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Part II

Environmental Protection Agency

40 CFR Parts 63, 261, and 430 National Emissions Standards for Hazardous Air Pollutants for Source Category: Pulp and Paper Production; Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards: Pulp, Paper, and Paperboard Category; Final Rule

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ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 63, 261, and 430

[FRL–5924–8]

RIN 2040–AB53

National Emission Standards for Hazardous Air Pollutants for Source Category: Pulp and Paper Production; Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards: Pulp, Paper, and Paperboard Category

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rules.

SUMMARY: This action promulgates effluent limitations guidelines and standards under the Clean Water Act (CWA) for a portion of the pulp, paper, and paperboard industry, and national emission standards for hazardous air pollutants (NESHAP) under the Clean Air Act (CAA) as amended in 1990 for the pulp and paper production source category.

EPA is also promulgating best management practices under the CWA for a portion of the pulp, paper, and paperboard industry, and new analytical methods for 12 chlorinated phenolic pollutants and for adsorbable organic halides (AOX). This action consolidates into 12 subcategories what had once been 26 subcategories of effluent limitations guidelines and standards for the pulp, paper, and paperboard industry, and revises the existing effluent limitations guidelines and standards for the Bleached Papergrade Kraft and Soda subcategory and the Papergrade Sulfite subcategory. The revised effluent limitations guidelines and standards require existing and new facilities within these two subcategories to limit the discharge of pollutants into navigable waters of the United States and to limit the introduction of pollutants into publicly owned treatment works. The NESHAP requires existing and new major sources within the pulp and paper production source category to control emissions using the maximum achievable control technology (MACT) to control hazardous air pollutants (HAP).

EPA is revising the effluent limitations guidelines and standards for the Bleached Papergrade Kraft and Soda subcategory and the Papergrade Sulfite subcategory primarily to reduce the discharge of toxic and nonconventional chemical compounds found in the effluents from these mills. Discharge of these pollutants into the freshwater, estuarine, and marine ecosystems may alter aquatic habitats, affect aquatic life, and adversely impact human health. Discharges of chlorinated organic compounds from chlorine bleaching, particularly dioxins and furans, are human carcinogens and human system toxicants and are extremely toxic to aquatic life. The final effluent limitations guidelines and standards for the Bleached Papergrade Kraft and Soda and Papergrade Sulfite subcategory are estimated to reduce the discharge of adsorbable organic halides (AOX) by 28,210 kkg/year; chloroform by 45 kkg/year; chlorinated phenolics by 47 kkg/year; and 2,3,7,8-TCDD (dioxin) and 2,3,7,8-TCDF (furan) by 125 gm/year. These reductions will permit all 19 dioxin/furan-related fish consumption advisories downstream of pulp and paper mills to be lifted.

EPA is revising the subcategorization scheme for the effluent limitations guidelines and standards because the new scheme better defines the processes typically found in U.S. mills and thus results in what ultimately will be a streamlined regulation that can be implemented more easily by the permit writer. With the exception of the new effluent limitations guidelines and standards for the Bleached Papergrade Kraft and Soda and Papergrade Sulfite subcategories, EPA is making no substantive changes to the limitations and standards applicable to the newly reorganized subcategories. Those portions of the existing pulp, paper, and paperboard effluent limitations guidelines and standards that are not substantively amended by this action are not subject to judicial review; nor is their effective date affected by this reorganization.

The HAPs emitted by facilities covered by the NESHAP include such compounds as methanol, chlorinated compounds, formaldehyde, benzene, and xylene. The health effects of exposure to these and other HAPs at pulp and paper mills can include cancer, respiratory irritation, and damage to the nervous system. The final NESHAP is expected to reduce baseline emissions of HAP by 65 percent or 139,000 Mg/yr.

The pollutant reductions resulting from these rules will achieve the primary goals of both the CAA and CWA, which are to ''enhance the quality of the Nation's air resources so as to promote the public health and welfare and productive capacity of its population'' and to ''restore and maintain the chemical, physical, and biological integrity of the Nation's waters,'' respectively. These rules will result in continued environmental improvement at reasonable cost by providing flexibility in when and how results are achieved and, for certain mills, by providing incentives to surpass baseline requirements.

