monitor their effluent in order to determine compliance with the ELG&S promulgated by EPA (see Section 6). For direct dischargers who must demonstrate compliance with AOX limits at the final effluent, you may simply require monitoring at the outfall where conventional pollutants are currently monitored. For TCDD, TCDF, chloroform, and the 12 chlorinated phenolic compounds (and AOX at indirect discharges), you must specify bleach plant monitoring locations.

The rule defines bleach plant effluent as "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" (40 CFR §430.01). At most mills, wastewaters from acid and alkaline bleaching stages are discharged to separate sewers. For these mills, you should specify a monitoring location for each sewer. The monitoring locations should be situated after the sewers have collected all of the acid or alkaline bleaching stage discharges and before they are mixed with other mill wastewaters. Because chloroform concentrations may change through air stripping as the samples are collected, measured, and composted or through chemical reaction when the acid and alkaline samples are combined, the acid and alkaline monitoring locations should be at the point as close as possible to where bleach plant wastewater is discharged from process equipment. Figure 8-2 illustrates appropriate monitoring locations for separate acid and alkaline streams at a generic mill.

At some mills, bleach plant wastewaters are discharged to a combined sewer containing both acid and alkaline wastewaters. For TCDD, TCDF, and the chlorinated phenolic compounds (and AOX at indirect discharges), compliance with the effluent limitations and standards can be demonstrated by collecting separate samples of the acid and alkaline discharges and preparing a flow-proportioned composite of these samples, resulting in one sample of bleach plant effluent for analysis. In determining the limitations, EPA used data from acid and alkaline bleach plant effluents that had been analyzed separately and also data from combined sewers. Unless prohibited by the mill's construction, chloroform must be monitored in the separate acid and alkaline streams at the point closest to where bleach plant wastewater is discharged from process equipment. Otherwise, chloroform may change through chemical reaction when the acid and alkaline samples are combined. Figure 8-2 illustrates an appropriate monitoring location for mills that use a combined acid and alkaline sewer.

Alert! Given the wide variety of bleach plant and sewer configurations, you must evaluate mills on a case-by-case basis to determine appropriate monitoring locations.

Mills certifying that they use exclusively TCF bleaching processes are not subject to ELG&S for any chlorinated compounds other than AOX. You may require direct dischargers that certify using exclusively TCF processes to monitor for AOX at the same location where they currently monitor for conventional pollutants, or use your discretion to establish a bleach plant effluent monitoring location. For indirect dischargers making this certification, you must require AOX monitoring at an appropriate bleach plant monitoring location.

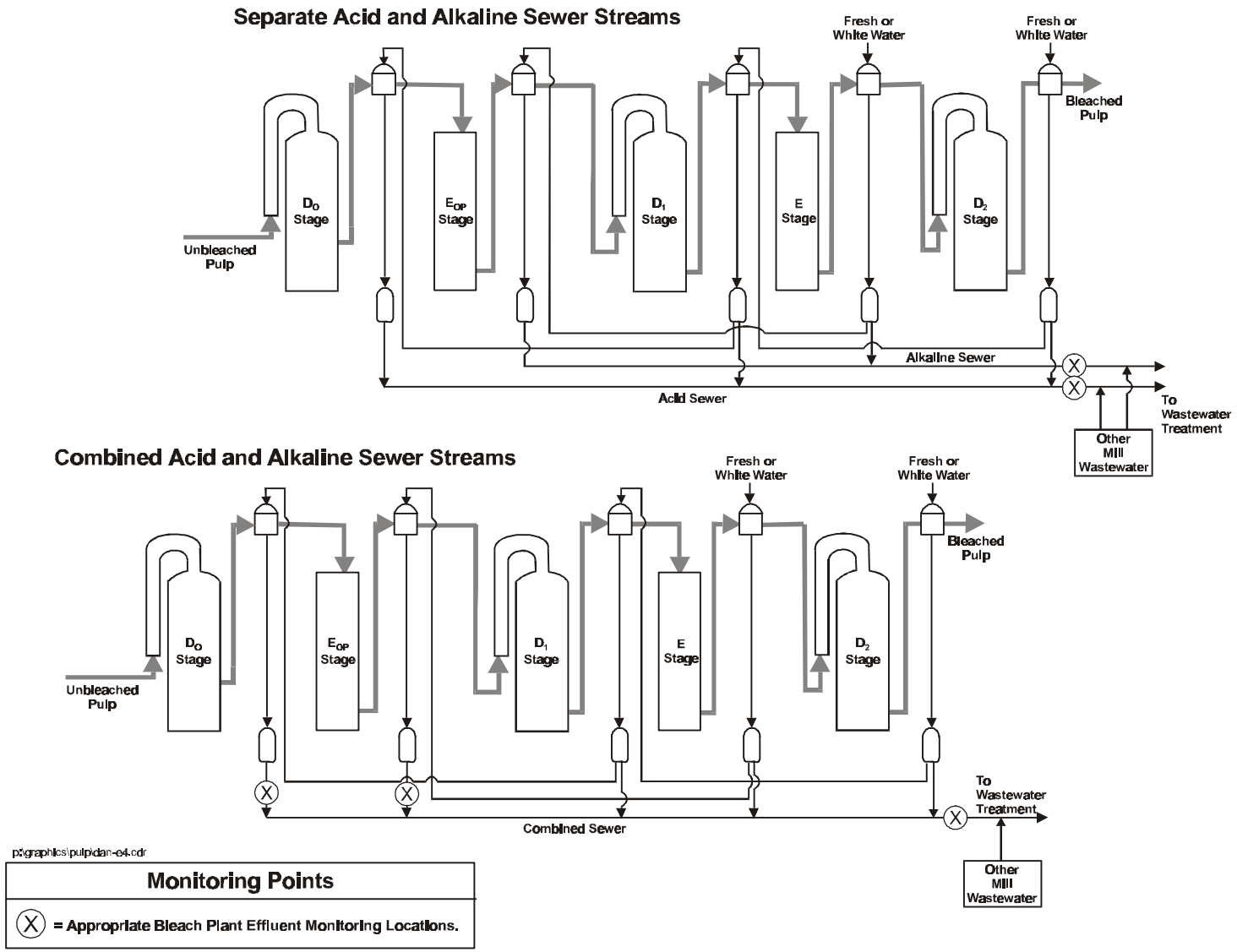


Figure 8-2: Sampling Locations for Various Acid and Alkaline Sewer Stream Configurations

What are the Monitoring Frequencies?

Unlike other ELG&S, the pulp and paper regulations *require* minimum monitoring frequencies for AOX, TCDD, TCDF, chloroform, and 12 chlorinated phenolic compounds, the toxic and nonconventional pollutants regulated under Subparts B and E (see 40 CFR 430.02). You must incorporate these minimum monitoring frequencies in permits for mills subject to those subparts (see Table 8-4 below). For all other pollutants, such as BOD_5 and TSS, you must establish monitoring frequencies in accordance with 40 CFR §122.44(I), using BPJ. You may also use BPJ to specify more frequent monitoring on a case-by-case basis.

Note that you must require mills to monitor at the minimum frequencies shown in Table 8-4 as of the date EPA amends the NPDES Discharge Monitoring Report ICR No. 229 (to be published in the Federal Register; current OMB approval number 2040-0004)). Until then, you must establish monitoring frequencies using BPJ, under 40 CFR §122.41. For indirect dischargers, you must require mills to monitor at the minimum required frequency on or before April 16, 2001.

Mills must monitor at the minimum required frequency for five years (40 CFR §430.02(b)), which is the duration of the permit. This will provide data that will be useful to you in establishing monitoring frequencies in the next revised permit. For direct dischargers, the five-year period is measured from the date the applicable limitations or standards are first included in the discharger's NPDES permit. For existing indirect dischargers, the five-year monitoring period is April 16, 2001 until April 17, 2006. New indirect dischargers must monitor their effluent at the specified monitoring frequencies for five years starting on the date the discharger commences operation.

After the five-year "minimum monitoring period" ends, you may adjust monitoring requirements as you deem appropriate on a case-by-case basis. You should consider the mill's compliance and enforcement history in determining monitoring frequencies. For those mills consistently demonstrating pollutant reductions better than permit requirements, you may establish less frequent monitoring requirements. Conversely, you may consider establishing more frequent monitoring requirements for mills with a poor compliance history.

Table 8-4: Minimum Monitoring Frequencies for Mills with Operations in Subparts B and E

Pollutant	Minimum Monitoring Frequency	
	Non-TCF (a)	TCF (b)
12 chlorinated phenolic pollutants	monthly	(c)
2,3,7,8-TCDD	monthly	(c)
2,3,7,8-TCDF	monthly	(c)
Chloroform	weekly	(c)
AOX	daily	none specified

(a) non-TCF: Pertains to any fiber line that does not use exclusively TCF bleaching processes.
(b) TCF: Pertains to any fiber line that uses exclusively TCF bleaching processes, as disclosed by the discharger in its permit application under 40 CFR §122.21(g)(3) and certified under 40 CFR §122.22, or for indirect dischargers, as reported to the pretreatment control authority under 40 CFR §403.12 (b), (d), or (e).
(c) Limit is not specified for this pollutant.

EPA has issued *The Interim Guidance for Performance-Based Reductions of NPDES Permit Monitoring Frequencies*, which may be useful to you in determining alternative monitoring frequencies at the end of the five-year period. You also may find this guidance useful in setting monitoring frequencies for indirect dischargers.

Because the regulation does not specify a minimum monitoring frequency for mills that certify they use exclusively TCF bleaching processes, you must specify the AOX monitoring frequency based on BPJ (see Section 2). In this case, EPA recommends monthly AOX monitoring. You may wish to include provisions for mills to decrease their monitoring frequency if they demonstrate nonexistent or minimal pollutant discharge.

During What Bleaching Conditions Should Mills Collect Samples?

The ELG&S are based on complete substitution of chlorine dioxide for chlorine and hypochlorite (i.e., ECF bleaching). However, because EPA does not mandate the use of model process technologies you may find some mills use chlorine and/or hypochlorite during bleaching operations while complying with BAT. Compared to chlorine dioxide bleaching, these chemicals generate greater quantities of chlorinated pollutants. A mill's bleaching practices must be considered carefully when determining how the mill should demonstrate compliance with permit limits on chlorinated pollutants in bleach plant effluent.

Section 122.41(j) of EPA's permitting regulations provides that "[s]amples and measurements taken for the purpose of monitoring shall be representative of the monitored activity." Therefore, if a mill's bleaching operations are so variable that samples collected once per month (for TCDD, TCDF, and the 12 chlorinated phenolic compounds) and once per week (for chloroform) may not be representative of all typical mill operations, you must require more frequent monitoring in order to satisfy the requirement of §122.41(j).

Alternatively, you could require sampling at the minimum monitoring frequency for each chlorinated pollutant, but require that the samples reflect the "worst case" condition of the bleach plant effluent with respect to chlorinated pollutants of concern. Note that because, by definition, the "worst case" is not *representative* of the monitored activity, you would need the mill's consent to this monitoring approach. EPA anticipates that when given the choice mills may opt to sample during "worst case" conditions rather than assume the costs of more frequent monitoring.

To determine "worst case" conditions, you should consider the following factors:

1. Chlorine and/or hypochlorite application rates (kg of bleaching chemical/MT of pulp bleached). Mills typically monitor and record information such as chemical application rates in order to optimize and control the bleaching process. You should review these records to select operations that represent "worst case" conditions. For those mills that continue to use chlorine and/or hypochlorite bleaching, you may require monitoring during operations that use these chemicals.

2. Kappa factor (equivalent chlorine ÷ kappa number). 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 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 chlorinated pollutants. High kappa factors may lead to excessive discharges of chlorinated pollutants. You should review mill records to determine what kappa factors represent "worst case" conditions, and consider requiring monitoring during use of those kappa factors.

3. Final product brightness. Greater chemical application rates are required to achieve higher brightness pulps. Typically, higher brightness pulps are produced through the application of increased rates of chlorine dioxide, chlorine, or hypochlorite. You may require monitoring during production of the highest brightness pulps.

4. Other indicators of bleaching intensity. One indicator is the types of furnish. Softwood furnish has a lignin content that is greater than that of hardwood furnish. As a result, softwood furnishes typically require increased bleaching chemical application rates. The type of furnish should be especially important with respect to "worst" case conditions for mills that use "swing" fiber lines. "Swing" fiber lines refer to pulping and/or bleaching systems that are used for both hardwood and softwood furnishes. In selecting "worst case" conditions for a "swing" line, you may require monitoring during worst case conditions for softwood bleaching.

5. Other measures demonstrated to be predictive of effluent pollutant loads. NCASI and IPST, for example, have developed a model that predicts AOX loadings based on inputs such as bleaching chemical application rates, kappa numbers, and type of furnish. This model can be used to determine the combination of bleaching conditions that represents "worst case." You may consider requiring monitoring during those conditions.

Note that identifying "worst case" conditions may be impossible for mills with extremely variable bleaching practices. For these mills, sampling during "worst case" conditions is *not* appropriate and you should require more frequent monitoring.

Should Mills be Required to Measure Bleach Plant Flows?

EPA strongly recommends that you require mills to *continuously* measure their bleach plant flows as a permit condition. Because the ELG&S for TCDD, TCDF, and the 12 chlorinated phenolic compounds are expressed as concentrations, continuous bleach plant flow measurements will indicate whether increases in bleach plant flow coincide with compliance sampling. Periodic increases in

Note: EPA strongly recommends that you require mills to measure their bleach plant effluent flow as a permit condition.

bleach plant effluent flow that are not representative of mill operations are in violation of Section 122.41(j). EPA included costs to install continuous bleach plant effluent flow measurement as part of the economic analysis for this final regulation. Only in the case where a facility can demonstrate that their flow measurement costs are wholly disproportionate to EPA's estimated costs should you consider continuous flow measurement to be impractical.

To ensure the mill collects samples that are representative of normal operations, you should require mills to:

1. Perform compliance sampling at the appropriate location(s). Appropriate sampling locations are discussed above.

2. Use appropriate flow measurement device(s) at the specified location(s). You will find that few mills with operations in Subpart B and E currently measure their bleach plant flow. Refer to Appendix F for a list of various flow measurement devices available to these mills.

3. Keep records of daily flow measurement records onsite for 3 years so inspectors can determine if samples were collected during normal operations and were representative of typical discharge flow.

What are Appropriate Sample Collection Methods?

In addition to establishing the frequency of compliance monitoring, you must specify the types of samples the mill should collect. This section summarizes the sample collection methods for each pollutant at the point at which compliance must be demonstrated.

You can find more detailed information on sample collection protocols in EPA's Generic Sampling and Analysis Plan for the *U.S. Environmental Protection Agency and Paper Industry Cooperative Long-Term Variability Study*. This plan was written for a sampling effort performed jointly by EPA, the American Forest and Paper Association (AF&P) and the National Council of the Paper Industry for Air and Stream Improvement (NCASI) to collect data necessary to establish the revised rule, and details sample collection methods approved by industry for each pollutant at the appropriate compliance point.

Bleach Plant Effluent

2,3,7,8-TCDD; 2,3,7,8-TCDF; and the Chlorinated Phenolic Compounds (and AOX for indirect dischargers). At each bleach line, mills should collect grab composite samples from both the acid sewer and alkaline sewers. Each composite should be collected every four hours, for 24 hours, from the monitoring location (at the identified tap, valve, or sump) specified in the permit. Mills may use a continuous automated sampling device, if it can be operated reliably at the appropriate monitoring location. Alternatively, mills may prepare one flow-proportioned composite of the acid and alkaline sewer samples (i.e., one bleach plant effluent sample). EPA did receive information during the comment period of the rule related to Method 1653. The commenter reported problems in achieving the Minimum Level in Method 1653 for samples of composited acid and alkaline filtrates. If necessary, to achieve the minimum level, EPA recommends that the facility test the effluents separately for reliable determination of the chlorophenolics, TCDD, and TCDF.

Chloroform. Mills must collect separate samples of acid and alkaline bleach plant filtrates for chloroform analysis. This is to prevent the loss of chloroform through air stripping as the samples are collected, measured, and composited, or through chemical reaction when the acid and alkaline samples are combined. If the mill does not have separate acid and alkaline sewers, they must collect compliance samples at the point closest to the bleach plant that is, or can be made, physically accessible.

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

Samples to be analyzed for chloroform should be collected every four hours, for 24 hours. Mills must never collect samples using a continuous automated sampling device because chloroform is volatile. In addition, the following special sampling procedures apply:

1. Samples should be cooled during collection because the bleach plant effluent streams are hot and if collected hot will result in trapped air bubbles in the sample container;

2. Samples should be collected as grabs (6 pairs of samples per 24 hours), 40 milliliters (mL) each from acid and alkaline stream (one set is back-up), which will be composited at the laboratory; and

3. Samples must not contain air bubbles.

Final Effluent

AOX (for direct dischargers). Unless you specify otherwise in the permit, mills may collect samples to be analyzed for AOX as grab samples or continuous automatic composited samples at the same point where the mill is required to monitor for BOD_5, TSS, and pH. If grab samples are appropriate, the mill should collect them every four hours, for 24 hours.

Table 8-5 summarizes recommended sample collection methods for each regulated pollutant. For a more detailed description of suggested sample collection methods, see Appendix B.

Table 8-5: Recommended Bleach Plant Effluent Sampling Collection Methods

Pollutant Monitored	Container	Preservative(a)	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°C	12 x 40 mL each	•Grab (2 vials 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	$Na_2S_2O_3$, 4°C	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°C	3 x 1,000 mL	
AOX	Amber glass bottle with Teflon lid liner	$Na_2S_2O_3$, HNO_3 to pH 2-3, 4°C	500 mL	

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

What are the Appropriate Analytical Methods?

Under the permitting regulations at 40 CFR §122.44(I), NPDES permits must require mills to monitor regulated pollutants using the analytical methods approved for those pollutants, under 40 CFR §136. EPA has established analytical methods for each pollutant regulated under Subparts B and E (62 FR 48394, 63 FR 18504 and 18723). Note that Method 1613, for TCDD and TCDF, was promulgated on September 15, 1997 (62 FR 48394). In addition, Method 1650, for AOX, and Method 1653, for chlorinated phenolic compounds, were promulgated as Appendix A to Part 430 (63 FR 18504 and 18723 (April 15, 1998)). These methods will be incorporated into 40 CFR §136 when it is next published. Table 8-6 lists the appropriate analytical test method for each regulated pollutant.

Table 8-6: Analytical Methods

Pollutant	Method	Minimum Level
Tetrachlorocatechol	1653	5.0 µg/L
Tetrachloroguiacol	1653	5.0 µg/L
Trichlorosyringol	1653	2.5 µg/L
4,5,6-trichloroguaiacol	1653	2.5 µg/L
3,4,6-trichlorocatechol	1653	5.0 µg/L
3,4,5-trichlorocatechol	1653	5.0 µg/L
3,4,5-trichloroguaiacol	1653	2.5 µg/L
2,3,4,6-tetrachlorophenol	1653	2.5 µg/L
3,4,6-trichloroguaiacol	1653	2.5 µg/L
Pentachlorophenol	1653	5.0 µg/L
2,4,6-trichlorophenol	1653	2.5 µg/L
2,4,5-trichlorophenol	1653	2.5 µg/L
2,3,7,8-TCDD	1613	10 pg/L
2,3,7,8-TCDF	1613	10 pg/L
Chloroform (1)	1624B	10 µg/L
AOX	1650	20 µg/L

(1) Other approved EPA methods for chloroform are Methods 601 and 624, and Standard Methods 6210B and 6230B.

What is the Minimum Level of Detection?

For various pollutants, EPA has established ELG&S that are expressed as less than the Minimum Level (<ML). You must require mills to demonstrate compliance with those limitations and standards using the methods and ML values specified in the regulations, as reproduced in Table 8-6. Mills cannot demonstrate compliance using an analytical method with an ML above that of the designated method.

The ML specified for each method is the lowest level at which laboratories calibrate their equipment. To do this, laboratories use standards (i.e., samples at several known concentrations). Calibration is necessary because laboratory equipment does not measure concentration directly; but generates signals or responses from analytical instruments that must be converted to concentration values. The calibration process establishes a relationship between the signals and the known concentration values of the standards. This relationship is then used to convert signals from the instruments for samples with unknown concentrations. In the calibration process, one of the standards will have a concentration value at the ML for the pollutant analyzed. Because the ML is the lowest level for which laboratories calibrate their equipment, measurements below the ML are to be reported as <ML.

Often, laboratories report values less than ML as “not detected” or “<ML.” In some cases, however, the laboratories quantify these values. For example, even though the ML for an approved analytical method is 10 ppq for a particular pollutant, a laboratory might report a measurement of 4 ppq. These are two situations where a laboratory might report such a value. In

the first situation, the laboratory could have used the method specified but referred to the measurement as "detected" although it was <ML. The second situation could occur in the future as analytical methods become more sensitive than the specified analytical method, allowing laboratories to reliably measure values less than today's MLs. Such measurements would demonstrate compliance with the <ML limitations codified for Subparts B and E, because these measurements are less than the ML defined in Part 430 for Subparts B and E.

When reviewing monitoring data, you need to distinguish between laboratory results that demonstrate compliance and those that do not. A sample-specific ML greater than the method ML will not demonstrate compliance. Such sample-specific MLs may result from sample volume shortages, breakage or other problems in the laboratory, or failure to properly remove analytical interferences from the sample. You should stress to mills that all of these situations can be avoided if they carefully adhere to proper sample collection methods (see Appendix B for detailed sample collection methods) and laboratory analysis procedures.

Alert! A sample-specific ML greater than the method ML will not demonstrate compliance. Such sample-specific MLs may result from sample volume shortages, breakage or other problems in the laboratory, or failure to properly remove analytical interferences from the sample. These situations can be avoided if mills carefully adhere to proper sample collection methods

The table below provides some examples demonstrating compliance with <ML limitations.

Example: The ML for Test Method 1613 is 10 ppq. Do the following laboratory results demonstrate compliance if the ELG&S requires <ML?

Is concentration reported as "detected" or "not-detected" in the sample?	Value reported by laboratory (ML in these examples is 10 ppq)	Does the sample demonstrate compliance?	Explanation for compliance determination
Detected	4 ppq	Yes	4 ppq is less than the ML specified.
Detected	10 ppq	No	Compliance is demonstrated with measurements less than the ML specified.
Detected	11 ppq	No	The measured value is greater than the ML specified.
Not detected	<5 ppq	Yes	<5 ppq is less than the ML of 10 ppq specified.
Not detected	<10 ppq	Yes	Compliance is demonstrated for all values less than the ML specified.
Not detected	<11 ppq	No	The sample-specific ML must be less than the ML of 10 ppq specified.