Elsewhere in today's **Federal Register,** EPA is concurrently proposing NESHAP to control hazardous air pollutants from chemical recovery combustion sources at kraft, soda, sulfite, and stand-alone semi-chemical pulp mills.

In another proposed rule published in today's **Federal Register,** EPA is also proposing a regulation that would require mills enrolled in the Voluntary Advanced Technology Incentives Program being promulgated for the Bleached Papergrade Kraft and Soda subcategory to submit a plan specifying research, construction, and other activities leading to achievement of the Voluntary Advanced Technology effluent limitations, with accompanying dates for achieving these milestones. Second, EPA proposes to authorize Bleached Papergrade Kraft and Soda subcategory mills under certain circumstances to submit a certification based on process changes in lieu of monitoring for chloroform. Third, although not proposing totally chlorine-free (TCF) technologies for new source performance standards under the CWA for Bleached Papergrade Kraft and Soda subcategory at this time, EPA is requesting comments and data regarding the feasibility of TCF processes for this subcategory, especially the range of products made and their specifications. In that proposal EPA is also requesting comments and data regarding the effluent reduction performance of TCF processes for this subcategory.

DATES: In accordance with the Small Business Regulatory Enforcement Fairness Act of 1996, the regulations shall become effective June 15, 1998. For compliance dates, see the **SUPPLEMENTARY INFORMATION** section under the heading ''Compliance Dates.''

ADDRESSES: *Air Dockets.* The Air Dockets are available for public inspection between 8 a.m. and 4 p.m., Monday through Friday except for Federal holidays, at the following address: U.S. Environmental Protection Agency, Air and Radiation Docket and Information Center (MC–6102), 401 M Street SW, Washington, DC 20460, Room M–1500, Waterside Mall; telephone: (202) 260–7548.

Water Docket. The complete public record for the effluent limitations guidelines and standards rulemaking is available for review, Monday through Friday except for federal holidays, at EPA's Water Docket, Room M2616, 401

M Street SW, Washington, DC 20460. For access to Docket materials, call (202) 260–3027. The Docket staff requests that interested parties call between 9:00 am and 3:30 pm for an appointment before visiting the docket.

For additional information about the dockets, see section X.A below.

Background and support documents containing technical, cost, economic, and health information, as well as EPA's response to public comments, are available for public use. A listing and how to obtain these background documents is provided in section XI in this notice.

FOR FURTHER INFORMATION CONTACT: For questions regarding air emissions standards for chemical wood pulping mills, contact Ms. Penny Lassiter, Emissions Standards Division (MD–13), U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, telephone number (919) 541–5396; or Mr. Stephen Shedd, at the same address, telephone number (919) 541–5397. For information concerning the final air standards for mechanical pulping processes, secondary fiber pulping processes, and nonwood fiber pulping processes, contact Ms. Elaine Manning, at the same Research Triangle Park address, telephone number (919) 541–5499. For questions on compliance, enforcement and applicability determinations, contact Ms. Maria Eisemann, Office of Enforcement and Compliance Assurance (2223A), U.S. Environmental Protection Agency, 401 M St., S.W., Washington, D.C. 20460, telephone number (202) 564–7106.

For questions regarding wastewater standards, contact Mr. Donald Anderson at the following address: Engineering and Analysis Division (4303), EPA, 401 M Street, S.W., Washington, D.C. 20460, telephone number (202) 260–7189; or Ms. Wendy D. Smith at the same address, telephone number (202) 260–7184.

For additional information on the economic impact analyses, contact Dr. William Wheeler, Office of Water, Engineering and Analysis Division (4303), U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC, 20460, (202) 260–7905.

SUPPLEMENTARY INFORMATION:

Overview

The preamble summarizes the legal authority for these rules, background information, the technical and economic methodologies used by the Agency to develop these rules, the impacts of the rules, regulatory implementation, and the availability of supporting documents.

Regulated Entities

Entities regulated by today's action are those operations that chemically pulp and nonchemically pulp wood and nonwood fibers for pulp and paper production. EPA projects that approximately 490 mills are subject to the air regulations promulgated today. Of these mills, 155 will be affected by MACT standards for mills that chemically pulp wood. Within that group, 96 are subject to the effluent limitations guidelines and standards promulgated today. Regulated categories and entities include:

Category	Rule	Examples of regulated entities
Industry	NESHAP	Pulp mills and integrated mills (mills that manufacture pulp and paper/paperboard) that: chemically pulp wood fiber (using kraft, sulfite, soda, or semi-chemical methods); pulp secondary fiber; pulp nonwood fiber; and mechanically pulp wood fiber.
	Effluent Guidelines	Subset of mills subject to the NESHAP that chemically pulp wood fiber using kraft, sulfite, or soda methods to produce bleached papergrade pulp and/or bleached paper/paperboard.

The foregoing table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by the NESHAP and effluent limitations guidelines and standards promulgated today. This table lists the types of entities that EPA is now aware could potentially be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your facility or company is regulated by this NESHAP, you should carefully examine the applicability criteria in § 63.440 of the air rule and the applicability criteria in part 63, Subpart A of Title 40 of the Code of Federal Regulations. To determine whether your facility is regulated by the effluent limitations guidelines and standards, you should carefully examine the applicability criteria in § 430.20 and § 430.50 of Title 40 of the Code of Federal Regulations.

If you have questions regarding the applicability of the NESHAP or the effluent limitations guidelines and standards, see the section entitled **FOR FURTHER INFORMATION CONTACT.**

Judicial Review

In accordance with 40 CFR § 23.2, the water portion of today's rule shall be considered promulgated for the purposes of judicial review at 1 pm Eastern time on April 29, 1998. Under section 509(b)(1) of the Clean Water Act (CWA), judicial review of today's effluent limitations guidelines and standards is available in the United States Court of Appeals by filing a petition for review within 120 days from the date of promulgation of those guidelines and standards. Under section 307(b)(1) of the CAA, judicial review of the NESHAP is available only by petition for review in the U.S. Court of Appeals for the District of Columbia Circuit within 60 days of today's publication of this NESHAP. Under section 509(b)(2) of the CWA and section 307(b)(2) of the CAA, the requirements in this regulation may not be challenged later in civil or criminal proceedings brought by EPA to enforce these requirements.

Compliance Dates

Existing direct dischargers must comply with limitations based on the best available technology economically achievable (BAT) as soon as such requirements are imposed in their National Pollutant Discharge Elimination System (NPDES) permits. The water regulation also establishes specific deadlines for compliance with best management practices (BMPs), which apply to all sources. The new reporting and recordkeeping requirements promulgated today are not effective until the Office of Management and Budget approves Information Collection Requests for those requirements.

Except as provided in today's BMP regulation, existing indirect dischargers subject to today's water regulations must comply with the pretreatment standards for existing sources being promulgated today by April 16, 2001. In addition, these dischargers must continue to comply with the pretreatment standards for existing sources for pentachlorophenol and trichlorophenol.

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Except as provided in today's BMP regulation, new direct and indirect discharging sources must comply with applicable treatment standards on the date the new source begins operation. For purposes of new source performance standards (NSPS), a source is a new source if it meets the definition of ''new source'' in 40 CFR 430.01(j) and if it commences construction after June 15, 1998. For purposes of pretreatment standards for new sources (PSNS), a source is a new source if it meets the definition of ''new source'' in 40 CFR 430.01(j) and if it commenced construction after December 17, 1993.

The following compliance dates apply to the Voluntary Advanced Technology Incentives Program being codified today as part of the water regulations for Subpart B. Each existing direct discharging mill that enrolls in the Voluntary Advanced Technology Incentives Program must comply immediately with limitations based on the mill's existing effluent quality or its current technology-based permit limits for the baseline BAT parameters, whichever are more stringent. Participating mills must also comply with mill-specific interim milestones by the dates specified in their NPDES permits. They must also achieve the baseline BAT effluent limitations for dioxin, furan, chloroform, 12 specified chlorinated organic pollutants and, for mills enrolled at the Tier II or Tier III level, AOX no later than April 15, 2004. Finally, participating mills must achieve BAT limitations corresponding to the most stringent phase of the Voluntary Advanced Technology Incentives Program by the dates specified below:

Voluntary BAT limitations for Tier I must be achieved by April 15, 2004.

Voluntary BAT limitations for Tier II must be achieved by April 15, 2009.

Voluntary BAT limitations for Tier III must be achieved by April 15, 2014.