What are Reporting and Recordkeeping Requirements?

In accordance with Section 122.44(i)(2), you must require mills to report the results of compliance monitoring at least once per year. You may require mills to submit the results of more frequently if you wish. As a result of new monitoring requirements for mills with operations in Subpart B and E, the reports:

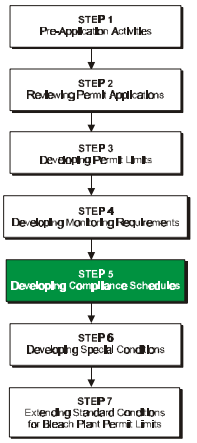
1. Must include results of monitoring at the bleach plant for 15 chlorinated pollutants;
2. Must include results of monitoring final effluent for AOX (bleach plant effluent for indirect dischargers);
3. Must include BMPs reporting (discussed in Section 9); and
4. Should include continuous bleach plant flow measurements.

All monitoring records must be kept for a period of at least 3 years and made available to inspectors.

When May Mills Certify to use of Certain Processes in Lieu of Monitoring?

Mills that certify in their permit application that they use exclusively totally chlorine-free (TCF) bleaching processes (40 CFR §430.02(a) and (c)-(e)) are not subject to minimum monitoring frequencies. EPA believes it is appropriate to exclude TCF mills from minimum monitoring requirements for chlorinated compounds because EPA does not expect TCF bleaching processes to produce chlorinated compounds. The mill would need to notify you if in the future they decide to use chlorinated chemicals in the bleach plant operations (following a certification as TCF). In that event, you must reopen the permit and establish new permit limits that reflect the new process and include minimum monitoring frequencies. Mills entering the Voluntary Advanced Technology Incentives Program (VATIP) also qualify for reduced monitoring frequencies. For details, see Section 8 and Section IX.B.2 of the Preamble (63 FR 18609-18610).

EPA has proposed to allow mills to demonstrate compliance with chloroform limitations by certifying that they use ECF bleaching processes (63 FR 18796). If this proposal is promulgated, you may reduce or eliminate chloroform monitoring at some mills. Final action has not been taken on this proposal as of the date of publication of this document.



STEP 5: Developing Compliance Schedules

- When Must Existing Mills Comply With Cluster Rules?
- What if Existing Direct Dischargers Cannot Meet Cluster Rules Immediately?
- What are Typical Implementation Periods for Subpart B Model Process Technologies?
- Compliance Schedule Examples.
- When Must New Sources Comply with the Cluster Rule?
- How Do Compliance Schedules of the Air and Water Components of the Cluster Rule Overlap?

Developing Compliance Schedule

When Must Existing Mills Comply With Cluster Rules?

For direct dischargers, you must establish NPDES permits that contain chlorinated pollutant permit limits based on the newly promulgated BAT ELGs on the date the NPDES permit is issued. Under the Clean Water Act, the NPDES permit must require immediate compliance with those new limitations (see CWA Section 301(b)(2)(C)-(F)). Therefore, as a matter of law, NPDES permits cannot include a compliance schedule for the achievement of the new chlorinated pollutant permit limits.

For indirect dischargers, however, the Clean Water Act imposes different compliance requirements. Under CWA Section 307(b)(1), existing indirect dischargers must comply with applicable pretreatment standards by the date specified in such standards, with the time for compliance not to exceed three years from the date of promulgation. As specified in the regulation, existing indirect dischargers subject to Subparts B or E must comply with pretreatment control limits based on the newly promulgated PSES on or before April 16, 2001 (see 40 CFR §430.26(a) and §430.56(a)).

What if Existing Direct Dischargers Cannot Meet Cluster Rules Immediately?

EPA strongly urges you to require mills to meet permit limits for all pollutants on the date the NPDES permit is issued. Since the statutory deadline for BAT passed in 1987, Agency guidance has stressed the importance of prompt modification of permits to incorporate more stringent limitations, focusing on those facilities that are not already in compliance with the new effluent limitations guidelines or on water bodies not complying with water quality standards. The technology basis of the final rule, ECF bleaching, was key to the proposed rule, published December 17, 1993, and has not changed since that time. Therefore, the industry has been on notice regarding ECF bleaching for more than five years. Mills have had little reason to delay all compliance activities until the final rule was signed (November 14, 1997) and no reason to delay any compliance activities beyond that date. Allowing other mills to receive additional time is unfair and undermines the effectiveness of the VATIP. For all practical purposes, most facilities

are capable of demonstrating compliance within this time-frame. In fact, some mills already employ several (or all) of the model process technologies that form the basis of BAT.

Some mills, however, may indicate that they need additional compliance time to implement several (or all) of the model process technologies to comply with the new ELGs for chlorinated pollutants. For these mills, you may exercise your enforcement discretion by either: 1) issuing a punitive order with a daily fine that accumulates or escalates over time until the mill comes into compliance; or 2) issuing an administrative order accompanying the permit that authorizes additional time for compliance.

You should evaluate requests for additional compliance time on a case-by-case basis. You should work closely with each facility, reviewing all materials and data that supports a mill's decision to implement a technology. (EPA reiterates, however, that a mill whose permit is reissued after April 15, 1999, is unlikely to be able to make a reasonable case that it needs additional time for compliance in view of the length of time it has been on notice of the BAT requirements to which it would be subject.)

What are Typical Implementation Periods for Subpart B Model Process Technologies?

Remember, EPA does not mandate the implementation of specific model process technologies to achieve the ELGs. Rather, mills currently incapable of achieving the effluent limitations and guidelines and standards may choose to implement any process technology or effluent controls that will enable the facility to comply with permit limits. Therefore, in the rare instances when additional compliance time is appropriate, you need to understand the basis for the additional time. To do this, you need to understand the implementation requirements of each model process technology to help you establish an appropriate administrative order for additional compliance time. You also need to determine how much progress the facility has made in implementing a process upgrade. They may have completed engineering studies and the procurement process. In this case, they would not need the complete time discussed below. (Note: mills may implement other process technologies. In this case, you should review mill plans to determine an appropriate administrative order.)

Of the model process technologies that form the basis of the revised regulation, the following may require significant implementation time in some cases:

- 100% substitution of chlorine dioxide;
- Effective brown stock washing;
- Closing brown stock pulp screen room;
- Elimination of hypochlorite;
- Oxygen and peroxide enhanced extraction; and
- High shear mixing.

You should note that the minimum implementation time associated with the model process technologies that require construction activities is at least 6 months. This minimum implementation time allows for sufficient engineering studies that must be performed prior to construction. Some process technologies, such as installation of oxygen and peroxide enhanced extraction, do not need extensive procurement and construction periods. For several of the process technologies, however, such as new brown stock washing systems, new chlorine dioxide towers, or

oxygen delignification systems, fabrication of appropriate equipment designed to meet the mill's specific requirements may require up to a year. However, facilities may expedite implementation schedules by performing most of the site construction activities while they are waiting for their equipment to be fabricated and delivered.

Oxygen delignification is not one of the model process technologies that forms the basis of BAT; however, a facility may decide to install oxygen delignification to ensure it meets environmental regulations and to benefit from reduced operating costs. Consequently, a discussion of the time necessary to install oxygen delignification is included in this section.

Table 8-7 summarizes reasonable implementation times for the EPA model process technologies that require significant time. The major construction elements of each model process technology are also included in the table. The information discussed is based on actual project data collected by EPA. These time requirements are discussed in detail, below. You should note that the time periods shown in Table 8-7 are for individual process technologies. In those cases, where more than one major process technology is necessary, the time periods presented are not necessarily additive and should be adjusted when appropriate phases of these projects can be combined.

100% substitution of chlorine dioxide. Full implementation of 100 percent substitution could take between 12 to a maximum of 24 months from the time that preliminary engineering studies are started. The amount of time depends on the scope of the project. If a facility currently uses 50 percent chlorine dioxide substitution, the facility may only need to expand the capacity of the existing chlorine dioxide generator, which will take not more than 12 months. For a facility that employs less than 50 percent substitution, the mill could need 18 months to replace (or augment) the existing chlorine dioxide generator with a new chlorine dioxide generator with increased capacity. A facility that does not perform any chlorine dioxide substitution could need 24 months to construct a new chlorine dioxide generator and to install chlorine dioxide bleaching towers with appropriate metallurgy. As a general guide, 50% substitution distinguishes mills that need to expand the chlorine dioxide generator from mills that need to install a new unit. A few pre-1970 mills operate chlorine dioxide generators, such as R-2, Mathieson or Solvay processes. These mills may require up to 18 months to install a new chlorine dioxide generator to replace the outdated equipment.

Effective brown stock washing. Facilities may decide to upgrade brown stock washing systems or install new brown stock washing systems to minimize the amount of pulping liquor carried over to the bleach plant with the pulp. Facilities that decide to upgrade existing brown stock washing systems by adding an extra stage to the existing washing equipment are capable of implementing this modification within 18 months from the time that preliminary engineering studies are started. Facilities that decide to completely replace the existing washing system could need up to 24 months.

Closed brown stock pulp screen room. Some facilities may opt to close the screen room to optimize wash water use and to prevent the overflow of decker filtrate to the sewer. Some facilities configure a closed screen room so that it operates like an extra brown stock washing stage. Installation of this model process technology at most facilities could be accomplished in less than 12 months.

Elimination of hypochlorite. Facilities that perform hypochlorite bleaching could need up to 24 months to engineer and implement bleaching changes that allow elimination of hypochlorite. For some facilities, particularly those with short bleaching sequences that do not use chlorine dioxide at all (e.g., CEH), eliminating hypochlorite may require replacement of the hypochlorite bleaching tower with a new chlorine dioxide tower, washer, and auxiliaries made of materials resistant to the more corrosive environment of chlorine dioxide bleaching. Some facilities may be able to modify the bleaching chemical additions to other stages (i.e., adding oxygen and/or peroxide to the first extraction stage) and abandon the hypochlorite stage, rather than replacing it. This may apply to mills with a CEHDED-type of bleaching sequence. This change may be accomplished in a matter of months, with little or no procurement and construction time.

Oxygen and peroxide enhanced extraction. Facilities may opt to install oxygen and/or peroxide enhanced extraction (Eo, Ep, or Eop) equipment to eliminate hypochlorite bleaching or to reduce the amount of chlorine dioxide required for bleaching. Installation of oxygen and peroxide enhanced extraction can take up to 8 months because of the need to install either an upflow extraction tower or a downflow tower preceded by a small upflow pre-retention tube to supply pressurized oxygen.

High shear mixing. To realize the full benefits of 100 percent chlorine dioxide substitution, oxygen-enhanced extraction, and oxygen delignification on the bleach plant effluent quality, the pulp and bleaching agents must be well-mixed and the chemical addition rate controlled as precisely as possible. New mixers are normally installed when mills increase chlorine dioxide substitution to 100%, install oxygen enhanced extraction, and/or install oxygen delignification. No additional installation time is necessary for installing new mixers because they are integral parts of the aforementioned upgrades.

Oxygen delignification. Facilities with outdated process equipment that face major process changes to comply with the regulations may decide to install oxygen delignification. To implement this technology, facilities need to install an oxygen reactor (with appropriate mixing and control) for use prior to the chlorine dioxide bleaching stages. In addition to the reactor, facilities need to include a post-oxygen washing system and oxidized white liquor equipment. Design and installation of oxygen delignification can be completed in 24 months. Concurrent upgrades in brown stock washing and screening are often required, and can be implemented in the same time frame. (Note: facilities that decide to install this process technology may enter the Voluntary Advanced Technology Incentives Program discussed in Section 8, which provides extended compliance time.)

Permitting authorities should note that Subpart B facilities do not need time to implement the following model process because these technologies do not require construction, have been implemented throughout the industry within the past few years, or have been part of industry operation for many years (i.e., biological treatment):

- Use of TCDD- and TCDF-precursor-free defoamers;
- Use of strategies to minimize kappa; and
- Efficient biological wastewater treatment.

Table 8-7: Model Process Technologies that Typically Need Significant Implementation Time

Model Process Technology	Major Construction Elements (a)	Reasonable Project Duration
100% Chlorine Dioxide Substitution		
a) >50% substitution at a mill that uses an R3 or SVP generator	· upgrade existing chlorine dioxide generator to expand capacity.	12 months
b) <50% substitution (or mills that do not use R3 or SVP generators that need to increase capacity)	· installation of new chlorine dioxide generator · upgrade mixing and process control systems · additional ClO_2 storage facilities	18 months
c) 0% chlorine dioxide use on mill site.	· installation of new chlorine dioxide generator, including sodium chlorate unloading and storage facilities · upgrade mixing and process control · additional ClO_2 storage facilities · installation of new corrosion- resistant chlorine dioxide bleaching tower	24 months
Effective Brown Stock Washing Systems		
a) Upgrade existing system	· installation of extra washing stage	18 months
b) Installation new system	· installation of new process unit (including screens)	24 months
Closed Screening Room	· replace atmospheric screens with pressure screens	12 months
Elimination of Hypochlorite		
a) 1) (CD)EHD, or similar, for softwood furnish	· replace H stage with D stage	24 months
2) bleaching sequences with two H stages and only one, or no, chlorine dioxide stages	· installation of corrosion-resistant chlorine dioxide bleaching tower	
3) CEH	· mixing and process control systems	
b) (CD)EHDED, or similar	· increase bleaching chemical in other stages to compensate for the elimination of H	0 months
Oxygen and Peroxide Enhanced Extraction	· installation of upflow extraction tower or a downflow tower preceded by a small upflow retention tube · high shear mixers	8 months
Oxygen Delignification	· oxygen reactor · post-oxygen washing system · mixing and control systems · white liquor oxidizing equipment	24 months

(a) Does not include minor elements such as pumps, fans, piping, etc

Compliance Schedule Examples

The text box below presents several examples of how you may determine compliance schedules for Subpart B existing dischargers. For the purposes of these examples, it is assumed that facilities will implement all model process technologies that are not currently in place.

The table below presents the status of five example mills:

Mill	Effective BSW?	Closed Screening Room?	EC/OD?	Bleach Sequence	% ClO_2 Substitution
A	N	N	N	CEH	0%
B	N	N	N	D/CEHDED	45%
C	Y	Y	N	D/CED	65%
D	N	Y	N	DEDED	100%
E	Y	Y	N	DEopDD	100%

The table below shows the model process technologies the mills will implement, assuming that the mills decide to implement all of the model process technologies. The table includes an estimate of the amount of time that probably would be needed in order to implement the processes, from initiation of preliminary engineering studies to commissioning of equipment.

Model Process Technology	Mill A	Mill B	Mill C	Mill D	Mill E
100% Substitution	✓	✓	✓		
Effective Brown Stock Washing	✓	✓		✓	
Closed Screening Rooms	✓	✓	✓	✓	
Eliminate H	✓	✓			
Eop	✓	✓	✓	✓	
Oxygen Delignification	✓(a)				
Compliance Time Frame	≤24 months	≤18 months	≤12 months	0-24 months (b)	0 months

(a) Because Mill A faces significant process changes to comply with BAT, Mill A decided to install oxygen delignification to benefit from reduced operating costs and further environmental improvement. The mill may decide to enroll in VATIP to take advantage of an extended compliance time.
(b) Mill D may be able to meet BAT limitations because the mill employs complete substitution; therefore, immediate compliance with new regulation would probably be appropriate. However, if the mill demonstrates installation of upgraded or new brownstock washing systems are required to meet AOX ELG, an appropriate compliance schedule could be 12 to 24 months.

When Must New Sources Comply with the Cluster Rules?

The owner or operator of a new source subject to Subpart B or E must install and have in operating condition, at "start up," all pollution controls necessary to meet the applicable NSPS/PSNS before beginning discharge. The mill must meet permit limitations based on those standards within 90 days of commencing discharge (see 40 CFR §122.29(d)(4)).

How Do Compliance Schedules for Air and Water Regulations for Pulp and Paper Mills Overlap?

Mills with operations in Subparts B and E must comply with air regulations, as well as the ELG&S. Under Maximum Achievable Control Technology (MACT) - based NESHAPs, these mills must reduce air emissions from bleaching systems, pulping systems, and kraft pulping process condensates. EPA has developed compliance schedules for air regulations that provide sufficient time for mills to resolve the cross-media technical issues. This section discusses the compliance schedule issues that overlap for MACT and BAT. For more information on the applicability of the MACT rules, see The Pulp and Paper NESHAP: A Plain English Description.

Bleaching Systems

Mills with operations in Subparts B and E must comply with the air regulations established for bleaching systems by April 15, 2001. Because many mills will modify their bleaching processes to comply with BAT and PSES, EPA feels this three-year compliance period provides individual mills enough time to install air controls subsequent to installing any appropriate bleaching process equipment. To comply with MACT requirements, mills must achieve a 99% reduction of all chlorinated hazardous air pollutants (HAPs), except chloroform, by installing closed vent systems on the bleaching system.

The MACT technology basis for chloroform emission control is complete chlorine dioxide substitution and elimination of hypochlorite bleaching. As discussed earlier, these two process changes are also integral elements of the technology basis for the effluent limitation guidelines and standards. As a result, mills must demonstrate compliance with the chloroform emission standards by meeting the applicable BAT and PSES effluent limitations guidelines and standards.

For mills entering VATIP, bleaching system compliance requirements are relaxed by up to three additional years so that these mills are required to demonstrate compliance no later than April 15, 2004 (see Section 9).

Pulping Systems

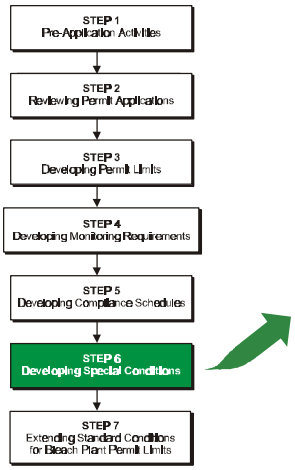
Mills with operations in Subparts B and E are allowed under the air regulation up to eight years to install controls for high-volume/low-concentration (HVLC) gas streams from the kraft pulping process, which include HVLC gases collected from brownstock washing systems and oxygen delignification (40 CFR §63.440). Although oxygen delignification is not included as part of the BAT technology basis, EPA established an the eight-year compliance period to encourage mills to install advanced pollution prevention technologies to reduce toxic air emissions and water pollutant discharges from pulping processes.

Kraft Pulping Process Condensates

Some mills may opt to use biological treatment (i.e., "hard-piping") as an option to comply with the standards established for kraft pulping condensates by April 15, 2001. The air regulations

require these mills to achieve a 92% reduction in HAPs by weight. By sending kraft pulping condensates to the wastewater treatment plant, mills will contribute loadings of conventional pollutants, particularly BOD_5, to the wastewater treatment plant. However, you *should not* adjust conventional pollutant limitations that are based on BPT and a mill's production.

Note that mills choosing this option must conduct a third type of monitoring program at the wastewater treatment plant. In addition to performing final effluent monitoring and BMP monitoring (see Section 8), these mills must conduct wastewater treatment monitoring to ensure 92% HAPs reduction as required by 40 CFR §63.453.



STEP 6: Developing Special Conditions

Developing Special Conditions

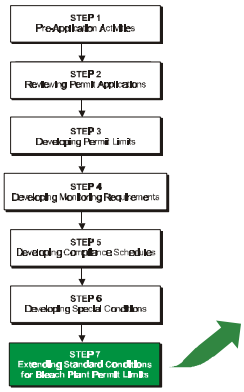
Special conditions are included in permits to require facilities to implement additional non-numerical measures of control that reduce pollutant discharges. EPA recommends that you include the following two special conditions in the permit of each mill with operations in Subparts B and E:

1) Reopener clause. A reopener clause does not provide an additional measure of control. However, by including a reopener clause in permits, you may revise a permit at any time during its duration to include more stringent numerical limits during the term of the permit. This is especially important for:

a) COD permit limits for mills with operations in Subpart B and COD, chloroform, and AOX permit limits for mills with operations in Subpart E. EPA has reserved ELGs for these pollutants at this time. EPA suggests that you establish permit limits for these pollutants using BPJ or, at a minimum, require mills to perform monthly monitoring and report the results. Where a facility has current COD effluent data, a BPJ permit limit could be set using the existing COD discharge concentrations. Monitoring of effluent COD is recommended so that you will have a basis (and baseline data) for developing a COD limit for the mill in the future and to provide COD data for helping the mill to develop a pollution control strategy. When EPA promulgates ELGs for these pollutants, the reopener clause will allow you to revise the permits to include limits based on ELGs.

b) VATIP requirements (for those mills choosing to enroll). Mills enrolling in VATIP will rebuild and update their pulping and bleaching operations. By including the reopener clause in permits, you may update limits to reflect improved effluent quality that results from these more extensive voluntary mill renovations. This is discussed in more detail in Section 10.

2) BMP requirements. Mandatory BMPs are included in 40 CFR 430. Therefore, permits for mills with operations in Subparts B and E must include BMP requirements as a special condition. For a discussion of BMPs, refer to Section 9. Appendix C presents sample language that you may include in the permit.



STEP 7: Extending Standard Conditions for Bleach Plant Permit Limits

Extending Standard Conditions for Bleach Plant Permit Limits

EPA's permitting regulations provide standard conditions (i.e., "boiler plate" conditions) that are typically included in permits. These conditions, which are found in Section 122.41 and 122.42, include legal, administrative, and procedural requirements of the permit that support the numeric permit limits. Because mills with operations in Subparts B and E are subject to ELGs that require compliance in bleach plant effluent, EPA recommends you extend the following standard conditions to include situations specific to bleaching process operations at these mills:

1) Require daily bleach plant flow measurements to ensure mills do not achieve compliance with their permit limits by increasing their bleach plant effluent flow rate during monitoring. Daily flow measurements will enable inspectors to determine whether monitoring occurred during representative mills operations. You should require mills to keep records of these measurements for three years.

2) Extend upset provision covered under 122.41(n) to include pulping and bleaching process upsets that affect compliance with bleach plant permit limits. Section 122.41(n) defines an upset as "an exceptional incident in which there is an unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee." Because some of the ELGs require compliance in bleach plant effluent, process upsets that affect pulping and bleach plant operations are subject to upset provisions. Upset provisions are *not* meant to cover improper operation and maintenance, but to provide relief in the event of unusual, unforseen circumstances over which the mill operator has no control. A few process upsets that could affect pulping and bleach plant operations that would be covered under this provision include:

    a) major power outages,
    b) tank failure due to metal fatigue,
    c) flooding of operations, and
    d) lightning strikes.

For a list of additional standard conditions that may apply to the facility you are permitting, you may refer to Chapter 9 of the U.S. EPA NPDES Permit Writer's Manual (EPA-833-B-96-003).

9 Best Management Practices Requirements

This section describes actions you must take to implement best management practices (BMPs) and suggests some areas where you may choose to go beyond the national regulations. This section also describes the mandatory components of the BMPs, focusing on the BMP monitoring requirements and the BMP plan, and outlines the BMP compliance schedule. For additional guidance on implementing BMPs, refer to *Technical Support Document for Best Management Practices for Spent Pulping Liquor Management, Spill Prevention, and Control* (EPA 821-R-97-011).

What are BMPs?

BMPs establish practices, rather than numerical limits, that reduce the release of toxic, conventional, and nonconventional pollutants to receiving waters. Under CWA 402(a)(1) and 40 CFR §122.44(k), BMPs can be imposed on a case-by-case basis. However, EPA decided to implement the BMP program by regulation for Subparts B and E to ensure that mills with operations in those subparts have effective BMP programs and to ensure uniform application of regulatory requirements across industry segments. You may, subject to state law, require more stringent BMPs than those required by the federal regulations.

The principal objective of BMPs is to prevent losses and spills of spent pulping liquor (i.e., black liquor) from process equipment; the secondary objective is to contain, collect, and recover, or otherwise control, spills, losses, and intentional diversions that do occur. BMPs also apply to turpentine and soap (pulping byproducts), for mills that generate these materials.

BMPs require mills to implement practices intended to prevent losses and spills of spent liquor. EPA has identified equipment and procedures that could be used to implement effective BMPs; however, EPA intends that mill owners and operators should have maximum flexibility to address management and control of spent pulping liquor at their mills, within the context of the general implementation requirements. Therefore, it is up to mill owners and operators to decide which equipment and control strategies are appropriate and effective at their mill.

How Do I Incorporate BMPs into Permits?

You must incorporate BMP requirements for new and existing direct dischargers as special conditions in NPDES permits (see 40 CFR §430.03(j)). Appendix C contains example permit language. For indirect dischargers, BMPs are pretreatment standards that must be included in updated pretreatment agreements.

Extension of BMP Requirements to Subparts Other Than B and E

EPA has promulgated BMPs only for Subparts B and E but has proposed BMPs for mills with chemical pulping operations (covered in Subparts A, C, D, F, and H). You may use the BMP requirements for Subparts B and E as guidance in issuing permits containing BMPs for mills with operations in other subparts. Similarly, for indirect dischargers, you may impose BMPs as local limits for mills with production in subparts for which BMPs have not yet been established.

Extension of BMP Requirements to Fresh Pulping Liquors

The BMP requirements specified by EPA apply to spent pulping liquors, soap, and turpentine. Depending upon mill circumstances and the likelihood of losses, you may use BPJ to decide if white or green liquors (Subpart B) or fresh sulfite pulping liquor (Subpart E) should be included in BMPs (see below).

BMP Plan

The rule requires mills to develop and implement a BMP plan (40 CFR §430.03(d)). The BMP plan documents each mill's approach to achieve full BMP implementation, and must:

- Contain a detailed engineering review of the mill;
- Specify procedures and practices to be implemented to meet the requirements of every mandatory component;
- Detail the construction that the mill determines is necessary to meet the mandatory components, including the construction schedule; and
- Describe the monitoring program that will be used to meet the BMPs monitoring requirements (discussed in detail in Section 9).

Engineering Review

The rule requires each mill to conduct a detailed engineering review of its 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 in spent pulping liquor, soap, and turpentine service -- to determine potential leaks, spills, and intentional diversions of spent pulping liquors, soap, and turpentine during the following periods of operation (40 CFR §430.03(d)(2)):

- Process startups and shutdowns;
- Maintenance;
- Production grade changes;
- Storms or other weather events;

- Power failures; and
- Normal operations.

As part of the engineering review, mills must determine whether:

- Existing spent pulping liquor containment facilities have enough capacity to collect and store anticipated intentional liquor diversions as well as potential spills.

- Continuous, automatic monitoring systems are needed to detect and control leaks and spills of spent pulping liquor, soap, and turpentine;

- Process wastewater diversion facilities are needed to protect end-of-pipe wastewater treatment facilities from adverse effects of spills and diversions of spent pulping liquors, soap, and turpentine;

- Potential for contamination of storm water from the immediate process areas exists; and

- Segregation and/or collection and treatment of contaminated storm water from the immediate process areas is appropriate.

Amendment of BMP Plan

The regulation requires mills to amend the BMP plan whenever there is a change in mill design, construction, operation, or maintenance that affects the potential for leaks and spills from the immediate process areas (40 CFR §430.03(e)).

Each mill must review and evaluate the BMP plan five years after it is first prepared and, unless there are substantial changes necessitating more frequent review, once every five years thereafter. The mill must amend the BMP plan within three months of the review if the mill determines that any new or modified management practices are necessary to reduce significantly the likelihood of spills and leaks.

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 must certify to you under penalty of law that the BMP plan has been prepared in accordance with good engineering practices and in accordance with the regulation. You are not required to approve the BMP plan or any future amendments (40 CFR §430.03(f)).

Recordkeeping Requirements

The rule requires mills to maintain a complete copy of the current BMP plan on site (40 CFR §430.03(g)). As specified in the rule, mills must maintain records that demonstrate compliance with BMP implementation requirements. The mill must maintain the following records for three years from the date they are created:

- Records tracking repairs performed as part of the mill's repair program (§430.03(b)(2));

- Records of initial and refresher training (40 CFR §430.03(b)(4));
- Reports of reviews of spills and intentional diversions (40 CFR §430.03(b)(s); and
- Records of wastewater monitoring to detect leaks and spills, track the effectiveness f the BMPs, and detect trends in spent pulping liquor losses (40 CFR §430.03(b)(10) and (h)).

The BMP plan and records must be made available to you or your authorized enforcement personnel upon request.

What Are the Implementation Requirements for BMPs?

The rule outlines the components of BMPs considered integral to preventing leaks and spills of spent pulping liquors, soap, and turpentine (40 CFR §430.03(c)). Under the rule, mills must implement the following BMPs:

1. Return spilled or diverted spent pulping liquors, soap, and turpentine to the process to the maximum extent practicable as determined by the mill.
2. Establish a program to identify and repair leaking equipment. The program must include:
   - Regular visual inspections of process areas with spent pulping liquor, soap, and turpentine service equipment;
   - Immediate repairs of leaking equipment (if not immediate, then the mill must control the leak and repair the equipment as soon as possible);
   - Identification of conditions under which production will be curtailed or halted to repair leaking equipment or to prevent leaks and spills; and
   - A system of tracking repairs over time to identify equipment that may need to be upgraded or replaced because of frequency and severity of leaks, spills, or failures.
3. Operate continuous, automatic monitoring systems to detect and control leaks, spills, and intentional diversions. These monitoring systems may be integrated with the mill process control system and may include high-level monitors and alarms on storage tanks, and conductivity (or pH) monitors and alarms in process areas, process area sewers, process wastewater, and the wastewater treatment plant.
4. Establish a training program for operators, maintenance personnel, and other technical and supervisory personnel who operate, maintain, or supervise the operation and maintenance of equipment in spent pulping liquor, soap, and

turpentine service. Conduct refresher training at least annually. The training program must be documented.

5. Prepare a brief report that evaluates each spill and any intentional diversion that are not contained at the immediate process area. The report must describe the equipment 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 any necessary changes to equipment and operating and maintenance practices to prevent recurrence. The annual refresher training must include discussion of these reports.

6. 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. This review is to prevent leaks and spills 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 during construction.

7. Install and maintain secondary containment constructed of materials impervious to pulping liquors for spent pulping liquor bulk storage tanks equivalent to the volume of the largest tank plus enough capacity for precipitation (e.g., rainfall). An annual tank integrity testing program, if combined with other containment or diversion structures, may be substituted for secondary containment of these tanks.

8. Install and maintain secondary containment for turpentine bulk storage tanks.

9. Install and maintain curbing, diking, or other means of isolating soap and turpentine processing and loading areas from the wastewater treatment plant.

10. Conduct wastewater monitoring to detect leaks and spills, to track the effectiveness of the BMPs, and to detect trends in spent pulping liquor losses.

What is Tank Integrity Testing?

Annual tank integrity testing should consist of two components:

1. Annual visual inspections to check for leaks, cracks, corrosion points, paint peeling bulges, dents, etc., and

2. Ultrasonic thickness (UT) testing.

Mills personnel should perform annual visual inspections and record the results of the inspection. The *frequency of UT testing is determined by the mill*. Factors that should be considered when determining appropriate testing frequency should include the types of tanks (i.e., pressure versus atmospheric), tank metallurgy (i.e., carbon steel versus stainless steel), and age. Table 9-1 summarizes acceptable UT testing frequencies based on these factors. Of course these factors vary

from mill to mill and from tank to tank. For those mills that do not perform UT testing, they may also refer to the American Petroleum Institute API 653 standards or the American Standards for Testing Materials ASTM G158 standards for information regarding the use of UT testing of metals. (Note: some mills currently perform UT testing on black liquor storage tanks at a specified frequency to comply with their insurance policies.)

Table 9-1: Annual Tank Testing Frequency

Type of Tank	Tank Metallurgy	Age	UT Testing Frequency(a)
Pressure Tank	Carbon Steel	< 15 years	every 2 years
		> 15 years	every year
	Stainless Steel	< 15 years	every 4 years
		> 15 years	every 2 year
Atmospheric Tank	Carbon Steel	< 15 years	every 5 years
		> 15 years	every 3 years
	Stainless Steel	< 15 years	every 10 years
		> 15 years	every 5 year

What Are the BMP Monitoring Requirements?

There are two types of monitoring associated with BMPs: 1) monitoring of tanks, sumps, and sewers as an element of the BMP program, and 2) monitoring of BMP effectiveness.

Monitoring of Tanks, Sumps, and Sewers as Elements of BMPs

As discussed below, the rule requires that the mill assess the possible sources of spent pulping liquor, turpentine, and soap releases to determine what additional spent pulping liquor containment facilities, monitoring systems, and operating practices may be necessary to detect and control leaks, spills, and intentional diversions. Some mills may implement an effective BMP program by adding conductivity or color monitors at strategic locations within the mill. By placing monitors in sumps, tanks and sewers, the mill would contain some spills and detect leaks early, thereby reducing the amount of spent pulping liquor reaching the wastewater treatment plant. The BMP plan should explain the rationale for the number and placement of such monitors as well as describing the response to alarm levels for these monitors. Explanation of the function of and response to monitors and alarm eaves should be part of the BMP training program.

Monitoring of BMP Effectiveness

The rule requires a mill to collect daily measurements of a parameter at the influent to wastewater treatment (or some other appropriate location as described below) to monitor the performance of the BMP program (40 CFR §430.03(i)). This monitoring is intended to systematically measure progress in reducing losses of spent pulping liquor, turpentine, and soap by effectively using BMPs

and to assure that the BMP program continues to be effective over time. This monitoring program is not a substitute for spill and leak detection monitoring that is conducted as part of the BMPs.

Action Levels

To establish an effective monitoring system, the rule requires existing dischargers to conduct an initial six-month monitoring program to characterize wastewater treatment influent (40 CFR §430.03(h)). Based on the results of this initial monitoring program, the mill will determine action levels. An action level is a pollutant loading determined by statistical analysis of six months of daily measurements (40 CFR §430.03(b)(1)). The action levels must consist of a lower action level, which if exceeded, will trigger investigation requirements, and an upper action level, which if exceeded, will trigger corrective action requirements. The *Technical Support Document for Best Management Practices for Spent Pulping Liquor Management, Spill Prevention, and Control* provides an example based on actual mill data and suggests that the 75th- and 90th-percentile values might be appropriate levels for investigative and action responses, respectively. The mills, however, may establish alternative action levels based on an examination of the variability of the specific parameter they have chosen.

The rule requires mills to complete a second six-month monitoring program to determine revised action levels as soon as possible after they have implemented the BMP requirements outlined earlier in this section (40 CFR §403(h)(4)). These revised action levels will then be used to measure full BMP effectiveness implementation.

Because new mills must implement all BMP requirements when they start operation, the rule requires new mills to complete one six-month monitoring program to develop the lower and upper action level limits based on the results of that program (40 CFR §430.03(h)(5)).

Monitoring Pollutant Parameters

Although mills are required to implement a BMP monitoring program, they have flexibility in selecting the specific parameter to be measured. EPA recommends using COD because of its sensitivity to turpentine, soap, and spent pulping liquor. However, the rule allows Total Organic Carbon (TOC) and 24-hour averages of color or specific conductivity as alternatives. For mills that do not pulp softwood furnish or mills that effectively isolate turpentine or soap from all pathways that could enter the wastewater treatment plant, mills may select alternatives to COD. (See *Technical Support Document for Best Management Practices for Spent Pulping Liquor Management, Spill Prevention, and Control* for more details.)

Direct dischargers must conduct monitoring at the point influent enters the wastewater treatment system, whereas indirect dischargers must conduct monitoring at the point of discharge to the POTW (40 CFR §430.03(h)(2)). Mills may also sample at locations other than the discharge to the wastewater treatment plant. For example, a mill may choose to monitor locations “upstream” of the combined mill influent-to-treatment to better identify the problem areas at the mill (e.g., pulp mill, chemical recovery operations, and bleach plants), as long as there are no points “downstream” of the sample points where waters potentially containing spent pulping liquor, turpentine, or soap enter the wastewater stream.

Corrective Action and Reporting Requirements

Whenever monitoring results exceed the lower action level, the rule requires mills to investigate the cause. Whenever monitoring results exceed the upper action level, the rule requires mills to take corrective action to bring the wastewater treatment system influent mass loading below the lower action level as soon as practicable. While exceeding an action level does not constitute a violation of an NPDES permit or pretreatment standard, failure of the mill to investigate and take corrective action does (40 CFR §430.03(i)(2)).

Mills are required to report to you the following: a summary of the monitoring results, the number of times and dates action levels were exceeded, and brief descriptions of any actions taken to correct the situation. You must establish the frequency of report submissions, but they must be submitted at least once a year (40 CFR §430.03(i)(4)).

What Are the BMPs Compliance Deadlines?

For existing direct discharges, you must establish NPDES permits that contain the deadlines outlined in Table 9-2. If one or more of the deadlines has passed at the time a mill's NPDES permit containing BMP requirement is issued, you must ensure that the permit requires the mill to immediately comply with the BMP requirement for which compliance dates have passed. For existing indirect dischargers, pretreatment control agreements must be updated so that BMPs are implemented by the schedule in Table 9-2.

Table 9-2: BMP Compliance Deadlines Schedule for Existing Direct and Indirect Dischargers

BMP Requirements	Compliance Deadline
Prepare BMP Plan	April 15, 1999
Incorporate BMP components that do not require construction of containment structures or installation of monitoring systems	April 15, 1999
Establish initial action levels	April 15, 1999
Automatic monitoring systems in operation	April 17, 2000
Finish construction of containment structures and associated monitoring systems	April 16, 2001
Establish revised action levels	January 15, 2002

New sources must achieve full BMP implementation and prepare the BMP plan prior to operation. As Table 9-3 notes, a new source must establish the action levels no later than 12 months after beginning wastewater discharge, based on six months of monitoring data.

Table 9-3: BMP Compliance Deadlines Schedule for New Sources

BMPs Requirements	Compliance Deadline
Establish action levels	12 months from the commencement of wastewater discharge

10 How are Permits Established for Mills that Decide to Enter the Voluntary Advanced Technology Incentives Program?

EPA established the Voluntary Advanced Technology Incentives Program (VATIP) to encourage existing and new direct dischargers subject to Subpart B to achieve more stringent ELG&S by implementing advanced pollution prevention controls (40 CFR §430.24(b)) and §430.25(c)). By enrolling in VATIP, mills receive additional time to comply with the rule and reduced monitoring requirements (among other incentives). This section presents the VATIP ELG&S, the extended compliance dates, and the reduced monitoring requirements. Note that there is no comparable program for mills subject to Subpart E or for indirect discharging mills. Refer to the *Voluntary Advanced Technology Incentives Program Technical Support Document* for more detail.

What Are the VATIP ELG&S?

VATIP comprises three tiers of ELG&S that reflect increasingly more effective levels of environmental protection that mills can achieve by implementing advanced pollution prevention technologies. Table 10-1 presents the VATIP requirements for each tier. Existing direct dischargers are eligible to enroll in any one of the three tiers (Tier I, II, or III) and new direct dischargers are eligible to enroll in either of the two more stringent tiers (Tier II or III).

Mills can choose to enroll in VATIP on a line-by-line basis. For instance, a mill subject to Subpart B with more than one fiber line may decide to enroll all or some of its fiber lines in VATIP. Only those lines enrolling in VATIP are subject to VATIP requirements. For nonparticipating fiber lines, you must apply BAT, if the mill is an existing source, or NSPS, if the mill is a new source.

Mills may choose to meet VATIP requirements immediately, but they are not required to do so. Mills have six or more years to meet the requirements of the selected tier. Before that time, you must apply appropriate conventional pollutant limits and continuously revise permit limits for all chlorinated pollutants during phases of the VATIP process.

Table 10-1: VATIP Effluent Limitations Guidelines and Standards

Tier	Kappa Number (Annual Average)	Filtrate Recycling	Total Pulping Area Condensate, Evaporator Condensate, and Bleach Plant Wastewater Flow (Annual Average)	End-of-Pipe AOX (kg/kkg)			
				Non-TCF (a)		TCF	
				Maximum for Any One Day	Annual Average	Maximum for Any One Day	Annual Average
Tier I	20 for SW 13 for HW	(b)	NA	0.58	0.26	<ML (c)	(d)
Tier II	NA	(b)	10 m^3/kkg	0.23	0.10	<ML (c)	(d)
Tier III	NA	(b)	5 m^3/kkg	0.11	0.05	<ML (c)	(d)

(a) Non-TCF: pertains to any fiber lines that does not use exclusively TCF bleaching processes.
(b) Complete recycling to the chemical recovery system of all filtrates generated prior to bleaching. Under Tier I, this includes all filtrates up to the point where the kappa number is measured.
(c) <ML means less than the minimum level specified in 430.01(i) for that particular pollutant.
(d) This regulation does not specify this type of limitation for this pollutant; however, you may do so as appropriate.
NA - Not applicable.

What are the Extended Compliance Dates?

To encourage existing mills to enroll in VATIP, EPA has extended the compliance deadlines. (Note that new sources enrolled in the program must meet VATIP ELG&S upon commencing operation). The deadlines are structured so that the tier with the most stringent ELGs allows the greatest amount of time for compliance. All mills have until April 15, 1999 to determine whether they would like to enroll. Mills may still enter VATIP after this time. However, mills enrolling after this date may not receive additional compliance time and must demonstrate compliance by the deadline of the selected tier.

Mills enrolled in Tier I are allowed up to April 15, 2004, to meet Tier I requirements. This tier is based on oxygen delignification, a commercially available technology; therefore, EPA has determined the Tier I compliance date provides enough time for mills to install this technology. You may find that some mills already operating oxygen delignification will enroll in VATIP and request that their permit be updated immediately to include VATIP ELG&S, so that they can immediately benefit from the program's reduced monitoring requirements.

Mills enrolling in Tiers II and III are allowed until April 15, 2009, and April 15, 2014, respectively, to fully comply with VATIP ELG&S. EPA believes this provides enough time for these mills to resolve the technical and economic difficulties associated with developing and implementing flow reduction technologies. **Note that Tier II and III mills, however, must achieve baseline BAT for AOX, TCDD, TCDF, chloroform, and the chlorinated phenolic pollutants by April 15, 2004** (discussed in more below). Again, mills enrolling in Tiers II and III may choose to meet their VATIP ELG&S prior to the final date so that they can obtain immediate VATIP benefits.

Must I Require the Mill to Submit a Milestones Plan?

In the July 7, 1999 Federal Register (36580-36586), EPA promulgated additional language to the VATIP requirements that would require mills to prepare a Milestones Plan covering all fiber lines enrolled in the program to their permitting authority (reserved in Section 430.24(c)). The milestones plan will reflect how the mill determined how to ultimately achieve the limitations for their selected tier. The plan will provide you with the information necessary to develop interim milestones for the mill.

Scope of the Milestones Plan

The Milestones Plan must describe each technology component or process modification the mill intends to implement to achieve the VATIP BAT limits. In addition, the plan must include a master schedule showing the sequence of implementing the new technologies and process modifications and identifying critical path relationships within the sequence. For each individual technology or process modification, the Milestones Plan must include:

1. A schedule listing the anticipated date(s) that associated construction, installation, or process changes will be initiated and completed;

2. The anticipated date that the process or individual component will be fully demonstrated as operational; and

3. The anticipated reductions in effluent quantity and improvements in effluent quality as measured at the bleach plant and, for AOX, at the end of the pipe.

For those technologies or process modifications that are not commercially available or demonstrated on a full-scale basis when the plan is developed, the plan must include a schedule for research (if necessary), process development, and mill trials. This schedule must show major milestone dates and the anticipated date the technology or process change will be available for mill implementation. The plan must also include contingency plans in case any of the technologies or process modifications specified in the Milestones Plan need to be adjusted or alternative approaches or processes developed to ensure that the mill will meet the ultimate tier limits by the dates in the master schedule.

How Do I Establish Permit Limits That Reflect the VATIP Schedule?

For existing mills that enroll in VATIP, you must establish enforceable permit requirements that become progressively more stringent over time to ensure that mills achieve performance of the selected tier. EPA has established three phases to measure mills' progress in complying with these permit requirements and to ensure their compliance with the selected tier limitations.

- Initial limitations ("Stage 1");
- Intermediate milestones; and
- Ultimate limitations ("Stage 2").