For new direct discharging mills in Subpart B, EPA is promulgating Voluntary NSPS at the Tier II and Tier III levels. Participating new sources must achieve NSPS at the selected level upon commencing operation.

Compliance dates for the NESHAP are as follows: Existing sources must comply with the NESHAP no later than April 16, 2001 except for the following cases. Equipment in the high volume low concentration (HVLC) system at existing sources at kraft mills (e.g., pulp washer systems, oxygen delignification systems) must comply no later than April 17, 2006. Bleach plants at existing source kraft and soda mills participating in the effluent limitations guidelines Voluntary Advanced Technology Incentives Program must comply with the first stage of the NESHAP no later June 15, 1998 and with the second stage no later than April 15, 2004.

Once today's rules take effect on June 15, 1998, new sources must comply with applicable MACT requirements upon start-up. For a discussion of the circumstances under which a source becomes a new source for compliance with new source air emissions standards, see Sections II.B.2.b. and VI.A.1.

Technology Transfer Network

The Technology Transfer Network (TTN) is one of EPA's electronic bulletin boards. The TTN provides information and technology exchange in various areas of air pollution control. New air regulations are now being posted on the TTN through the world wide web at ''http://www.epa.gov/ttn.'' For more information on the TTN, call the HELP line at (919) 591–5384.

Information on the water regulations may be accessed through the world wide web at http://www.epa.gov/OST/Rules/#final.

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I. Legal Authority

These regulations are being promulgated under the authority of sections 301, 304, 306, 307, 308, 402, and 501 of the Clean Water Act, 33 U.S.C. sections 1311, 1314, 1316, 1317, 1318, 1342, and 1361, and sections 112, 114, and 301 of the Clean Air Act, 42 U.S.C. sections 7412, 7414, and 7601.

II. Scope of This Rulemaking

Today's Cluster Rules consist of effluent limitations guidelines and standards for the control of wastewater pollutants and national emission standards for hazardous air pollutants. The final rules issued today are based on extensive information gathered by the Agency and on comments received from interested parties during the development of these regulations.

Section VI of this notice discusses the major changes since proposal and the rationale for the regulatory decisions

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underlying the rules promulgated today. This summary section highlights the technology bases and other key aspects of the final rules. More detailed descriptions are included in the supporting documents listed in section XI.

In addition, the Agency is today codifying the subcategorization scheme that was proposed for 40 CFR parts 430 and 431, see 58 FR 66078, 66098–100 (Dec. 17, 1993) and is redesignating the section and subpart numbers in 40 CFR part 430 accordingly.

A. EPA's Long-Term Environmental Goals

EPA has integrated the development of the regulations discussed today to provide greater protection of human health and the environment, reduce the cost of complying with the wastewater regulations and air emissions controls, promote and facilitate coordinated compliance planning by industry, promote and facilitate pollution prevention, and emphasize the multimedia nature of pollution control.

The Agency envisions a long-term approach to environmental improvement that is consistent with sound capital expenditures. This approach, which is presented in today's notice, stems from extensive discussions with a range of stakeholders. The effluent limitations guidelines and standards and air emissions standards are only one component of the framework to achieve long-term environmental goals. The overall regulatory framework also includes incentives to reward and encourage mills that implement pollution prevention beyond regulatory requirements. The Agency will continue to encourage mill-specific solutions to remaining environmental problems through water quality-based requirements in permits and enforcement of those requirements. In addition, continuing research on minimum impact technologies, such as closed-loop and totally chlorine-free bleaching processes, will help to identify economical ways of furthering environmental improvement in this industry.