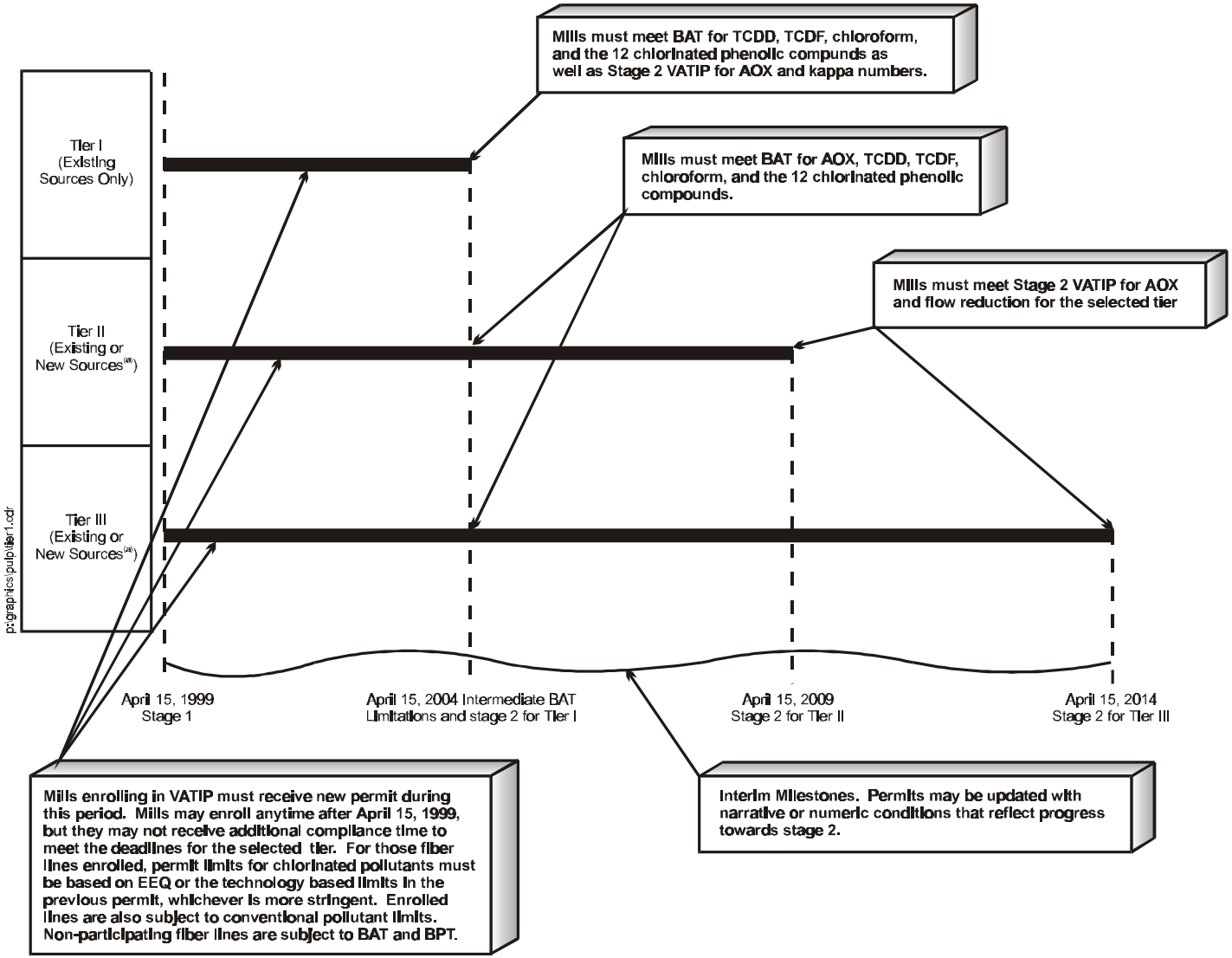
You should include reopener clauses in the NPDES permit of a mill enrolling in VATIP. This will allow you to adjust the permit to reflect the results as the mill implements advanced pollution prevention technologies and improves their effluent quality. Figure 10-1 summarizes the permit process discussion presented below.

Initial Limitations (Stage 1)

Initial limitations (Stage 1) for each fiber line enrolled in VATIP must reflect either *existing* effluent quality (EEQ) or the technology-based limits in the mill's last permit, whichever is more stringent. EEQ refers to the current levels of chlorinated pollutants in the mill's effluent. For pollutants limited in bleach plant effluent (e.g., TCDD), you must determine EEQ at the bleach plant. For AOX, which is limited in the final effluent, you must determine EEQ based on the loadings attributable to the fiber line enrolled in VATIP (i.e., the fiber line's percentage of production multiplied by total AOX load). Appendix E presents detailed procedures for calculating EEQ. Stage 1 limitations ensure that, at a minimum, EEQ is maintained as the mill moves toward achieving Stage 2 limitations in its selected tier.

You must require mills to meet these Stage 1 limitations immediately by including them in the permit because the limitations constitute BAT for enrolled fiber lines engaged in the initial phase of achieving the ultimate limitations (Stage 2). Under the CWA, mills must immediately comply with BAT promulgated after March 31, 1989 (CWA §301(b)(2)). As discussed in more detail in the preamble to the rule (63 FR 18600-06), the remaining VATIP limitations and requirements become BAT over a period of time. The rule requires immediate compliance with those limitations as well (e.g., the "Stage 2" limitations), but only if they have ripened into BAT. For example, for Stage 2 limitations for Tier II, that would be April 15, 2009. See 40 CFR §430.24(b)(4)(ii)(B).

Figure 10-1: Permit Process for Direct Discharges During Each Phase of VATIP



[a] Note: New sources must comply with VATIP upon commencing operations.

Intermediate Milestones

You must establish two sets of interim milestones that are critical in assuring that mills incrementally improve their effluent quality prior to achieving Stage 2 limits.

1. Intermediate BAT Limitations

You must require existing mills enrolled in all three tiers to comply with interim limitations equivalent to BAT for the 15 regulated chlorinated pollutants no later than April 15, 2004. At that time, note that those mills enrolled in Tier I are also required to fully comply with Stage 2 limitations for AOX and kappa number limits.

EPA anticipates that mills that enroll in Tiers II or III will achieve limits for chlorinated pollutants by April 15, 2004, by substantially modifying pulping and bleaching processes (i.e., installing oxygen delignification, ECF, or TCF). Mills will most likely install oxygen delignification and ECF or TCF processes before achieving the wastewater flow objectives to allow them enough time to design, test, and install emerging or yet-to-be-developed wastewater flow reduction processes to help meet the Stage 2 limitations.

You should note that some mills required to achieve WQBELs or other ELG&S equivalent to one or more of the VATIP ELG&S are eligible to enroll in VATIP and to receive the incentives for achieving all VATIP ELG&S. However, you must require mills to comply with existing WQBELs and other ELG&S by the compliance data specified by the applicable law.

2. Interim Milestones

In addition to establishing intermediate BAT limitations, you may wish to establish interim milestones using the information provided by the mill in their Milestones Plan and BPJ to ensure that the mill is progressing toward the Stage 2 limitations. These intermediate milestones, which may be expressed as *narrative or numeric* conditions in the NPDES permit (40 CFR §430.24(b)(2)), should reflect progressive steps toward achieving limitations in the mill's selected tier.

Ultimate Limitations (Stage 2)

You must require mills to meet ultimate limitations no later than the effective date of the selected tier. Remember, new mills must achieve Stage 2 limitations when they commence operation.

Note that, in addition to VATIP ELG&S, mills enrolled in the incentives program must also meet applicable ELG&S for conventional pollutants (e.g., BOD_5, TSS, and pH), as well as BMP requirements and any appropriate WQBELs.

What are the Reduced Monitoring Requirements?

Table 10-2 presents the reduced minimum monitoring frequencies established for mills that enroll in VATIP. You may reduce the monitoring frequency for mills enrolled in VATIP only *after* they have met Stage 2 requirements.

During the time between Stage 1, when mills must meet EEQ or the technology-based limits in the last permit, and Stage 2, you should require all mills that enroll in VATIP to monitor at the minimum frequencies established for all chlorinated pollutants (see Table 8-4). This monitoring requirement assures that mills demonstrate that they are consistently achieving EEQ and/or BAT limitations. Keep in mind that EPA did not establish minimum monitoring requirements for those mills that certify that they perform TCF bleaching. For these mills, you may use BPJ to establish monitoring frequencies.

Note that VATIP rewards mills that implement advanced pollution prevention technologies that reduce the amount of chlorine and chlorine dioxide used during bleaching. For those mills that certify that they perform advanced ECF bleaching, the required monitoring of TCDD, TCDF, chloroform, and chlorinated phenolic compounds may be suspended and AOX monitoring may be relaxed one year after the mill meets Stage 2 limitations.

Table 10-2: Minimum Monitoring Frequencies for Chlorinated Compounds and AOX for Fiber Lines Enrolled in VATIP

	Minimum Monitoring Frequency				
Pollutant	**non-ECF (a)**	**Advanced ECF (b)(e)**			**TCF (c)**
12 chlorinated phenolics pollutants	monthly	monthly (f)			(d)
2,3,7,8-TCDD	monthly	monthly (f)			(d)
2,3,7,8-TCDF	monthly	monthly (f)			(d)
Chloroform	weekly	monthly (f)			(d)
Pollutant	**non-ECF, any Tier (a)**	**Advanced ECF - Tier I (b)**	**Advanced ECF - Tier II (b)**	**Advanced ECF - Tier III (b)**	**TCF (c)**
AOX	daily	weekly (for 1 year after achieving Stage 2) monthly (for years 2 through 5 after achieving Stage 2)	weekly (for 1 year after achieving Stage 2) quarterly (for years 2 through 5 after achieving Stage 2)	weekly (for 1 year after achieving Stage 2) annually (for years 2 through 5 after achieving Stage 2)	(d)

(a) Pertains to any fiber line that does not use exclusively ECF or TCF bleaching operations.
(b) Pertains to any fiber line that uses exclusively Advanced ECF bleaching processes.
(c) Pertains to any fiber line that uses exclusively TCF bleaching processes.
(d) This regulation does not specify a limit for this pollutant for TCF bleaching processes. Use BPJ.
(e) You must determine the appropriate monitoring frequency for these pollutants after one year under 40 CFR §122.44(i).
(f) The minimum monitoring frequency applies during the initial compliance demonstration period.

How Does VATIP Enrollment Affect MACT Compliance Schedule?

EPA recently promulgated MACT-based NESHAPs for the pulp and paper industry (see 63 FR 18399 and 40 CFR Part 63). For bleaching operations at existing sources, control of chloroform emissions is based on compliance with the BAT ELG&S. Control of other chlorinated HAPs is based on the use of caustic scrubbing of bleach plant air emissions. Existing sources are required to comply with the NESHAP no later than April 16, 2001.

EPA was concerned that requiring mills to comply in three years with MACT standards based on ClO_2 substitution would discourage mills from enrolling in the VATIP. This is largely because a mill that installs or upgrades a ClO_2 generator before it installs oxygen delignification is likely to construct more capacity than it ultimately will need. A mill that has invested in a large ClO_2 generator would be very reluctant to abandon a portion of that investment soon afterwards in order to participate in the VATIP.

To encourage mills to participate, EPA extended the date for compliance with the bleach plant standards for mills that enroll in VATIP. The NESHAP sets out a two-phased compliance schedule.

1. *Phase One: June 15, 1998 through April 15, 2004.* For existing sources enrolled in VATIP, MACT allows no increase in the existing HAP emission levels from the papergrade bleaching system--i.e., no backsliding--during the initial period when the mill is working toward meeting its VATIP BAT requirements. The effective date of the first phase requirements is June 15, 1998. Mills may not increase their application rates of chlorine or hypochlorite above the average rates determined for the three-month period prior to June 15, 1998.

2. *Phase Two: After April 15, 2004.* For existing sources enrolled in VATIP the mill must achieve the MACT standard for chloroform emission reduction; it must also apply controls for other chlorinated HAPs. To comply with the chloroform standard the mill may either:

    a. comply with baseline BAT for all pollutants, or

    b. certify that chlorine and hypochlorite are not used in the bleach plant.

    All mills that enroll in the VATIP must comply with the second phase of existing source MACT no later than April 15, 2004.

The MACT rule also allows an extended compliance time for *all* mills to collect and control HVLC gas streams from the kraft pulping process (that is, air emissions from brownstock washing and oxygen delignification). The compliance time is extended from three years to eight years (until April 17, 2006). This time extension will allow mills to make changes needed to comply with BAT, such as upgrading brownstock washing and closing pulp screening, prior to collecting and controlling air emissions from these processes. It will also allow mills to make changes needed to comply with VATIP, such as installation of oxygen delignification, prior to controlling air emissions.

11 Case Studies

Because there are complex permitting issues associated with 40 CFR 430, this section presents case studies showing the development of NPDES permits for mills subject to BPT and BAT under Subparts B and E. There are nine case studies, which cover a variety of mill types and complexity. Each case study presents the following:

- Example mill's current permit status;
- General site description;
- Information about mill operations relevant to establishing permit limits;
- Step-by-step approach to determining limits for each regulation (e.g., BPT, BAT); and
- Final limits as they would appear in each example mill's permit.

Table 11-1 summarizes the nine case studies to assist you in selecting the one(s) of most interest to you.

Table 11-1: Summary of Case Studies

Case Study #	Description of Mill	Discharge Status (Direct or Indirect)	Subpart(s) Covering Operations	Is Mill Enrolling in VATIP?
1	Bleached kraft mill with multiple products	D	Subpart B	
2	Papergrade sulfite mill with multiple products	D	Subpart E	
3	Colocated bleached papergrade kraft and papergrade sulfite mills with multiple products	D	Subparts B and E	
4	Colocated bleached papergrade kraft, thermomechanical, and secondary deink fiber mills with multiple products	D	Subparts B, G, and I	
5	Bleached papergrade kraft mill with multiple products and seasonal discharge	D	Subpart B	
6	Bleached papergrade kraft mill with multiple products and one existing fiber line and one new fiber line	D	Subpart B	
7	Bleached papergrade kraft mill that discharges to a POTW	I	Subpart B	
8	Bleached papergrade kraft mill with multiple products and one existing fiber line and one new fiber line enrolling in VATIP	D	Subpart B	X
9	Bleached papergrade kraft mill with purchased pulp in addition to an existing fiberline	D	Subpart B	

Case Study #1

The Softwood Paper Corporation manufactures fine paper and market pulp. The mill, which discharges effluent into the Seneca River, has submitted an application for a new NPDES permit because their current permit expires September 16, 1999.

Case Study #1 highlights:

1. Permit process for direct discharging mill with operations in Subpart B.
2. Production rate determination.

General Site Description

The Softwood Paper Corporation operates one bleached kraft fiber line and two paper machines, one to produce fine paper and another to produce market pulp.

Relevant Information for Establishing Permit Limits

The table below summarizes the information from the permit application you need to calculate discharge limits for the reissued NPDES permit.

Information Needed to Establish Permit Limits for Case Study #1	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subpart B
The mill is subject to which ELG&S?	BPT (40 CFR 430.22) Fine Paper Segment Market Bleached Kraft Pulp Segment BAT (40 CFR 430.24)
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use chlorophenolic biocides?	No

Softwood Paper manufactures bleach kraft pulp and two products (fine paper and bleached kraft market pulp). The two products fall under two segments of Subpart B. Because BPT ELGs for conventional pollutants and BAT for AOX and chloroform are mass-based, you must review the production information submitted with the mill's permit application to determine production rates for each product and for bleached pulp to calculate their BPT and BAT limits. The table below explains how to calculate production rates (also see Section 8 for a description of how to determine production rates).

CASE STUDY #1

In reviewing the monthly production data for Softwood paper from the last five years, you find that the maximum production occurred from August 1996 - July 1997. The monthly production data from this time period will determine the production rate that results in the maximum permit limits for conventional pollutants, AOX, and chloroform.

Date	Bleached Kraft Pulp Production (ADMT/mo)	Fine Paper Segment Production Rate (OMMT/mo)	Market Pulp Production Rate (ADMT/mo)
August 1996	30,600	19,000	14,100
September 1996	30,650	19,250	14,200
October 1996	30,400	19,300	14,500
November 1996	30,800	19,500	14,650
December 1996	30,900	19,600	14,750
January 1997	30,300	19,200	14,600
February 1997	30,700	19,000	14,500
March 1997	30,400	18,900	14,500
April 1997	30,750	19,000	14,700
May 1997	30,500	19,100	14,800
June 1997	30,600	19,525	14,900
July 1997	30,900	19,625	4,800
Production Total (ADMT or OMMT/yr)	**376,500**	**231,000**	**175,000**
Total Op. Days/yr	**350**	**350**	**350**
Total (ADMT or OMMT/day)	**1,050**	**660**	**500**

Determining Permit Limits for Pollutants Regulated Under BPT

You may then calculate conventional pollutant permit limits using the following equation:

$$\text{Final Effluent Limit} = \sum (PROD_i \times Limit_i)$$

where:

$PROD_i$	=	Production rate
$LIMIT_i$	=	ELG for conventional pollutant
i	=	Segment

$$\text{Final Effluent Limit} = (\text{PROD}_{\text{fine paper}} \times \text{LIMIT}_{\text{fine paper}}) + (\text{PROD}_{\text{market pulp}} \times \text{LIMIT}_{\text{market pulp}})$$

The table below presents the conventional pollutant permit limits calculated for this mill.

BPT Segment	Production	TSS				BOD_5			
		Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
		ELG	Subtotal	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
Fine Paper	660 kkg/day	22.15 kg/kkg	14,600 kg/day	11.9 kg/kkg	7,850 kg/day	10.6 kg/kkg	7,000 kg/day	5.5 kg/kkg	3,600 kg/day
Market Pulp	500 kkg/day	30.4 kg/kkg	15,200 kg/day	16.4 kg/kkg	8,200 kg/day	15.45 kg/kkg	7,730 kg/kkg	8.05 kg/kkg	4,030 kg/day
BPT Final Effluent Limit Totals		29,800 kg/day		16,050 kg/day		14,730 kg/day		7,630 kg/day	

Determining Permit Limits for Pollutants Regulated Under BAT

The bleaching operations at Softwood Paper are covered under Subpart B. BAT ELGs for the regulated toxic and nonconventional pollutants are either concentration-based or mass-based. For concentration-based ELGs, you may simply include the limit specified in 40 CFR 430.24 for each pollutant as the permit limit.

Example: Concentration-Based Limit Calculation

TCDF: Maximum for one day = 31.9 pg/L
TCDD: <ML; Method 1613 ML for TCDD = 10 pg/L, TCDD maximum for one day = <10 pg/L

Example: Mass-Based Limit Calculation

For mass-based ELGs, such as those for chloroform and AOX, you must calculate the production rate of unbleached pulp entering the bleach plant. Using the maximum production time period illustrated above, the following table explains how to calculate the production rate for these pollutants (also see Section 8 for a description of how to determine production rate).

CASE STUDY #1

In your review of the permit application, you determine that the following production rate results in maximum AOX and chloroform permit limits.

Date	Bleached Kraft Pulp Production (ADMT)
August 1996	30,600
September 1996	30,650
October 1996	30,400
November 1996	30,800
December 1996	30,900
January 1997	30,300
February 1997	30,700
March 1997	30,400
April 1997	30,750
May 1997	30,500
June 1997	30,600
July 1997	30,900
Production Subtotal (ADMT/yr)	**376,500**
Total Op. Days/Year	**350**
Production Subtotal (ADMT/yr)	**1,050**

Softwood Paper used an 8% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. As a result, you can calculate the production rate for determining AOX and chloroform permit limits as follows:

1050/(1-0.08) = 1,141 ADMT/day of unbleached papergrade kraft pulp entering the bleach plant.

You may then determine permit limits for AOX and chloroform using the following equation:

Bleach plant or final effluent limit = PROD × LIMIT

where:

PROD = Production rate for AOX and chloroform (MT/day = kkg/day)
LIMIT = ELG for AOX or chloroform

> **Alert!** Remember, the mill must demonstrate compliance with chloroform limits at bleach plant effluent but with AOX limits at the final effluent.

The table below presents the limits calculated for AOX and chloroform.

Mill	Production	Chloroform				AOX			
		Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
		ELG	Total	ELG	Total	ELG	Total	ELG	Total
Softwood paper	1,141 kkg/day	6.92 g/kkg	7.90 kg/day	4.14 g/kkg	4.72 kg/day	0.951 kg/kkg	1,085 kg/day	0.623 kg/kkg	711 kg/day

Final Permit Limits for Softwood Paper

Table 11-2 presents the permit limits for Softwood Paper Corporation's NPDES permit.

Under the Clean Water Act, the NPDES permit must require immediate compliance with the new limitations. The permit will be issued in September 1999 (which is over a year after the promulgation of the final rule), and you are requiring Softwood Paper to meet permit limits immediately upon the reissuance of the permit. As shown in Table 11-2, using BPJ, you have included in the permit:

1. COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and
3. Mandatory flow measurement and recording of bleach plant and final effluent.

Make sure you also include the following in the permit:

- A reopener clause so that you may include COD permit limits when EPA promulgates ELGs for this pollutant (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-2: NPDES Permit Limits, Softwood Paper Corporation

Pollutant	Permit Limits		Effluent Monitoring Location	Sample Frequency	Sample Collection Method
	1-Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
TCDF	31.9 pg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Chloroform	7.90 kg/day	4.72 kg/day	Bleach Plant Effluent**	Weekly	24 hr composite
Trichlorosyringol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Pentachlorophenol	<5.0 μg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
AOX	1,085 kg/day	711 kg/day	Final Effluent	Daily	24 hr composite
COD*	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	14,730 kg/day	7,630 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	29,800 kg/day	16,050 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	Bleach Plant Effluent	Continuous	Recorder
Flow*	Report	Report	Final Effluent	Continuous	Recorder

*Reporting for COD and flow determined using Best Professional Judgment (BPJ).

**Acid and alkaline streams monitored separately.

Case Study #2

The White Bright Paper Company manufactures fine paper. Wastewaters produced during mill operations are treated using primary and secondary treatment prior to discharge into the Falls River. The mill has submitted a permit application to you because their NPDES permit expired January 1, 1998.

Case Study #2 highlights:

1. Permit process for direct dischargers with operations in Subpart E.
2. Production rate determination.

General Site Description

The White Bright Paper Company operates a papergrade sulfite process to produce pulp which it bleaches, and then uses it to make fine paper. The sulfite process uses a continuous digester and is ammonium-based. Prior to bleaching, the pulp is washed using vacuum washers.

Relevant Information for Establishing Permit Limits

The table below summarizes the information from the permit application you need to calculate discharge limits for the reissued NPDES permit.

Information Needed to Establish Permit Limits for Case Study #2	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subpart E
The mill is subject to which ELG&S?	BPT (40 CFR 430.52) Papergrade Sulfite with Continuous Digester Segment BAT (40 CFR 430.54) Ammonium-based Segment
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use chlorophenolic biocides?	No

Determining Permit Limits for Pollutants Regulated Under BPT

White Bright uses a vacuum washer and continuous digester and, therefore, the mill is subject to the segment of Subpart E that covers these operations. Because the BPT ELGs for conventional pollutants are mass-based, you must review their permit application to determine a production rate to calculate their BPT limits. The table below explains how to calculate production rate.

CASE STUDY # 2

In reviewing the monthly production data for White Bright Paper Company from the last five years, you find that the maximum 12-month production occurred from August 1996 - July 1997. The monthly production data from this time period will determine the production rate that results in the maximum permit limits for conventional pollutants.

Date	Fine Paper Production (OMMT)
August 1996	23,000
September 1996	22,500
October 1996	22,700
November 1996	22,100
December 1996	22,300
January 1997	22,100
February 1997	22,500
March 1997	22,300
April 1997	22,600
May 1997	22,950
June 1997	23,000
July 1997	21,910
Production Total (OMMT/year)	**269,960**
Total Op. Days/Year	**340**
Production Total (OMMT/day)	**794**

You may then calculate conventional pollutant permit limits using the following equation:

$$\text{Final Effluent Limit} = \sum (PROD_i \times Limit_i)$$

where:

$PROD_i$	=	Production rate
$LIMIT_i$	=	ELG for conventional pollutant
i	=	Subpart E Segment - Facilities with vacuum washers and continuous digesters

$$\text{Final Effluent Limit} = (\text{PROD}_{\text{Subpart E Segment - Facilities with vacuum washers and continuous digesters}}) \times (\text{LIMIT}_{\text{Subpart E Segment - Facilities with vacuum washers and continuous digesters}})$$

The table below presents the conventional pollutant permit limits calculated for this mill.

BPT Segment	Production	TSS				BOD_5			
		Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
		ELG	Subtotal	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
Papergrade Sulfite with Vacuum Washer and Continuous Digester	794 kkg/day	53.75 kg/kkg	42,700 kg/day	28.95 kg/kkg	23,000 kg/day	38,15 kg/kkg	30,300 kg/day	19.85 kg/kkg	15,800 kg/day

Determining Permit Limits for Pollutants Regulated Under BAT

Since all BAT ELGs for Subpart E are concentration-based, you must simply include the limit specified in the regulation for each pollutant as the permit limit.

Example: Concentration-Based Limit Calculation

TCDD: Maximum for one day = <ML; Method 1613 ML for TCDD = 10 pg/L,
TCDD: Maximum for one day = <10 pg/L

Final Permit Limits for White Bright Paper Company

Under the Clean Water Act, the NPDES permit must require immediate compliance with the new limitations. The permit will be issued in September 1999 (which is over a year after the promulgation of the final rule), and you are requiring White Bright Paper Company to meet permit limits immediately upon the reissuance of the permit. As shown in Table 11-3, you exercised BPJ to include the following in the permit:

1. Chloroform, AOX, and COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and
3. Mandatory flow measurement and recording of bleach plant and final effluent.

Make sure you also include the following in the permit:

- Because chloroform, AOX, and COD limits are reserved, a reopener clause so that you may include chloroform, AOX, and COD permit limits when EPA promulgates ELGs for these pollutants (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-3: Permit Limits for White Bright Paper Company

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1-Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
TCDF	<10 pg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Chloroform*	Report	--	Bleach Plant Effluent**	Monthly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
AOX*	Report	--	Final Effluent	Monthly	24 hr composite
COD*	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	30,300 kg/day	15,800 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	42,700 kg/day	23,000 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	Bleach Plant Effluent	Continuous	Recorder
Flow*	Report	Report	Final Effluent	Continuous	Recorder

"--" Monthly averages do not apply for pollutant.

*Reporting for chloroform, AOX, COD, and flow determined using BPJ.

**Acid and alkaline streams monitored separately.

Case Study #3

Acme Paper Company manufactures office paper, tissue, and clay-coated printing papers. The company operates both a bleached kraft fiber line and a papergrade sulfite fiber line. All process wastewater generated by Acme Paper is treated using primary and secondary treatment prior to discharge into the Tyler River. The mill has submitted a permit application because their current NPDES permit expires in August 2000.

Case Study #3 highlights:

1. Permit process for mill with operations in multiple subparts (Subparts B and E).
2. Production rate determination.

General Site Description

Acme Paper operates a bleached kraft fiber line producing bleached pulp that is used to manufacture fine papers and tissue. The papergrade sulfite fiber line bleaches pulp that is primarily used to manufacture printing paper and some of the bleached papergrade sulfite pulp is used to manufacture tissue. The tissue product is made up of both bleached kraft pulp and bleached sulfite pulp. The sulfite process is ammonium-based and the papergrade sulfite fiber line uses a pressure drum washing system prior to bleaching the pulp.

Relevant Information for Establishing Permit Limits

The mill has certified in their permit application that they use TCF bleaching to produce papergrade sulfite pulp. The table below summarizes relevant information for establishing permit limits for pollutants with ELGs.

Information Needed to Establish Permit Limits for Case Study #3	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subparts B and E
The mill is subject to which ELG&S?	<u>Subpart B</u> BPT (40 CFR 430.22) Fine Paper Segment Paperboard, Coarse Paper, and Tissue Segment BAT (40 CFR 430.24) <u>Subpart E</u> BPT (40 CFR 430.52) Papergrade Sulfite with Vacuum or Pressure Drum (bisulfite liquor/surface condenser) Segment BAT (40 CFR 430.54) Ammonium-Based Segment

Information Needed to Establish Permit Limits for Case Study #3	
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	Only on the papergrade sulfite line.
Does the mill use chlorophenolic biocides?	No

Acme Paper Company manufactures papergrade kraft pulp, papergrade sulfite pulp, and three products (fine paper, tissue, and clay-coated printing papers). Two of the products (fine paper and tissue) Acme Paper manufactures fall under two segments of Subpart B. In addition, the Subpart E regulations also apply to the tissue production. The third product (clay-coated printing papers) is comprised of bleached papergrade sulfite pulp and, therefore, falls under Segment E. Because BPT ELGs for conventional pollutants and BAT for AOX and chloroform are mass-based, you must review the production information submitted with the mill's permit application to determine appropriate production rates for each product and for bleached pulp to calculate their BPT and BAT limits.

The table below explains how to calculate production rates (also see Section 8 for a description of how to determine production rates).

CASE STUDY # 3

In reviewing the monthly production data for Acme Paper Company from the last five years, you find that the maximum 12-month production occurred from April 1998 - March 1999. The monthly production data from this time period will determine the production rate that results in the maximum permit limits for conventional pollutants, AOX, and chloroform.

Date	Bleached Kraft Pulp Production (ADMT/mo)	Bleached Sulfite Pulp Production (ADMT/mo)	Fine Paper Production (OMMT/mo)	Tissue Production (OMMT/mo)	Printing Paper Production (OMMT/mo)
April 1998	26,900	17,100	16,300	14,600	13,400
May 1998	26,100	17,300	15,800	14,500	13,400
June 1998	26,250	17,500	15,750	14,500	13,500
July 1998	26,800	17,700	15,300	14,400	13,600
August 1998	26,250	17,900	15,800	14,100	13,700
September 1998	26,100	17,600	16,300	14,600	13,500
October 1998	26,300	17,500	15,750	14,850	13,400
November 1998	27,000	17,600	15,750	14,400	13,200
December 1998	26,300	17,300	15,400	14,500	13,100
January 1999	26,100	17,400	15,950	14,850	13,100
February 1999	25,500	17,500	15,500	14,900	13,400
March 1999	25,400	17,600	15,400	14,800	13,700
Production Total (ADMT or OMMT/yr)	**315,000**	**210,000**	**189,000**	**175,000**	**161,000**
Total Op. Days/Year	**350**	**350**	**350**	**350**	**350**
Production Total (ADMT or OMMT/day)	**900**	**600**	**540**	**500***	**460**

*The tissue production is comprised of 360 OMMT/day bleached kraft pulp and 140 OMMT/day bleached sulfite pulp.

Determining Permit Limits for Pollutants Regulated Under BPT

You may then calculate conventional pollutant permit limits using the following equation:

$$\text{Final Effluent Limit} = \sum (PROD_i \times Limit_i)$$

where:

$PROD_i$	=	Production rate
$LIMIT_i$	=	ELG for conventional pollutant
i	=	Subpart B - Fine paper segment; Subpart B - paperboard, coarse paper, and tissue segment; and Subpart E - papergrade sulfite with vacuum or pressure drum segment

$$\text{Final Effluent Limit} = (\text{PROD}_{\text{Subpart G - fine paper}} \times \text{LIMIT}_{\text{Subpart B - fine paper}}) + (\text{PROD}_{\text{Subpart E - vacuum or pressure drum}} \times \text{LIMIT}_{\text{Subpart E - vacuum or pressure drum}})$$

The table below presents the conventional pollutant permit limits calculated for this mill.

Subcategory	Segment	Production	TSS				BOD			
			Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
			ELG	Subtotal	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
Subpart B	Fine Paper	540 kkg/day	22.15 kg/kkg	12,000 kg/day	11.9 kg/kkg	6,430 kg/day	10.6 kg/kkg	5,720 kg/day	5.5 kg/kkg	3,000 kg/day
Subpart B	Paperboard, Coarse Paper, and Tissue	360 kkg/day	24.0 kg/kkg	8,600 kg/day	12.9 kg/kkg	4,600 kg/day	13.65 kg/kkg	4,900 kg/day	7.1 kg/kkg	2,600 kg/day
Subpart E	Papergrade Sulfite with Vacuum or Pressure Drum (bisulfite liquor/surface condenser)	600 kkg/day	43.95 kg/kkg	26,370 kg/day	23.65 kg/kkg	14,190 kg/day	26.7 kg/kkg	16,020 kg/day	13.9 kg/kkg	8,340 kg/day
BPT Final Effluent Limit Totals			46,970 kg/day		25,220 kg/day		26,640 kg/day		13,940 kg/day	

Determining Permit Limits for Pollutants Regulated Under BAT

The bleaching operations at Acme Paper are covered under Subparts B and E. Subpart B ELGs for the regulated toxic and nonconventional pollutants are either concentration- or mass-based permit limits. For concentration-based limits, you must simply include the limit specified in 40 CFR 430.24 for each pollutant as the permit limit. The Subpart E BAT ELGs for TCDD, TCDF, chloroform, and 12 chlorinated compounds do not apply to fiber lines that use a TCF bleaching process. Since this mill's bleached sulfite pulping process does use TCF bleaching, there are no limits for these pollutants. Limits for AOX and COD are reserved under BAT for this subpart.

CASE STUDY #3

In your review of the permit application, you determine that the following production rate results in maximum AOX and chloroform permit limits for the Subpart B operations.

Date	Bleached Kraft Pulp Production (ADMT/mo)
April 1998	26,900
May 1998	26,100
June 1998	26,250
July 1998	26,800
August 1998	26,250
September 1998	26,100
October 1998	26,300
November 1998	27,000
December 1998	26,300
January 1999	26,100
February 1999	25,500
March 1999	25,400
Production Total (ADMT/year)	**315,000**
Total Op. Days/year	**350**
Production Total (ADMT/day)	**900**

Acme Paper provided a 10% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. As a result, you can calculate the production rate for determining AOX and chloroform permit limits as follows:

900/(1-0.10) = 1,000 ADMT = 1,000 kkg of unbleached papergrade kraft pulp entering the bleach plant.

Example: Concentration-Based Limit Calculation

TCDF: Maximum for one day = 31.9 pg/L

Example: Mass-Based Limit Calculation

For mass-based limits established in Subpart B, you must calculate the kraft mill fiber line's production rate of unbleached kraft pulp entering the first stage of the bleach plant. Using the maximum production time period illustrated above, the following table explains how to calculate the production rate (also see Section 8 for a description of how to determine production rate).

Because the only BAT ELG for this segment is <ML for AOX in final effluent, you must base final permit limits on the load attributable to the bleached kraft fiber line. This is demonstrated in the calculation below. You may then determine permit limits for AOX by using the following equation:

$$\text{Final Effluent Limit} = \sum (\text{PROD}_i \times \text{LIMIT}_i)$$

where:

PROD_i	=	BPT production; and
LIMIT_i	=	AOX pollutant limit for specific bleached papergrade kraft product or AOX pollutant limit for papergrade sulfite mill washing/pulping operation.
i	=	Subpart B BPT product segment or Subpart E BPT operation segment.

$$\text{Final Effluent Limit} = (\text{PROD}_{\text{fine paper}} \times \text{LIMIT}_{\text{fine paper}}) + (\text{PROD}_{\text{tissue}} \times \text{LIMIT}_{\text{tissue}}) + (\text{PROD}_{\text{printing paper}} \times \text{LIMIT}_{\text{papergrade sulfite mill with continuous digester}})$$

Mill	Production	Chloroform				AOX			
		Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
		ELG	Total	ELG	Total	ELG	Total	ELG	Total
Bleached Papergrade Kraft	1,000 kkg/day	6.92 g/kkg	6.9 kg/day	4.14 g/kkg	4.1 kg/day	0.951 kg/kkg	951 kg/day	0.623 kg/kkg	623 kg/day

Final Permit Limits for Acme Paper

Table 11-4 presents the permit limits for Acme Paper Company. Under the Clean Water Act, the NPDES permit must require immediate compliance with the new limitations. The permit is being reissued in August of 2000 (almost two years after the promulgation of the final rule), and you are requiring the mill to comply with permit limits for chlorinated pollutants immediately. As shown in the table, you exercised BPJ to include the following in the permit:

1. COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and

3. Mandatory flow measurements of bleach plant and final effluent.

Make sure you also include the following in the permit:

- Because AOX and COD limits are reserved, a reopener clause so that you may include AOX and COD permit limits when EPA promulgates ELGs for these pollutants (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-4. Permit Limits for Acme Paper Company

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
TCDF	31.9 pg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Chloroform	6.9 kg/day	4.1 kg/day	Kraft Mill Fiber Line BPE**	Weekly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
AOX	951 kg/day	623 kg/day	Final Effluent	Daily	24 hr composite
COD*	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	26,640 kg/day	13,440 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	46,970 kg/day	25,220 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	Kraft Mill Fiber Line BPE	Continuous	Recorder
Flow*	Report	Report	Sulfite Mill Fiber Line BPE	Continuous	Recorder
Flow*	Report	Report	Final Effluent	Continuous	Recorder

"--" Monthly averages do not apply for pollutant.

BPE - Bleach Plant Effluent.

*Reporting for COD and flow based on BPJ.

**Acid and alkaline streams monitored separately.

Case Study #4

Pulpco Corporation is an integrated pulp and paper mill that manufactures paperboard and three types of market pulp. Pulpco operates a bleached papergrade kraft fiber line, a secondary deink fiber line, and a thermo-mechanical fiber line. All process wastewaters generated by Pulpco Corporation are treated using primary and secondary treatment prior to discharge into the Murray River. The mill has submitted a permit application because their current NPDES permit expires December 2000.

Case Study #4 highlights:

1. Permit process for mills with operations in multiple subparts (Subparts B, G, I).
2. Production rate determination.

General Site Description

Pulpco operates a bleached kraft fiber line producing bleached pulp that is either sold as market pulp or used to manufacture paperboard. Pulpco uses some of the secondary deink fiber in their paperboard production. The secondary deink fiber makes up 10% of the paperboard while the rest is sold to other paper manufacturers for use in a variety of products. All of the thermo-mechanical pulp is sold to a newsprint manufacturer.

Relevant Information for Establishing Permit Limits

The table below summarizes the relevant information from the permit application you need to calculate discharge limits for the reissued NPDES permit.

Information Needed to Establish Permit Limits for Case Study #4	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subparts B, G, and I
The mill is subject to which ELG&S?	<u>Subpart B</u> BPT (40 CFR 430.22) Market Bleached Kraft Pulp Segment Paperboard, Coarse Paper, and Tissue Segment BAT (40 CFR 430.24) <u>Subpart G</u> BPT (40 CFR 430.72) Pulp and Paper at Groundwood Mills Through the Application of Thermo-mechanical Process Segment BAT (40 CFR 430.74) <u>Subpart I</u> BPT (40 CFR 430.92) BAT (40 CFR 430.94)
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use chlorophenolic biocides?	No

Determining Permit Limits for Pollutants Regulated Under BPT

Pulpco manufactures two products (paperboard and bleached market pulp) that fall under two segments of Subpart B. The secondary fiber deink production is subject to BPT ELGs for Subpart I. The thermo-mechanical pulp production falls under one segment (i.e., the Pulp and Paper at Groundwood Mills Through the Application of Thermo-Mechanical Process Segment) of Subpart G. Because BPT ELGs are mass-based, you must review their permit application to determine production rates for each product to calculate their BPT limits. The table below explains how to calculate production rates (also see Section 8 for a description of how to calculate production rates).

CASE STUDY # 4

In reviewing the monthly production data for Pulpco from the last five years, you find that the maximum production occurred from November 1997 - October 1998. The monthly production data from this time period will determine the production rate that results in the maximum permit limits for conventional pollutants.

Date	Coated Paperboard Production (OMMT/mo)	Market Pulp Production (OMMT/mo)	Secondary Deink Fiber (ADMT/mo)	Thermo-Mechanical Pulp (ADMT/mo)
11/97	29,500	11,100	8,000	8,900
12/97	29,100	11,300	7,500	8,750
1/98	29,150	12,400	7,900	8,200
2/98	29,000	11,200	7,900	8,400
3/98	28,950	12,500	8,000	8,750
4/98	29,100	11,200	7,600	8,750
5/98	28,590	11,400	7,200	8,100
6/98	29,150	1,600	7,800	8,750
7/98	29,500	11,700	7,900	9,100
8/98	29,100	11,900	8,000	9,300
9/98	29,000	11,800	8,000	9,000
10/98	29,500	11,900	8,000	9,000
Production Total (ADMT or OMMT/yr)	**350,000**	**140,000**	**93,800**	**105,000**
Total Op. Days/Year	**350**	**350**	**350**	**350**
Production Total (ADMT or OMMT/day)	**1,000**	**400**	**268**	**300**

Approximately 10% of paperboard is comprised of secondary deink fiber (or approximately 100 ADMT/year). As a result, you can calculate the production rate for Paperboard, Coarse Paper, and Tissue subject to Subpart B ELGs as follows:

Production rate for Paperboard, Coarse Paper, and Tissue subject to Subpart B ELGs
= 1,000 ADMT/day - 100 ADMT/day = 900 ADMT/day
= 900 kkg/day

You may then calculate conventional pollutant permit limits using the following equation:

$$\text{Final Effluent Limit} = \sum (PROD_i \times Limit_i)$$

where:

$PROD_i$ = Production rate
$LIMIT_i$ = ELG for conventional pollutant
i = Segment

$$\text{Final Limit} = (PROD_{\text{paperboard}} \times LIMIT_{\text{paperboard}}) + (PROD_{\text{bleach kraft pulp}}) \times LIMIT_{\text{bleach kraft pulp}}) + (PROD_{\text{thermo-mechanical pulp}} \times LIMIT_{\text{thermo-mechanical pulp}}) + (PROD_{\text{secondary deink fiber}} \times LIMIT_{\text{secondary deink fiber}})$$

The table below presents the calculation of conventional pollutant permit limits calculated for this mill.

			TSS				BOD			
			Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
Subcategory	**Segment**	**Production**	**ELG**	**Subtotal**	**ELG**	**Subtotal**	**ELG**	**Subtotal**	**ELG**	**Subtotal**
Subpart B	Market Pulp	400 kkg/day	30.4 kg/kkg	12,200 kg/day	16.4 kg/kkg	6,560 kg/day	15.45 kg/kkg	6,180 kg/day	8.05 kg/kkg	3,220 kg/day
Subpart B	Paperboard, Coarse Paper, and Tissue	900 kkg/day	24.0 kg/kkg	21,600 kg/day	12.9 kg/kkg	11,610 kg/day	13.65 kg/kkg	12,280 kg/day	7.1 kg/kkg	6,390 kg/day
Subpart G	Thermo-mechanical	300 kkg/day	15.55 kg/kkg	4,670 kg/day	8.35 kg/kkg	2,510 kg/day	10.6 kg/kkg	3,180 kg/day	5.55 kg/kkg	1,670 kg/day
Subpart I	Secondary Fiber Deink	268 kkg/day	24.05 kg/kkg	6,450 kg/day	12.95 kg/kkg	3,470 kg/day	18.1 kg/kkg	4,850 kg/day	9.4 kg/kkg	2,520 kg/day
BPT Effluent Limit Totals			44,920 kg/day		24,150 kg/day		26,500 kg/day		13,800 kg/day	

Determining Permit Limits for Pollutants Regulated Under BAT

The bleaching operations at Pulpco are covered under Subpart B. (Note that the secondary fiber deink line does not bleach and you do not expect any chlorinated pollutants from this line.) BAT ELGs for the regulated toxic and nonconventional pollutants are either concentration-based or mass-based. For concentration-based ELGs, you may simply include the limits specified in 40 CFR 430.24 for each pollutant as the permit limit.

Example: Concentration-Based Limit Calculation

TCDF: Maximum for one day = 31.9 pg/L
TCDD: Maximum for one day: <ML: Method 1613 ML for TCDD = 10 pg/L. Therefore,
Maximum for one day: <10 pg/L

Example: Mass-Based Limit Calculation

For mass-based ELGs, such as those for chloroform and AOX, you must calculate the production rate of unbleached pulp entering the bleach plant. Using the maximum production rate time period illustrated above, the following table explains how to calculate the production rate for these pollutants (also see Section 8 for a description of how to determine production rate).

CASE STUDY #4

In your review of Pulpco's permit application, you determine that the following production rate results in the maximum AOX and chloroform permit limits.

Date	Bleached Kraft Pulp Production (ADMT)
11/97	37,500
12/97	37,500
1/98	37,900
2/98	38,100
3/98	38,400
4/98	38,000
5/98	38,300
6/98	38,300
7/98	37,500
8/98	37,600
9/98	37,900
10/98	38,000
Total Production (ADMT/year)	**455,000**
Total Op. Days/Year	**350**
Total Production (ADMT/day)	**1,300**

Pulpco provided a 10% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. As a result, the production rate for calculating AOX and chloroform permit limits is as follows:

1,300 ADMT/(1-0.10) = 1,444 ADMT of unbleached papergrade kraft pulp entering the bleach plant.

You may then determine permit limits for AOX and chloroform using the following equation:

Bleach plant or final effluent limit = PROD × LIMIT

where:

PROD = Production rate for AOX and chloroform; and
LIMIT = Toxic and nonconventional pollutant ELG.

> **ALERT!** Remember, chloroform is limited in bleach plant effluent while AOX is limited in final effluent.

The table below presents the limits calculated for AOX and chloroform.

		Chloroform				AOX			
		Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
Subcategory	Production	ELG	Total	ELG	Total	ELG	Total	ELG	Total
Subpart B	1,444 kkg/day	6.92 g/kkg	9.99 kg/day	4.14 g/kkg	5.98 kg/day	0.951 kg/kkg	1,270 kg/day	0.623 kg/kkg	830 kg/day

Final Permit Limits for Pulpco Corporation

Table 11-5 presents the permit limits for Pulpco. Under the Clean Water Act, the NPDES permit must require immediate compliance with the new limitations. The permit is being reissued in December 2000 (over two years after the promulgation of the final rule), and you are requiring the mill to comply with permit limits for chlorinated pollutants immediately. Also shown in the table, you exercised BPJ to include the following in the permit:

1. COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and
3. Mandatory flow measurements of bleach plant and final effluent.

Make sure you also include the following in the permit:

- A reopener clause so that you may include COD permit limits when EPA promulgates ELGs for this pollutant (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-5: Permit Limits for Pulpco Corporation

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
TCDF	31.9 pg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Chloroform	10.0 kg/day	6.0 kg/day	Kraft Mill Fiber Line BPE	Weekly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	Kraft Mill Fiber Line BPE	Monthly	24 hr composite
AOX	1,270 kg/day	830 kg/day	Final Effluent	Daily	24 hr composite
COD*	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	26,500 kg/day	13,800 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	44,920 kg/day	24,150 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	Kraft Mill Fiber Line BPE	Continuous	Recorder
Flow*	Report	Report	Final Effluent	Continuous	Recorder

*Reporting for COD and flow based on BPJ.

Case Study #5

Case Study #5 highlights:

1. Production rate determination.
2. Permit limits for non-continuous dischargers.

United Papers Corporation is an integrated pulp and paper mill that manufactures office paper and market pulp. All process wastewaters generated by United Paper are treated and discharged to a holding pond. The mill discharges wastewater to Johnstone Creek nine months of the year. Wastewater is not discharged during July, August, and September due to Johnstone Creek's low flow and inability to assimilate oxygen-demanding wastewater during these months. The mill has submitted a permit application because their current NPDES permit expires January 2001.

General Site Description

United Papers operates a bleached papergrade kraft fiber line and two paper machines. In 1998, the mill purchased a second paper machine to increase office paper production. United Paper reduced the amount of market pulp sold to paper manufacturers and used the pulp for their increased office paper production.

Relevant Information for Establishing Permit Limits

The table below summarizes the relevant information from the permit application you need to calculate discharge limits for the reissued permit.

Information Needed to Establish Permit Limits for Case Study #5	
What type of discharger is the mill?	Direct (non-continuous discharger)
Under which subpart(s) do the mill's operations fall?	Subpart B
The mill is subject to which ELG&S?	BPT (40 CFR 430.22) Fine Paper Segment Market Bleached Kraft Pulp Segment BAT (40 CFR 430.24)
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use chlorophenolic biocides?	No

United Papers manufactures bleached kraft pulp and two products (office papers and bleached market pulp) that fall under two segments of Subpart B. Note that as a non-continuous discharger, the mill is subject to annual average permit limits, rather than maximum one-day and 30-day permit limits, for conventional pollutants regulated in final effluent. Because BPT ELGs for conventional pollutants and BAT for AOX and chloroform are mass-based, you must review the production information submitted with the mill's permit application to determine production rates for both products and bleached pulp to calculate their BPT and BAT limits. The table below explains how to calculate production rates for United Papers (also see Section 8 for a description of how to calculate production rates).

ALERT! Non-continuous discharge mills are subject to annual average ELGs for conventional pollutants; however, maximum one-day and 30-day average limitations may be required to protect receiving water quality.

CASE STUDY #5

In reviewing the monthly production data for United Papers from the last five years, you find that the maximum production occurred from September 1998 - August 1999. The monthly production data form this time period will determine the production rate that results in the maximum permit limits for conventional pollutants, AOX, and chloroform.

Date	Bleached Kraft Pulp Production (ADMT/mo)	Fine Paper Production (OMMT/mo)	Market Pulp Production (ADMT/mo)
9/98	33,300	20,700	12,600
10/98	32,600	20,400	12,200
11/98	32,900	20,500	12,400
12/98	32,750	20,100	12,650
1/99	32,850	20,350	12,500
2/99	32,600	20,100	12,500
3/99	33,800	20,600	13,200
4/99	33,250	20,350	12,900
5/99	32,700	20,100	12,600
6/99	34,000	20,600	13,400
7/99	33,000	20,400	12,600
8/99	33,500	20,800	12,700
Total Production (ADMT or OMMT/yr)	**397,250**	**245,000**	**152,250**
Total Op. Days/Year	**350**	**350**	**350**
Total Production (ADMT or OMMT/day	**1,135**	**700**	**435**

Determining Permit Limits for Pollutants Regulated Under BPT

You may then calculate conventional pollutant permit limits using the following equation:

$$\text{Final Effluent Limit} = \sum (\text{PROD}_i \times \text{Limit}_i)$$

where:

PROD_i	=	Production rate
LIMIT_i	=	ELGs for conventional pollutant
i	=	Segment

$$\text{Final effluent limit} = (\text{PROD}_{\text{fine paper}} \times \text{LIMIT}_{\text{fine paper}}) + (\text{PROD}_{\text{market pulp}} \times \text{LIMIT}_{\text{market pulp}})$$

The table below presents the conventional pollutant permit limit calculated for this mill.

Subcategory	Segment	Production	TSS		BOD	
			Annual Average		Annual Average	
			ELG	Subtotal	ELG.	Subtotal
Subpart B	Fine Paper	700 kkg/day	6.54 kg/kkg	4,580 kg/kkg	3.09 kg/kkg	2,160 kg/day
Subpart B	Market Pulp	435 kkg/day	9.01 kg/kkg	3,920 kg/day	4.52 kg/kkg	2,000 kg/day
BPT Final Effluent Limit Totals			8,500 kg/day		4,160 kg/day	

Determining Permit Limits for Pollutants Regulated Under BAT

The bleaching operations at United Papers are covered under Subpart B. Although United Papers non-continuously discharges final effluent, the mill performs bleach plant operations continuously and, therefore, bleach plant effluent is continuously generated. As a result, the ELGs for those pollutants limited in bleach plant effluent are equivalent to those for direct dischargers.

BAT ELGs for the regulated toxic and nonconventional pollutants are either concentration-based or mass-based. For concentration-based ELGs, you may simply include the limits specified in 40 CFR 430.24 for each pollutant as the permit limit.

Examples: Concentration-Based Limit Calculation

TCDF: Maximum for one day = 31.9 pg/L
TCDD: Maximum for one day: <ML: Method 1613 ML for TCDD = 10 pg/L. Therefore,
Maximum for one day: <10 pg/L

Example: Mass-Base Limit Calculation

For mass-based ELGs, such as those for chloroform and AOX, you must calculate the production rate of unbleached pulp entering the bleach plant. Using the maximum production time period

illustrated above, the following table explains how to calculate the production rate for these pollutants (also see Section 8 for a description of how to determine production rate).

CASE STUDY #5

In your review of United Papers' permit application, you determine that the following production rate results in the maximum AOX and chloroform permit limits.

Date	Bleached Kraft Pulp Production (ADMT)
9/98	33,300
10/98	32,600
11/98	32,900
12/98	32,750
1/99	32,850
2/99	32,600
3/99	33,800
4/99	33,250
5/99	32,700
6/99	34,000
7/99	33,000
8/99	33,500
Total Production (ADMT/year)	**397,250**
Total Op. Days/Year	**350**
Total Production (ADMT/day)	**1,135**

United Papers provided an 8% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. As a result, the production rate for calculating AOX and chloroform permit limits is as follows:

1,135/(1-0.08) = 1,230 ADMT/day of unbleached papergrade kraft pulp entering the bleach plant.

You may then determine permit limits for AOX and chloroform by using the following equation:

Bleach plant or final effluent limit = PROD × LIMIT

where:

PROD	=	Production rate for AOX and chloroform; and
LIMIT	=	Toxic and nonconventional pollutant ELG

> **ALERT!** Remember, chloroform is limited in bleach plant effluent while AOX is limited in final effluent.

The table below presents the limits calculated for AOX and chloroform.

		Chloroform				AOX	
		Daily Maximum		Monthly Average		Annual Average	
Subcategory	Production	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
Subpart B	1,230 kkg/day	6.92 g/kkg	8.51 kg/day	4.14 g/kkg	5.09 kg/day	0.512 kg/kkg	630 kg/day

Final Permit Limits for United Papers Corporation

Table 11-6 presents the permit limits for United Papers Corporation. Under the Clean Water Act, the NPDES permit must require immediate compliance with the new limitations. The permit is being reissued in January of 2001 (which is over a year after the promulgation of the final rule), and you are requiring the mill to comply with permit limits for chlorinated pollutants immediately. Also shown in Table 11-6, you exercised BPJ to include the following in the permit:

1. COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and
3. Mandatory flow measurements of bleach plant and final effluent.

Make sure you also include the following in the permit:

- A reopener clause so that you may include COD permit limits when EPA promulgates ELGs for this pollutant (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-6: Permit Limits for United Papers Corporation

Pollutant	Permit Limits			Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1-Day Maximum	Monthly Average	Annual Average			
TCDD	<10 pg/L	--	--	BPE	Monthly	24 hr composite
TCDF	31.9 pg/L	--	--	BPE	Monthly	24 hr composite
Chloroform	8.51 kg/day	5.09 kg/day	--	BPE	Weekly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	--	BPE	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	--	BPE	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	--	BPE	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	--	BPE	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	--	BPE	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	--	BPE	Monthly	24 hr composite
AOX			630 kg/day	Final Effluent	Daily	24 hr composite
COD*	Report	--	--	Final Effluent	Weekly	24 hr composite
BOD_5	–		4,160 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	--		8,500 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	Report	BPE	Continuous	Recorder
Flow*	Report	Report	Report	Final Effluent	Continuous	Recorder

*Reporting for COD and flow based on BPJ.

Case Study #6

PaperTech Corporation manufactures market pulp and fine paper. The company has two bleached kraft fiber lines, one of which was recently installed. All process wastewaters generated by PaperTech are treated using primary and secondary treatment prior to discharge into the Jackson River. The mill has submitted a permit application since they are to begin operation of their new fiber line in March 2001.

Case Study #6 highlights:

1. Permit process for mill that triggers NSPS.
2. Permit limits that include NSPS conventional pollutant contribution.
3. Production rate projections for new mill operations.

General Site Description

PaperTech operates two bleached kraft fiber lines. The existing line (Fiber line #1) produces bleached pulp that is used to manufacture market pulp and fine papers. To expand operations, PaperTech has installed a new bleached kraft fiber line and paper machine. PaperTech's new line (Fiber line #2) has a capacity to produce 583 ADMT/yr of bleached kraft pulp to produce fine papers.

Relevant Information for Establishing Permit Limits

The table below summarizes relevant information from the permit applications you need to calculate discharge limits for the NPDES permit. Note that the Fiber line #2 triggers new source requirements and is subject to NSPS. Fiber line #1 remains subject to existing source requirements and is subject to BAT and BPT.

Relevant Information for Establishing Permit Limits for Case Study #6	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subpart B
The mill is subject to which ELG&S?	Subpart B *Fiber Line #1* BPT (40 CFR 430.22) Fine Paper Segment Market Bleached Kraft Pulp Segment BAT (40 CFR 430.24) *Fiber Line #2* NSPS (40 CFR 430.25)
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use biocides?	No

Determining Permit Limits for Conventional Pollutants Regulated Under BPT and NSPS

Both products (market pulp and fine paper) manufactured by PaperTech fall under two segments of Subpart B. The ELG&S for conventional pollutants are mass-based. As a result, you must review the production information submitted with the mill's permit application to determine appropriate production rates for calculating conventional pollutant limits. Note that the production must be separated by the portion attributable to each line. You must apply BPT for the market pulp and fine paper production attributable to Fiber line #1 and NSPS for the fine paper production attributable to Fiber line #2.

CASE STUDY # 6

In reviewing the monthly production data for Paper Tech from the last five years, you find that the maximum production occurred from September 1999 - August 2000. The monthly production data from this time period will determine the production rate that results in the maximum permit limits for conventional pollutants.

Date	Fine Paper Production (OMMT)	Market Pulp Production (ADMT)
9/99	17,500	3,200
10/99	17,400	2,900
11/99	17,800	2,700
12/99	18,000	3,300
1/00	17,400	2,800
2/00	18,000	2,700
3/00	17,500	3,300
4/00	17,200	2,700
5/00	17,000	2,400
6/00	17,200	2,900
7/00	17,500	2,900
8/00	17,500	3,200
Total Production (ADMT or OMMT/yr)	**210,000**	**35,000**
Total Op. Days/Year	**350**	**350**
Total Production (ADMT or OMMT/day)	**600**	**100**

Starting in March 2001, PaperTech expects to continue to produce approximately 600 OMMT of fine paper and 100 ADMT of market pulp as well as the projected 700 OMMT of fine paper from their new paper machine. As a result, you should must determine conventional pollutant limits that also account for the new production.

You may then calculate conventional pollutant permit limits using the following equation:

$$\text{Final Effluent} = \sum (PROD_i \times LIMIT_i)$$

where:

$PROD_i$	=	BPT or NSPS production for conventional pollutants; and
$LIMIT_i$	=	Conventional pollutant effluent limitation guideline for appropriate BPT or NSPS segment; and
i	=	Segment.

Final Effluent Limit = Fiberline #1 + Fiberline #2

$= (PROD_{\text{fine paper}} \times LIMIT_{\text{BPT for fine paper}}) + (PROD_{\text{BPT for market pulp}} \times LIMIT_{\text{BPT for market pulp}}) +$

$(PROD_{\text{fine paper}} \times LIMIT_{\text{NSPS for market pulp}})$

The table below presents the conventional pollutant permit limits calculated for this mill.

Subpart	Fiber line	Guideline or Standard	Segment	Production	TSS				BOD			
					Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
					ELG	Subtotal	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
B	#1	BAT	Fine Paper	600 kkg/day	22.15 kg/kkg	13,300 kg/day	11.9 kg/kkg	7,140 kg/day	10.6 kg/kkg	6,360 kg/day	5.5 kg/kkg	3,300 kg/day
			Market Pulp	100 kkg/day	30.4 kg/kkg	3,040 kg/day	16.4 kg/kkg	1,640 kg/day	15.45 kg/kkg	1,550 kg/day	8.05 kg/kkg	805 kg/day
	#2	NSPS	Fine Paper	700 kkg/day	9.1 kg/kkg	6,400 kg/day	4.8 kg/kkg	3,400 kg/day	5.7 kg/kkg	4,000 kg/day	3.1 kg/kkg	2,200 kg/day
Limit Totals					22,740 kg/day		12,180 kg/day		11,910 kg/day		6,305 kg/day	

Determining Permit Limits for Pollutants Regulated Under BAT

PaperTech is subject to BAT ELGs for mills with operations in Subpart B. You must establish concentration- and mass-based permit limits. For concentration-based limits, you must include the concentration value specified in 40 CFR 430.24 for each pollutant as the permit limit. Note that permit limits for those pollutants regulated in bleach plant effluent must be established for each fiber line.

> **Alert!** PaperTech operates two fiber lines that discharge bleach plant effluent. You must establish permit limits for those pollutants regulated in bleach plant effluent for each fiber line.

Example: Concentration-Based Limit Calculation

TCDF: Maximum for one day = 31.9 pg/L
TCDD: Maximum for one day = <ML for Test Method 1613 = <10 pg/L
Therefore, the maximum for one day: <10 pg/L

Example: Mass-Based Limit Calculation

For mass-based limits established in Subpart B, you must calculate the production rate of unbleached kraft pulp entering the first stage of each bleach plant. You must review PaperTech's permit application to determine production rate so that you can calculate AOX and chloroform permit limits. You must assume the projected production for Fiber line #2. Using the maximum production period illustrated above, the following table presents the fiber line production rate to use for PaperTech.

CASE STUDY #6

In your review of PaperTech's permit application, you determine that the following production rate that results in the maximum AOX and chloroform permit limits.

Date	Fiber Line #1 Bleached Kraft Pulp Production (ADMT)
9/99	17,500
10/99	17,400
11/99	17,800
12/99	18,000
1/00	17,400
2/00	18,000
3/00	17,500
4/00	17,200
5/00	17,000
6/00	17,200
7/00	17,500
8/00	17,500
Total Production (ADMT/year)	**210,000**
Total Op. Days/Year	**350**
Total Production (ADMT/year)	**600**

In their permit application, PaperTech provided a 4% shrinkage factor for the bleached papergrade kraft pulp production data for Fiber line #1. As a result, the production rate for calculating AOX and chloroform permit limits is as follows:

600/(1-0.04) = 625 ADMT of unbleached papergrade kraft pulp entering the bleach plant.

PaperTech projects that their new fiber line, at full capacity, will produce 583 ADMT/yr of bleached kraft pulp. In mill studies, PaperTech calculated that the softwood furnish will experience 8% shrinkage during bleaching operations. As a result, the production rate for calculating AOX and chloroform permit limits is as follows:

583/(1-0.08) = 634 ADMT of unbleached papergrade kraft pulp entering the bleach plant.

You may then determine permit limits for AOX and chloroform by using the following equation:

Bleach plant or final effluent limit = PROD × LIMIT

where:

PROD = Production rate for AOX and chloroform; and
LIMIT = Toxic and nonconventional pollutant ELG.

> **Alert!** Remember, chloroform is limited in bleach plant effluent while AOX is limited in final effluent.

The table below presents the limits calculated for AOX and chloroform.

Subpart	Fiberline	Guideline or Standard	Production	Chloroform				AOX			
				Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
				ELG	Subtotal	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
Subpart B	#1	BAT	625 kkg/day	6.92 g/kkg	4.33 kg/day	4.14 g/kkg	2.59 kg/day	0.951 kg/kkg	594 kg/day	0.623 kg/kkg	389 kg/day
	#2	NSPS	634 kkg/day	6.92 g/kkg	4.39 kg/day	4.14 g/kkg	2.62 kg/day	0.476 kg/kkg	302 kg/day	0.272 kg/kkg	172 kg/day
Toxic and Nonconventional Limit Totals				8.72 kg/day		3.21 kg/day		896 kg/day		561 kg/day	

Final Permit Limits for PaperTech Corporation

Table 11-7 presents the permit limits for PaperTech. Under the Clean Water Act, the NPDES permit must require immediate compliance with the new limitations. The permit is being reissued in March 2001 (which is almost two years after the promulgation of the final rule), you are requiring the mills to comply with permit limits for chlorinated pollutants immediately. As shown in Table 11-7, you exercised BPJ to include the following in the permit:

1. COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and
3. Mandatory flow measurements of bleach plant and final effluent.

Make sure you include the following in the permit:

- A reopener clause so that you may include COD permit limits when EPA promulgates ELGs for this pollutant (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-7: Permit Limits for PaperTech Corporation

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1-Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
TCDD	<10 pg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
TCDF	31.9 pg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
TCDF	31.9 pg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
Chloroform	4.33 kg/day	2.59 kg/day	BPE for Fiber Line #1	Weekly	24 hr composite
Chloroform	4.39 kg/day	2.62 kg/day	BPE for Fiber Line #2	Weekly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1-Day Maximum	Monthly Average			
2,4,6-Trichlorophenol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	BPE for Fiber Line #2		
Tetrachloroguaiacol	<5.0 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	BPE for Fiber Line #2		
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	BPE for Fiber Line #1	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	BPE for Fiber Line #2	Monthly	24 hr composite
AOX	896 kg/day	561 kg/day	Final Effluent	Daily	24 hr composite
COD*	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	11,910 kg/day	6,305 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	22,740 kg/day	12,180 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	BPE for Fiber Line #1	Continuous	Recorder
Flow*	Report	Report	BPE for Fiber Line #2	Continuous	Recorder
Flow*	Report	Report	Final Effluent	Continuous	Recorder

"--" Monthly averages do not apply for pollutant.

BPE - Bleach Plant Effluent.

*Reporting for COD and flow based on BPJ.

Case Study #7

Commerce Pulp Company manufactures market pulp and printing papers. The company operates a bleached kraft fiber line. All process wastewaters generated by Commerce Pulp is sent to the Sutton City POTW. The POTW is revising the pretreatment control agreement to include discharge limits for chlorinated pollutants.

Case Study #7 highlights:

1. Pretreatment control agreements for mills with operations in Subparts B.
2. Production rate determination.

General Site Description

Commerce Pulp operates a bleached kraft fiber line that generates bleached pulp that is used to manufacture market pulp and printing papers.

Relevant Information for Establishing Pretreatment Limits

The table below summarizes relevant information for establishing a pretreatment control agreement for Commerce Pulp Company.

Information Needed to Establish Pretreatment Limits for Case Study #7	
What type of discharger is the mill?	Indirect
Under which subpart(s) do the mill's operations fall?	Subparts B
The mill is subject to which E.G.&S?	PSES (40 CFR 430.26)
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use biocides?	No

Determining Permit Limits for Toxic and Nonconventional Pollutants Regulated Under PSES

Commerce Pulp is subject to PSES for mills with operations and Subpart B. You must establish concentration- and mass-based permit limits. For concentration-based limits, you must simply denote the concentration value specified in 40 CFR 430.24 for the appropriate compliance point in the permit.

Example: Concentration-Based Limit Calculation

TCDF: Maximum for one day = 31.9 pg/L
TCDD: Maximum for one day = <ML, Method 1613 ML for TCDD = 10 pg/L
Therefore, maximum for one day = <10 pg/L

Example: Mass-Based Limit Calculation

For mass-based limits established in Subpart B, you must calculate the maximum 12-month production rate of unbleached kraft pulp entering the bleach plant. You must review the mill's monthly production information to determine this production rate so that you may calculate AOX and chloroform permit limits. The following table presents the production rate for Commerce Pulp.

CASE STUDY #7

In reviewing the monthly production data for Commerce Pulp from the last five years, you find that the maximum production occurred from January 1997 - December 1997. The monthly production data from this time period will determine the production rate that results in the maximum AOX and chloroform permit limits.

Date	Bleached Kraft Pulp Production (ADMT/month)
1/97	25,500
2/97	25,125
3/97	25,125
4/97	25,600
5/97	25,125
6/97	24,700
7/97	24,900
8/97	25,225
9/97	25,100
10/97	25,600
11/97	24,800
12/97	24,700
Total Production (ADMT/year)	**301,500**
Total Op. Days/Year	**335**
Total Production (ADMT/day)	**900**

Commerce Pulp provided an 8% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. As a result, you can calculate the production rate for determining AOX and chloroform permit limits as follows:

900/(1-0.08) = 978 ADMT = 978 kkg of unbleached papergrade kraft pulp entering the bleach plant.

You may then determine permit limits for AOX and chloroform by using the following equation:

Bleach Plant or Final Effluent Limit = PROD × LIMIT

where:

PROD	=	Production rate for AOX and chloroform; and
LIMIT	=	Toxic and nonconventional pollutant E.G.

		Chloroform				AOX			
		Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
Subcategory	Production	Standard	Total	Standard	Total	Standard	Total	Standard	Total
Subpart B	978 kkg/day	6.92 g/kkg	6.8 Kg/day	4.14 g/kkg	4.0 kg/day	2.64 kg/kkg	2,580 kg/day	1.41 kg/kkg	1,380 kg/day

Final Pretreatment Limits for Commerce Pulp

The table below presents the pretreatment limits for Commerce Pulp Company. As shown in the table, the pretreatment control authority decided to include the following in the permit:

Note. *For indirect dischargers, pretreatment limits for AOX must be established for bleach plant effluent.*

1. COD monitoring requirements.
2. Monitoring frequencies for conventional pollutants.
3. Mandatory flow measurements of bleach plant and final effluent.

In addition, the pretreatment control authority must require Commerce Pulp to implement BMPs by the schedule specified in the regulation.

Table 11-8: Permit Limits for Commerce Pulp Company

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1-Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
TCDF	31.9 pg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Chloroform	6.8 kg/day	4.0 kg/day	Bleach Plant Effluent	Weekly	6 grabs/24 hr
Trichlorosyringol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	Bleach Plant Effluent	Monthly	24 hr composite
AOX	2,580 kg/day	1,380 kg/day	Bleach Plant Effluent	Daily	24 hr composite
COD*	Report	--	End-of-Pipe Effluent	Weekly	24 hr composite
Flow*	Report	Report	Bleach Plant Effluent	Continuous	Recorder
Flow*	Report	Report	End-of-Pipe Effluent	Continuous	Recorder

"--" Monthly averages do not apply for pollutant.

*Reporting for COD and flow based on BPJ.

Case Study #8

The Great American Paper Company manufactures fine paper and paperboard. The mill, which discharges wastewater into the Redbanks River, has informed you that they wish to enter Voluntary Advanced Technology Incentives Program (VATIP). Although their NPDES permit does not expire until February 15, 2000, the company has indicated its intent to enroll in the program by submitting a letter to the permitting authority. The letter was signed by the corporate officials as specified in 40 CFR 122.22.

Case Study #8 highlights:

1. VATIP permit process
2. VATIP compliance schedules
3. Calculation of EEQ
4. VATIP monitoring requirements
5. Accelerated VATIP rewards.

General Site Description

The Great American Paper Company operates two bleached kraft fiber lines to produce fine paper and paperboard. One fiber line (Fiber Line #1) is dedicated to pulping and bleaching pine, a softwood, to produce bleached kraft pulp used in the manufacture of paperboard. In 1992, the mill installed oxygen delignification systems on Fiber line #1 to improve mill productivity and effluent quality. Fiber Line #1 currently meets BAT Tier I limits. A second fiber line (Fiber Line #2) pulps and bleaches birch, a hardwood, to produce fine paper. The mill has approved a plan to install a two-stage oxygen delignification system on Fiber line #2 by June 2003, so they can enroll Fiber Line #2 in VATIP. Pertinent process information for each fiber line, including the planned bleach sequence for Fiber Line #1, is summarized below:

Note. *Installation of oxygen delignification does not trigger NSPS. See "new source" definition in Section 7.*

Fiber line	Current Bleach Sequence	Kappa Number after Oxy Delig	Future Bleach Sequence
Fiber line #1	ODEoD	17	ODEoD
Fiber line #2	C_dEDED	12	OODED

Permitting Information

The mill has informed you that they would like to enroll both fiber lines in Tier I of VATIP. In order to immediately receive rewards associated with the program, the mill elected to by-pass EEQ and interim milestones for Fiber line #1 altogether, achieving all of the VATIP limitations for Tier 1 immediately. Because the mill does not plan to install and operate oxygen delignification on

Fiber Line #2 until June 2003, you must establish Stage 1 permit limits for Fiber Line #2 that are based on either EEQ or current permit limits (if any) for the chlorinated pollutants. The table below summarizes relevant information for establishing permit limits.

Relevant Information for Establishing Permit Limits for Case Study #8	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subpart B
The mill is subject to which ELG&S?	BPT (40 CFR 430.22) Fine Paper Segment BAT (40 CFR 430.24)
Is the mill planning on entering VATIP?	Yes, therefore, in addition to BPT, the mill is subject to the following BAT regulation under 40 CFR 430.24: 1) Immediate Stage 1 permit limits based on VATIP Tier I for Fiber line #1 and EEQ (or current permit limits) for Fiber line #2 2) Interim milestones based on progress in installing and operating two-stage OD system on Fiber line #2. Since mill intends to install and operate OD by June 2003, you should consider establishing interim milestones at or prior to that time. 3) Stage 2 permit limits that include Tier I ultimate VATIP requirements for both lines no later than April 15, 2004.
Does mill use wet barking; log washing or chip washing; or log flume or log ponds?	No
Does the mill certify using TCF?	No
Does the mill use biocides?	No

Establishing Stage 1 Permit Limits

Remember, Stage 1 permit limits are intended to ensure that, at a minimum, existing effluent quality is maintained as the mill moves toward meeting Stage 2 permit limitations. Since Great American Paper has elected to accept Stage 2 permit limits for Fiber Line #1, permit limits as the mill enters the program must include:

1. Conventional pollutant permit limits based on BPT for the fine paper segment and the paperboard, coarse paper, and tissue segment.

2. Toxic and nonconventional pollutant permit limits for Fiber line #1 based on baseline BAT and VATIP requirement for Tier I (see Step #5 for AOX).

3. Toxic and nonconventional pollutant permit limits for Fiber line #2 based on EEQ.

4. AOX permit limits based on the load attributable to Fiber line #1 (using Tier I BAT) and the load attributable to Fiber line #2 (using EEQ).

5. A reopener clause.

Step #1 - Conventional pollutant permit limits - BPT

Great American Paper manufactures two products (fine paper and paperboard) that fall under two segments of Subpart B. Because conventional pollutant ELGs are mass-based (with the exception of pH), you must review the mill's permit application to determine production rate. The text box below presents the production rate.

A review of their permit application reveals that the production rates that result in the maximum pollutant loads are from the following data.

Date	Paperboard Segment Production Rate (OMMT/month)	Fine Paper Production Rate (OMMT/month)
12/97	22,600	18,300
1/98	22,700	17,900
2/98	22,700	17,700
3/98	22,500	18,500
4/98	22,600	18,300
5/98	22,750	18,000
6/98	22,300	17,500
7/98	23,200	17,900
8/98	22,750	17,700
9/98	22,800	18,200
10/98	23,300	18,400
11/98	22,800	18,600
Total Production (OMMT/year)	**273,000**	**217,000**
Total Op. Days/Year	**350**	**350**
Total Production (OMMT/day)	**780**	**620**

You may then calculate the conventional pollutant permit limits by using the following equation:

$$\text{Final Effluent Limit} = \sum (\text{PROD}_i \times \text{LIMIT}_i)$$

where:

PROD_i	=	Production Rate
LIMIT_i	=	ELG for conventional
i	=	Segment

$$\text{Final Effluent Limit} = (\text{PROD}_{\text{fine paper}} \times \text{LIMIT}_{\text{fine paper}}) + (\text{PROD}_{\text{paperboard}} \times \text{LIMIT}_{\text{paperboard}})$$

Refer to Table 11-X which presents the calculated Stage 1 permit limits.

Step #2 - Toxic and nonconventional pollutant permit limits for Fiber line #1 using BAT and ultimate VATIP requirements for Tier I

Because the mill elected to receive Stage 2 requirements immediately, you must establish permit limits for Fiber Line #1 based on baseline BAT for TCDD, TCDF, chloroform, and the 12 chlorinated phenolic compounds and Tier I VATIP requirements for AOX and kappa number (AOX permit limits are discussed in Step #5). With the exception of AOX and chloroform, which have mass-based ELGs, you must simply denote the concentration-based limit specified as BAT for the chlorinated pollutants limited in Fiber line #1's bleach plant effluent.

For AOX and chloroform permit limits, you must first determine the production rate of unbleached pulp entering the bleach plant. Using the maximum production time period illustrated above, the following table explains how to calculate the production rate for these pollutants (also see Section 8 for a description of how to determine production rate).

Data from the permit application that yield the production rate for AOX and chloroform for Fiber line #1.

Date	Fiber line #1 Bleached Pulp Production Rate (OMMT)
12/97	18,200
1/98	17,900
2/98	18,200
3/98	17,600
4/98	18,400
5/98	18,600
6/98	18,500
7/98	18,200
8/98	18,200
9/98	18,000
10/98	18,100
11/98	18,500
Total Production (OMMT/yr)	**218,400**
Total Op. Days/Year	**350**
Total Production (OMMT/day)	**624**

Great American Paper provided an 8% shrinkage factor for the bleached papergrade kraft pulp production data submitted with their permit application. As a result, the production rate for calculating AOX and chloroform permit limits is as follows:

624/(1-0.08) = 687 OMMT of unbleached papergrade kraft pulp entering the bleach plant.

With the production rate, you may determine permit limits for AOX and chloroform by using the following equation:

$$\text{Bleach Plant or Final Effluent Limits} = \text{PROD} \times \text{LIMIT}$$

where:

PROD	=	Production rate for AOX and chloroform
LIMIT	=	Toxic and non-conventional pollutant ELG

Refer to Table 11-9 which presents the calculated Stage 1 permit limits.

Step #3 - Toxic and nonconventional pollutant permit limits for Fiber line #2 based on EEQ.

In their previous permit, Great American Paper was not subject to permit limits for any chlorinated pollutants. Since Great American Paper uses chlorine on Fiber Line #2, the fiber line has existing effluent quality (EEQ) that is of poorer quality than baseline BAT. As a result, you must establish permit limits for chlorinated pollutants based on EEQ (Note: EPA recommends you calculate EEQ permit limits expressed as mass/day rather than concentrations or mass per unit production). EEQ permit limits should be calculated by using mill sampling results, estimating a "long term average" (in mass/day) for each pollutant, and multiplying the long term average by a variability factor. Appendix E presents detailed calculation procedures for determining EEQ. The calculation of EEQ for AOX is shown below.

- **Step 1 - Collect Wastewater Samples**
  You receive the 30 days of data the mill has collected for AOX (with flow measurements for each sample collected).

- **Step 2 - Review Wastewater Sampling Data**
  In your review of the data, you make sure Great American did not submit multiple sampling measurements from the same day.

- **Step 3 - Calculate Mass/Day for Each Sampling Result**
  Using the data points, you calculate the mass per day of each sample collected.

AOX Data Point	Concentration	Final Effluent	Mass/Day
1	20.5 g/L	106,400,000 L/day	2,180 kg/day
2	30.1 g/L	100,000,000 L/day	3,010 kg/day
. . .	. . .	. . .	. . .
. . .	. . .	. . .	. . .
30	25.2 g/L	103,450,000 L/day	2,600 kg/day

- **Step 4 - Calculate Long-Term Averages (LTAs) for Each Pollutant**
  Using the calculated mass per day, you may determined the LTA.

AOX Data Point	Mass/Day
1	2,180 kg/day
2	3,010 kg/day
. . .	. . .
. . .	. . .
30	2,600 kg/day
LTA	2,800 kg/day

- **Step 5 - Calculate EEQ Permit Limits by Applying Variability Factors**
  Use the following variability factor suggested in Appendix E to develop the daily maximum and monthly average for AOX:

Limitation	Variability Factor (VF)	Mass/Day	VF × Mass/Day
Daily Maximum	1.86	2,800 kg/day	5,200 kg/day
Monthly Average	1.22	2,800 kg/day	3,420 kg/day

Also, you could do your own variability analysis of data if there is an adequate number of data points.

- **Step 6 - Determining AOX Load Attributable to Fiber Line #2**
  This may be determined by attributing the Fiber Line #1 fraction of total unbleached pulp production. The following table summarizes the AOX loads:

Type of Limitation	Limit	Attributable Load (a)	Limit × Attributable Load
Daily Maximum	5,200 kg/day	45%	2,340 kg/day
Monthly Average	3,480 kg/day	45%	1,530 kg/day

(a) This is calculate as Fiber Line #2 production ÷ (Fiber Line #1 + #2 production).

- **Step 7 - Compare Permit Limits Based on EEQ with Existing Permit Limits**
  Previously, Great American was not subject to AOX limits; therefore, the sum of EEQ had from Fiber Line #2 and the BAT allowable load from Fiber Line #1 serves as Stage 1 permit limit.

Step #4 - AOX permit limits based on the allowable load attributable to Fiber Line #1 using BAT and the load attributable to Fiber Line #2 using EEQ.

Because AOX is limited in final effluent, Stage 1 permit limits must equal the sum of AOX load from Fiber line #1, which is the product of the line's production rate and the baseline Tier I AOX ELG, and the AOX load from Fiber line #2, which is based on EEQ. Stage 1 permit limits are as follows:

AOX 1-Day Maximum Limit = (AOX load form Fiber Line #1 based on BAT) + (AOX load from Fiber Line #2 based on EEQ) = (687 kkg × 58 kg/kkg × 55% (production load for Line #1) + (2,340 kg from Step 3)

AOX 1-Day Maximum Limit = 2,560 kg/day

AOX Monthly Average Limit = (687 kkg × 0.58 kg/kkg ×) + (1,520 kg/day from Step 3) = 1,750 kg/day

Step #5 - Reopener clause.

Great American Paper's next permit should include a reopener clause. By including the reopener clause, you may modify permit limits at any time. This is especially important for interim milestones, which may need to be adjusted during the permit period. The interim milestones should be adjusted, if necessary, to reflect the results of research, process development, mill trials, and contingencies.

Great American Paper Stage 1 Permit. The table below presents Great American Paper's Stage 1 permit limits. Note that because Fiber Line #2 is subject to ultimate Stage 2 VATIP requirements for Tier I, the mills must perform monthly chloroform sampling on Fiber Line #1 is reduced from weekly to monthly (and then quarterly after the first year in the program).

Table 11-9: Stage 1 Permit Limits, Great American Paper

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
TCDD (a)	512 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
TCDF	31.9 pg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
TCDF (a)	620 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
Chloroform	4.7 kg/day	2.8 kg/day	BPE from Fiber line #1	Monthly (1 yr) (b)	6 grabs/24 hr
Chloroform (a)	11.7 kg/day	7.0 kg/day	BPE from Fiber line #2	Weekly	6 grabs/24 hr
Trichlorosyringol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
Trichlorosyringol (a)	31 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
3,4,5-Trichlorocatechol (a)	1,370 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
3,4,6-Trichlorocatechol (a)	375 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
3,4,5-Trichloroguaiacol (a)	1,100 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
3,4,6-Trichloroguaiacol (a)	353 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
4,5,6-Trichloroguaiacol (a)	195 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
2,4,5-Trichlorophenol (a)	235 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr)	24 hr composite
2,4,6-Trichlorophenol (a)	313 g/day	--	BPE from Fiber line #2	Monthly (b)	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
Tetrachlorocatechol (a)	391 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
Tetrachloroguaiacol (a)	509 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
2,3,4,6-Tetrachlorophenol (a)	548 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	BPE from Fiber line #1	Monthly (1 yr) (b)	24 hr composite
Pentachlorophenol (a)	275 g/day	--	BPE from Fiber line #2	Monthly	24 hr composite
AOX	2,560 kg/day	1,750 kg/day	Final Effluent	Daily	24 hr composite
COD	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	14,721 kg/day	7,655 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	28,819 kg/day	16,054 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow	Report	Report	BPE from Fiber line #1	Continuous	Recorder
Flow	Report	Report	BPE from Fiber line #2	Continuous	Recorder
Flow	Report	Report	Final Effluent	Continuous	Recorder
Kappa Number	18 kappa units	--	Fiber Line #1 - pulp exiting OD system prior to bleaching		

BPE = Bleach Plant Effluent

(a) Based on EEQ.

(b) Sampling frequency reduced to quarterly after the first year because Fiber Line #2 meets Tier I Stage 2.

Intermediate Milestones

To help you update permit limits based on the mill's progress in implementing technologies, you require the Great American Paper Company to submit a Milestones Plan.

Milestones Plan

EPA published new regulatory language on July 7, 1999 in the Federal Register (36580-36586) describing the Milestones Plan in §430.24(c). You must require the plan under your authority to use Best Professional Judgement to establish permit conditions. For example, Great American's Milestone Plan must lay out (in much more detail) the following schedule:

Technology	Begin Construction	Complete Construction	Process Fully Operational
install additional brown stock washing stage	March 1999	October 1999	January 2000
install two-stage oxygen delignification system, including post-oxygen washing and mixing and control systems	April 2001	April 2003	June 2003
upgrade white liquor oxidizing equipment to increase capacity	April 2002	April 2003	June 2003
upgrade existing chlorine dioxide generator to expand capacity	June 2002	September 2003	January 2004
add chlorine dioxide storage facilities	January 2003	September 2003	January 2004

In addition, the Milestone Plan must present the anticipated reductions in effluent quantity and improvements in effluent quality as measured at the bleach plant (for bleach plant, pulping area and evaporator condensates flow and BAT parameters other than Adsorbable Organic Halides (AOX)) and at the end of the pipe (for AOX).

Interim Milestones

You musts develop enforceable interim milestones to ensure that Great American Paper makes continuous progress on the improvements to Fiber Line #2. The milestones, based on your professional judgment and information provided in Great American's Milestone Plan, can be expressed as narrative or numeric conditions in the mill's permit.

Stage 2 Permit Limits

By April 15, 2004, you must establish Stage 2 permits limits based on the ultimate limitations for the selected tier for each fiber line. In this case, you must update permit limits for Fiber line #2 so that they include the baseline BAT and ultimate VATIP requirements for Tier I. You should revise the permit to include:

1. Updated conventional pollutant limits based on BPT for the fine paper segment and the paperboard, coarse paper, and tissue segment. Or, if the mill has modified paper manufacturing operations, you must account for new production (for the purpose of this

case study, we assume that Great American Paper continues to manufacture fine paper and paperboard at constant production rates. For an actual permit, you must review production data to make this determination.).

2. Updated mass-based toxic and nonconventional pollutant limits (i.e., AOX and chloroform) for Fiber line #1 based on baseline BAT and VATIP Tier I (for the purpose of this case study, we assume that unbleached kraft pulp production rate has remained constant).

3. Toxic and nonconventional pollutant limits for Fiber line #2 based on baseline BAT and VATIP Tier I.

4. AOX permit limits based on the allowable loads, as limited by Tier I, attributable to both fiber lines.

Step #3 - Toxic and nonconventional pollutant limits for Fiber line #2 based on BAT and ultimate VATIP requirements for Tier I.

For Stage 2 permit limits, you must establish updated permit limits for Fiber line #2 based on baseline BAT for TCDD, TCDF, chloroform, and the 12 chlorinated phenolic compounds and Tier I VATIP requirements for AOX and kappa number (AOX permit limits are discussed in Step #4).

Step #4 - AOX permit limits based on the allowable loads, as limited by Tier I, attributable to both fiber lines.

Since AOX is limited in final effluent, you must simply multiply the total unbleached pulp production rate by the AOX limit. See Table 11-10 below.

Stage 2 permit limits. The table below presents Great American Paper's Stage 2 permit limits. If Great American Paper consistently meets permit limits, you have included a provision that allows for reduced monitoring frequencies for chlorinated pollutants. The permit allows for reduced monitoring one year after consistently meeting baseline BAT and VATIP requirements. The table below presents the mill's Stage 2 permit limits.

Table 11-10: Stage 2 Permit Limits, Great American

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
TCDD	<10 pg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
TCDD	<10 pg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
TCDF	31.9 pg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
TCDF	31.9 pg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
Chloroform	4.7 kg/day	2.8 kg/day	BPE from Fiber line #1	Quarterly	6 grabs/24 hr
Chloroform	3.6 kg/day	2.1 kg/day	BPE from Fiber line #2	Monthly (1 yr) (a)	6 grabs/24 hr
Trichlorosyringol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
Trichlorosyringol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
3,4,5-Trichlorocatechol	<5.0 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
3,4,5-Trichlorocatechol	<5.0 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
3,4,6-Trichlorocatechol	<5.0 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
3,4,5-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
3,4,6-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
4,5,6-Trichloroguaiacol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
2,4,5-Trichlorophenol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
2,4,6-Trichlorophenol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
Tetrachlorocatechol	<5.0 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
Tetrachloroguaiacol	<5.0 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
2,3,4,6-Tetrachlorophenol	<2.5 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	BPE from Fiber line #1	Quarterly	24 hr composite
Pentachlorophenol	<5.0 µg/L	--	BPE from Fiber line #2	Monthly (1 yr) (a)	24 hr composite
AOX	712 kg/day	320 kg/day	Final Effluent	Daily (yr 1)	24 hr composite
				Monthly (after yr 1)	
COD	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	14,721 kg/day	7,655 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	28,819 kg/day	16,054 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow	Report	Report	BPE from Fiber line #1	Continuous	Recorder
Flow	Report	Report	BPE from Fiber line #2	Continuous	Recorder
Flow	Report	Report	Final Effluent	Continuous	Recorder
Kappa Number	18 kappa units	--	Fiber Line #1 - pulp exiting OD system prior to bleaching		
Kappa Number	13 kappa units	--	Fiber Line #2 - pulp exiting OD system prior to bleaching		

BPE = Bleach Plant Effluent

Case Study #9

Sunburst Paper is an integrated pulp and paper mill that manufactures fine paper. Sunburst Paper operates a TCF bleached papergrade kraft fiber line and also purchases market pulp for use in their fine paper production. All process wastewaters generated by Sunburst Paper are treated using primary and secondary treatment prior to discharge into the Eva River. The mill has submitted a permit application because their current NPDES permit expires December 2000.

Case Study #9 highlights:

1. Permit process for integrated mills with operations in Subpart B who also purchase pulp.
2. Production rate determination.
3. AOX contributions from purchased pulp where on-site pulp bleaching is TCF.

General Site Description

Sunburst Paper operates a TCF bleached kraft fiber line producing bleached pulp that is used along with purchased pulp to manufacture fine papers. The purchased pulp makes up 50% of the final fine paper product.

Relevant Information for Establishing Permit Limits

The table below summarizes the relevant information from the permit application you need to calculate discharge limits for the reissued NPDES permit.

Information Needed to Establish Permit Limits for Case Study #9	
What type of discharger is the mill?	Direct
Under which subpart(s) do the mill's operations fall?	Subparts B
The mill is subject to which ELG&S?	Subpart B BPT (40 CFR 430.22) Pulp and Fine Paper Segment BAT (40 CFR 430.24) [Note: The Subpart K ELG&S do not apply since this is an integrated mill.]
Is the mill planning on entering VATIP?	No
Does mill use wet barking; log washing or chip washing; or log flumes or log ponds?	No
Does the mill certify using TCF?	Yes (The mill also purchases pulp that is not TCF.)
Does the mill use chlorophenolic biocides?	No

Determining Permit Limits for Pollutants Regulated Under BPT

Sunburst Paper manufactures one product (fine paper) that falls under one subcategory of Subpart B. Because BPT ELGs are mass-based, you must review their permit application to determine production rates for each product to calculate their BPT limits. The table below explains how to calculate the production rate (also see Section 8 for a description of how to calculate production rates).

CASE STUDY # 9

In reviewing the monthly production data for Sunburst Paper from the last five years, you find that the maximum production occurred from November 1997 - October 1998. The monthly production data from this time period will determine the production rate that results in the maximum permit limits for conventional pollutants.

Date	Fine Paper Production (OMMT)
11/97	11,100
12/97	11,300
1/98	12,400
2/98	11,200
3/98	12,500
4/98	11,200
5/98	11,400
6/98	1,600
7/98	11,700
8/98	11,900
9/98	11,800
10/98	11,900
Production Total (OMMT/yr)	**140,000**
Total Op. Days/Year	**350**
Production Total (OMMT/day)	**400**

You may then calculate conventional pollutant permit limits using the following equation:

Final Effluent Limit = PROD × Limit

where:

PROD	=	Production rate (kkg/day)
LIMIT	=	ELG for conventional pollutant (kg/kkg)

The table below presents the calculation of conventional pollutant permit limits calculated for this mill.

			TSS				BOD			
			Daily Maximum		Monthly Average		Daily Maximum		Monthly Average	
Subcategory	Segment	Production	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal	ELG	Subtotal
Subpart B	Fine Paper	400 kkg/day	22.15 kg/kkg	8,860 kg/day	11.9 kg/kkg	4,760 kg/day	10.6 kg/kkg	4,240 kg/day	5.5 kg/kkg	2,200 kg/day

Determining Permit Limits for Pollutants Regulated Under BAT

The TCF bleaching operations at Sunburst Paper are covered under Subpart B. The BAT ELG&S include a maximum daily limitation for AOX at the mill final effluent of <ML and a reserved limitation for COD. Sunburst Paper has certified to TCF bleaching as required by 40 CFR 122.22. However, due to whitewater recycling in the process, the mill has a measurable effluent of AOX due to their use of non-TCF purchased pulp. Therefore, you should work with the facility to develop a no-net AOX mass-based limitation to use in their permit.

To do this, you need to require the facility to monitor the following:

- AOX in the pulp going into the bleach plant;
- AOX in recycled water used in the bleach plant; and
- AOX in the pulp and filtrates from the bleach plant.

The facility will need to monitor flows for these streams so that an AOX mass balance can be developed for the process. The results of the mass balance will determine what “no-net” AOX mass is coming from the purchased pulp (in kg/kkg) this mass should be adjusted with a variability factor and then multiplied by the mass/day use of purchased pulp. You may then calculate an AOX permit limit (which can be applied at the bleach plant or at the mill final effluent) using the following equation:

AOX Allowable Limit = No-Net AOX Limit (kg/kkg) × purchased pulp rate (kkg/day)

The mill purchases 200 ADMT/day of non-TCF pulp. The mill no-net AOX balance shows that 0.2 kg/kkg of AOX results from the use of the purchased pulp. The AOX allowable limit is therefore:

AOX Allowable Limit = 200 kkg/d × 0.2 kg/kkg = 40 kg/d

Final Permit Limits for Sunburst Paper

Table 11-11 presents the permit limits for Sunburst Paper. The table also shows that you exercised BPJ to include the following in the permit:

1. COD monitoring requirements;
2. Monitoring frequencies for conventional pollutants; and
3. Mandatory flow measurements of bleach plant and final effluent.

Make sure you also include the following in the permit:

- A reopener clause so that you may include COD permit limits when EPA promulgates ELGs for this pollutant (see Section 8);
- Dilution prohibition as a permit condition (see Section 8);
- Process upsets as a permit condition (see Section 8); and
- BMP requirements as permit conditions (see Section 9).

Table 11-11: Permit Limits for Sunburst Paper

Pollutant	Permit Limits		Effluent Sampling Location	Sample Frequency	Sample Collection Method
	1 Day Maximum	Monthly Average			
AOX	40 kg/day	--	Final Effluent	Daily**	24 hr composite
COD*	Report	--	Final Effluent	Weekly	24 hr composite
BOD_5	4,240 kg/day	2,200 kg/day	Final Effluent	3 Days/Week	24 hr composite
TSS	8,860 kg/day	4,760 kg/day	Final Effluent	3 Days/Week	24 hr composite
pH	5-9	--	Final Effluent	5 Days/Week	Grab
Flow*	Report	Report	Kraft Mill Fiber Line BPE	Continuous	Recorder
Flow*	Report	Report	Final Effluent	Continuous	Recorder

*Reporting for COD and flow based on BPJ.
**Using BPJ you may want to reduce the AOX sample frequency after sufficient data is provided that shows consistent compliance with the “no-net” AOX limits.

12 Where to Get Additional Help

This section presents additional sources of information, as well as EPA contacts, that may help you obtain additional information related to implementation of the final pulp and paper effluent limitations guidelines and standards for Subparts B and E. Specifically, the section presents a list of selected documents, databases, and websites either relating generally to the pulp and paper industry, or specifically to the pulp and paper Cluster Rules. These lists also include information on how to reach EPA program personnel and how to access these information sources.

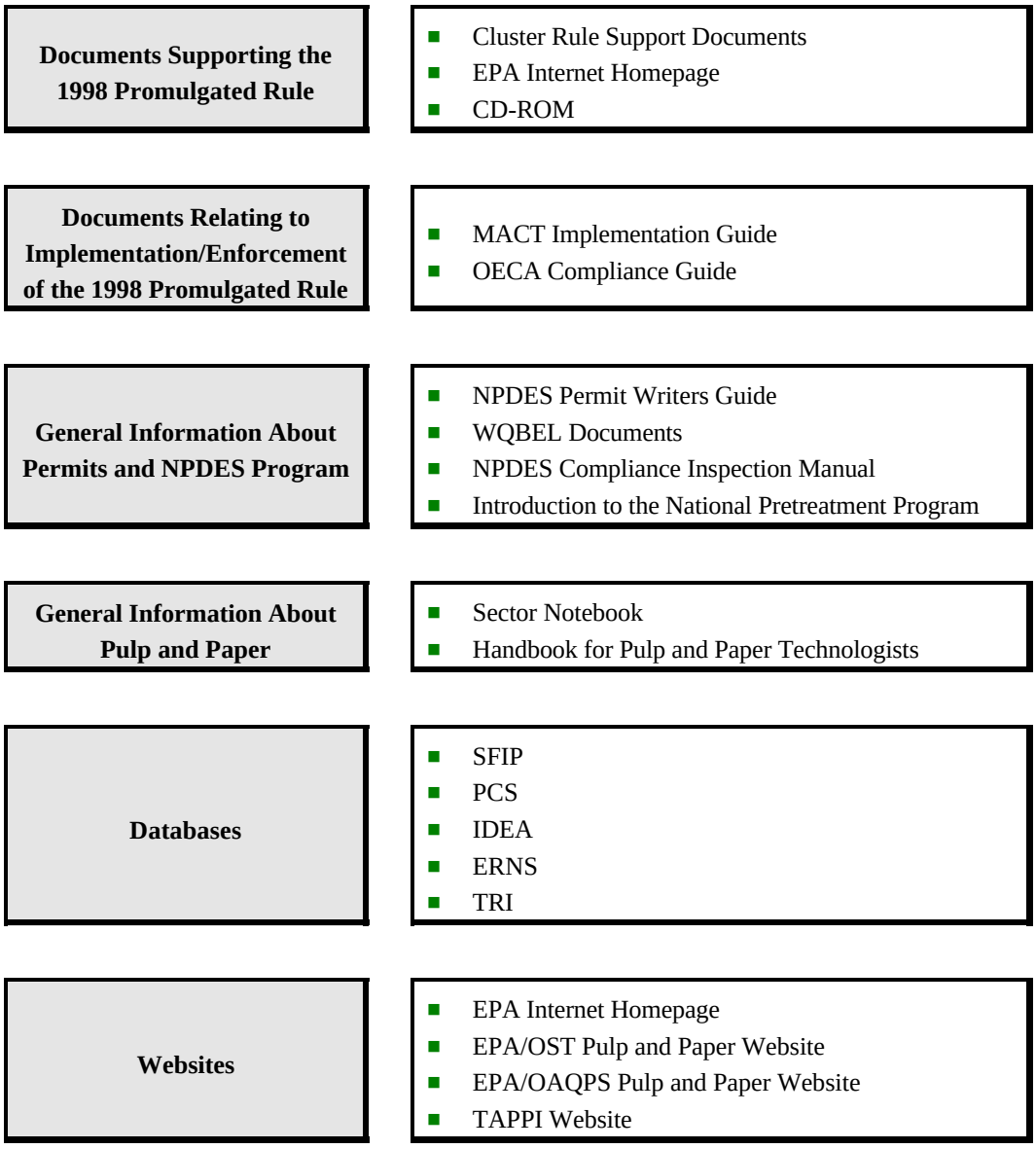
Questions specifically related to the effluent limitations guidelines and standards for the pulp and paper industry should be directed to:

Mr. Troy Swackhammer
Engineering and Analysis Division
Office of Water
U.S. EPA (4303)
401 M Street, SW
Washington, DC 20460
Tel: (202) 260-7128
Fax: (202) 260-7185
E-Mail: swackhammer.j-troy@epa.gov

Information Relating to the Pulp and Paper Rule

This manual is one element in a broad spectrum of materials that are available related to the regulations promulgated April 15, 1998 for mills with operations in Subparts B and E. The April 15, 1998 rule can be accessed at www.epa.gov/ost/pupppaper/jd/finwtr2.pdf. Figure 12-1 illustrates some of the information currently available, as well as some other information resources the Agency plans to develop in connection with the Cluster Rules. Following Figure 12-1 is a summary of each resource and how to obtain the resource or more information about it.

Figure 12-1: Information Resources Map



Documents Supporting the 1998 Promulgated Rule

- **Cluster Rule Support Documents.** In support of the proposed and final cluster rule, EPA developed technical support documents for both the water and air regulations. These documents present the information and rationale supporting the MACT-based NESHAPs and the effluent limitations guidelines and standards. They provide background information on industrial processes and regulatory requirements; summarize data collection methods; provide a detailed overview of air emission and wastewater characteristics, and the selection of pollutant parameters; and discuss pollution prevention and control standards and technologies, including cost estimates. Below is a list of these documents:

- Supplement Technical Development Document for the Pulp, Paper, and Paperboard Category Effluent Limitations Guidelines and Standards, and New Source Performance Standards (Subparts B and E), EPA-821-R-97-011, October 1997

- Technical Support Document for the Voluntary Advanced Technology Incentives Program

- Environmental Assessment

- Technical Support Document for Best Management Practices for Spent Pulping Liquor Management, Spill Prevention, and Control, EPA-821-R-97-011, October 1997

- Analysis of Impacts of BAT Options on the Kraft Recovery Cycle (abbreviated title: Recovery Impacts Document), August 12, 1997

- Preliminary Report on the Relationship Between Dioxin Emissions from Kraft Recovery Boilers and the Chloride Content of the Fuel, November 1997

- BAT Cost Model Support Document, June 14, 1996

- Memorandum: Costing Revisions Made Since Publication of July 15, 1996 Notice of Data Availability (61 FR 36837), September 10, 1997

- Data Available for Limitations Development for Toxic and Nonconventional Pollutants, November 12, 1997

- Final Analysis of Data Available for Development of COD Limitations, August 25, 1997

- Statistical Support Document for the Pulp and Paper Industry, Subpart B, November 1997

- Background Information Document for the Final Air Rules

- **Spent Pulping Liquor BMP Support Document.** This 1997 document **("Technical Support Document for Best Management Practices for Spent Pulping Liquor Management, Spill Prevention and Control, EPA-821-R-97-011, October 1997)** has been developed as part of developing the final cluster rule and provides the technical background for BMP programs applicable to spent pulping liquor management, spill prevention, and control at pulp and paper facilities. The document includes chapters discussing wood pulping processes and chemical recovery systems; the composition, toxicity, and source of spent pulping liquor; current industry pollution control practices; and BMP implementation, with estimated costs and effluent reduction benefits. See **http://www.epa.gov/ost/rules/#final**.

In addition, EPA plans to place a number of these documents on a CD-ROM to facilitate their availability to the public. To be completed.

Documents Relating to Implementation/Enforcement of the 1998 Promulgated Rule

- The Pulp and Paper NESHAP: A Plain English Guide
- OECA compliance guide
- Kraft Pulp Mill Compliance Assessment Guidance

General Information About Permits and NPDES Program

- **NPDES Permit Writer's Manual.** This 1996 EPA manual **(EPA-833-B-96-003)** was prepared to provide the basic regulatory framework and technical considerations that support the development of wastewater discharge permits as required under the National Pollutant Discharge Elimination System (NPDES) program.

- **NPDES Compliance Inspection Manual.** This 1994 EPA manual **(EPA-300-B-94- 014)** was developed to support wastewater inspection personnel in conducting NPDES field inspections, and to provide standardized inspection procedures. The manual encourages a consolidated inspection approach, and is organized in two parts. The first part addresses basic inspection components, including technical information on documentation, recordkeeping and reporting, sampling, and laboratory procedures. The second part provides information on specific types of inspections, concluding with a discussion of multi-media concerns. Contact **NTIS (1-703-487-4650)** to order a copy of this report.

- **Guidance for Water Quality-Based Decisions: The TMDL Process.** This document **(EPA-440-4-91-001)** is intended to define and clarify the requirements under Section 303(d) of the Clean Water Act. Its purpose is to aid state water-quality program managers in understanding the application of total maximum daily loads within the water quality-based approach to establish pollution control limits for waters not meeting water quality standards.

- **Technical Support Document for Water Quality-Based Toxics Control.** This document **(EPA/505/2-90-001)** was prepared as technical guidance for assessing and regulating the discharge of toxic substances to waters of the United States.

- **Industrial User Permitting Guidance Manual.** This document is intended to provide guidance to Publicly Owned Treatment Works (POTWs) on the development and issuance of industrial user (IU) permits.

General Information About Pulp and Paper

EPA Documents

- **Sector Notebook.** The EPA Office of Compliance in 1995 developed the **"Profile of the Pulp and Paper Industry" (EPA/310-R-95-015)** as part of EPA's sector notebook project. This notebook provides a sector-based profile of air, water, and land pollution regulations for the pulp and paper industry. The notebook reflects EPA's desire to move toward comprehensive sector-based compliance programs for all industrial sectors. The notebook includes a detailed discussion of paper and pulp industrial processes, chemical profiles, pollution prevention opportunities, a summary of applicable federal statutes and

regulations, compliance history and initiatives, and resource lists. See **http://es.epa.gov**.

- **Pollution Prevention Technologies for the Bleached Kraft Segment of the U.S. Pulp and Paper Industry (1993).** This report, published in 1993 by EPA's Office of Pollution Prevention and Toxics **(EPA/600/R-93/110)**, provides a detailed description of pollution prevention techniques for pulp and paper facilities, and includes a discussion of alternative pulping and bleaching processes. Contact **NTIS (1-703-487-4650)** to order a hardcopy version of this report.

- **Model Pollution Prevention Plan for the Kraft Segment of the Pulp and Paper Industry (1992).** This document, a product of EPA's Industrial Pollution Prevention Project **(EPA 910/9-92-030)**, provides a model pollution prevention plan for the kraft segment of the pulp and paper industry as a whole. This model plan includes both general background information, and numerous pollution prevention options applicable to kraft processes. The model plan was developed after implementation of a specific plan for the Simpson Tacoma Kraft Mill. Contact **NTIS (1-703-487-4650)** to order a hardcopy version of this report.

- **Simpson Tacoma Pollution Prevention Plan (1992).** This report **("Pollution Prevention Opportunity Assessment and Implementation Plan for Simpson Tacoma Kraft Company, Tacoma, Washington (EPA 910/9-92-027)** reflects a specific pollution prevention opportunity assessment and voluntary implementation plan for a single kraft pulp mill. The plan was developed by EPA Region 10 to serve as background for development of a model pollution prevention plan for the kraft segment of the pulp and paper industry as a whole. Contact **NTIS (1-703-487- 4650)** to order a hardcopy version of this report.

Other

- **Handbook for Pulp & Paper Technologists (2d ed. 1992).** This handbook, written by pulp and paper expert G.A. Smook, provides technical information relevant to pulp and paper processes, and includes information on the economic and environmental benefits of various pollution minimization efforts. See http://www.tappi.org for information on obtaining a copy of this handbook.

Databases

- **Sector Facility Indexing Project (SFIP).** The SFIP is a pilot data integration effort initiated by EPA's Office of Enforcement and Compliance Assurance that synthesizes environmental records from several compliance-related data sources into a system that allows facility-level and sector analysis. The SFIP is currently a pilot project covering five industry sectors, including the pulp mill sector. The SFIP provides the public with better access to compliance-related information and allows for sector-based analyses. See **http://es.epa.gov/oeca** for further details.

- **PCS.** The Permit Compliance System (PCS) is a national information system that automates entry, updating and retrieval of NPDES data and tracks permit issuance, permit limits, and monitoring data for NPDES facilities. Public access is available by obtaining a mainframe account on EPA's National Computer Center. See **http://es.epa.gov/oeca/datasys** for further details.

- **IDEA.** The Integrated Data for Enforcement Analysis System (IDEA) is an interactive data retrieval and integration system developed by EPA's Office of Enforcement and Compliance Assurance. Users can retrieve data for performing multimedia analyses of regulated facilities, produce compliance histories of individual facilities, identify a group of facilities that meet user-defined criteria, and produce aggregated data on selected industries. Public access is available by obtaining a mainframe account on EPA's National Computer Center. See **http://es.epa.gov/oeca/idea** for further details.

- **ERNS.** Through The Emergency Response Notification System, EPA maintains a database of reported spills of oil and other materials. See **http://www.epa.gov/docs/ernsacct** for further details.

- **TRI Data.** The Toxics Release Inventory (TRI) provides the public with information on toxic chemicals being used, manufactured, transported, or released into the environment. See **http://www.epa.gov/opptintr/tri** for access to numerous TRI topics, including; "What is TRI", "Accessing and Using TRI Data", "Tri Forms and Reporting Requirements", "TRI chemicals", "TRI Program Development", "TRI National and International Programs", "TRI Contacts", and "What's New with TRI". See **http://www.epa.gov/opptintr/tri/ttpubacc.htm** to learn more about TRI information found on CD-ROM, the Right-to-Know Network (RTK NET), Envirofacts, TOXNET (user fee), and TRI User Support (TRI-US).

Websites

- **EPA on the World Wide Web.** EPA's webserver is the primary public access mechanism on the Internet for EPA. The webserver provides a range of EPA-generated information in electronic format, and also offers access to OLS, the national online catalog of the EPA library network. It includes the catalogs of the Headquarters Information Resource Center and all the Regional libraries.

  Via Internet:

  EPA's homepage on the World Wide Web: **http://www.epa.gov**

  EPA's pulp and paper rulemaking actions homepage on the World Wide Web:

  http://www.epa.gov/ost/pulppaper (water documents)

  http://www.epa.gov/tth/oarpq (air documents)

- **TAPPI Internet Website.** The Technical Association of the Pulp and Paper Industry (TAPPI) maintains a website on the Internet **(http://www.tappi.org)** that provides references to available pollution prevention materials as well as links to other related websites, such as the sites maintained by the National Council of the Paper Industry for Air and Stream Improvement (NCASI) **(http://www.ncasi.org)** and the American Forest and Paper Association (AF&PA) **(http://www.afandpa.org)**.

Other Sources and Contacts

EPA Headquarters Information Resource Center

The EPA Headquarters Information Resource Center provides information support services to EPA staff and maintains a varied collection of environmental resources, including CD-ROMs, an online catalog, and other program-specific services. The library provides services to the general public and develops several publications, including newsletters and brochures. Library hours are 8:00 a.m. to 5:00 p.m. ET, Monday through Friday. EPA's Online Library Service (OLS) is available through Telnet: "epaibm.rtpnc.epa.gov."

National Technical Information Service (NTIS)

Located in the U.S. Department of Commerce, the National Technical Information Service (NTIS) is the central source for the public sale of U.S. Government-sponsored research, development, and engineering reports. It is also a central source of federally generated machine processible data files. It contains reports on air pollution, acid rain, water pollution, marine pollution, marine ecosystems, land use planning, fisheries management, solar energy, offshore oil drilling, solid wastes, traffic noise, and radiation monitoring.

For more information, contact:
Chief, Order Processing Branch
National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161
Tel: (703) 487-4650
Fax: (703) 321-8547

EPA Regional Contact

Contacts for permitting assistance for mills covered by the pulp and paper regulation at the regional level are:

Karrie-Jo Robinson-Shell
U.S. EPA Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, GA 30303
(404) 562-9308 (tel)
(404) 562-8692 (fax)
shell.karrie-jo@epa.gov

Danforth Bodien
U.S. EPA Region 10
1200 6th Avenue
Seattle, WA 98101
(206) 553-1491 (tel)
(206) 553-0119 (fax)
bodien.danforth@epa.gov

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.

Permit No.

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) <u>New Sources.</u> 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:

- Venturi meters,
- Pitot tubes,

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.

- 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.