EPA's long-term goals include improved air quality, improved water quality, the elimination of fish consumption advisories downstream of mills, and the elimination of ecologically significant bioaccumulation. An integral part of these goals is an industry committed to continuous environmental improvement—an industry that aggressively pursues research and pilot projects to identify technologies that will reduce, and ultimately eliminate, pollutant discharges from existing and new sources. A holistic approach to implementing these pollution prevention technologies would contribute to the long-term goal of minimizing impacts of mills in all environmental media by moving mills toward closed-loop process operations. Effective implementation of these technologies is capable of increasing reuse of recoverable materials and energy while concurrently reducing consumption of raw materials (e.g., process water, unrecoverable chemicals, etc.), and reducing air emissions and generation of hazardous and non-hazardous wastes. EPA expects that this combination of regulation, research, pilot projects, and incentives will foster continuous environmental improvement with each mill investment cycle. For this reason, EPA is including an incentives program as part of the effluent limitations guidelines and standards being promulgated today for bleached papergrade kraft and soda mills that accept enforceable permit limits requiring effluent reductions well beyond the rule's regulatory baseline (see Section IX). To ensure that today's air emission standards do not present barriers or disincentives to mills in choosing technologies beyond baseline BAT, EPA is providing additional time to comply with MACT beyond the three-year compliance time for certain process units. See Sections VI.A.3.b and VI.A.7 for details on MACT compliance times.

B. National Emission Standards for Hazardous Air Pollutants (NESHAP)

1. Purpose of the NESHAP

The main purposes of the Clean Air Act (CAA) are to protect and enhance the quality of our Nation's air resources, and to promote the public health and welfare and the productive capacity of the population. See CAA, section 101(b)(1). To this end, section 112(d) of the CAA directs EPA to set standards for stationary sources emitting greater than ten tons of any one HAP or 25 tons of total HAPs annually (one ton is equal to 0.908 megagrams). EPA is promulgating this NESHAP because pulp and paper mills are major sources of HAP emissions. Individual mills are capable of emitting as much as several hundred tons per year (tpy) of HAPs. The HAPs emitted may adversely affect air quality and public health. The HAPs controlled by this rule are associated with a variety of adverse health effects including cancer; a number of other toxic health effects such as headaches, nausea, and respiratory distress; and possible reproductive effects.

a. Hazardous Air Pollutants. Table II–1 lists the 14 HAPs emitted in the largest quantities from pulp and paper mills. A few HAPs emitted from pulp and paper mills have been classified as possible, probable, or known human carcinogens. These include acetaldehyde, benzene, carbon tetrachloride, chloroform, formaldehyde, and methylene chloride. The total reduction in national HAP emissions by compliance with the NESHAP is estimated to be 139,000 megagrams per year (Mg/yr).

TABLE II–1.—HIGHEST EMITTED HAZARDOUS AIR POLLUTANTS FROM PULP AND PAPER MILLS

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

b. Volatile Organic Compounds. Emissions of volatile organic compounds (VOC) have been associated with a variety of health and welfare impacts. Volatile organic compound emissions, together with nitrogen oxides (NO_X), are precursors to the formation of tropospheric ozone. Exposure to ozone is responsible for a series of health impacts, such as alterations in lung capacity; eye, nose, and throat irritation; malaise and nausea; and aggravation of existing respiratory disease. Among the welfare impacts from exposure to ozone include damage to selected commercial timber species and economic losses for commercially valuable crops, such as soybeans and cotton. The total reduction in national VOC emissions by compliance with the NESHAP is estimated to be 409,000 Mg/yr.

c. Total Reduced Sulfur Compounds. Total reduced sulfur (TRS) compound emissions are responsible for the malodors often associated with pulp and paper production. The total reduction in TRS compound emissions estimated as a result of compliance with this NESHAP is 79,000 Mg/yr. Surveys of odor pollution caused by pulp mills have supported a link between odor and health symptoms such as headaches, watery eyes, nasal problems, and breathing difficulties.

2. Summary of the NESHAP

The MACT standards apply to pulp and paper mills that have the potential to emit ten tons per year of any one HAP

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or 25 tons per year of all HAPs (one ton is equal to 0.908 megagrams). Potential to emit is based on the total of all HAP emissions from all activities at the mill.

The NESHAP specifies emission standards for pulping processes and bleaching processes. The emission standards for pulping and bleaching processes provide several options for compliance, including an alternative pollution prevention option (the ''clean condensate alternative'') for the kraft pulping process. The standards specify compliance dates for new and existing sources, require control devices to be properly operated and maintained at all times, and clarify the applicability of the NESHAP General Provisions (40 CFR part 63, subpart A) to sources subject to this rule.

The rule subcategorizes the industry to specify different emission standards based on the type of pulping process (kraft, sulfite, semi-chemical, soda, mechanical wood pulping, secondary fiber pulping, or non-wood pulping) and bleaching process (papergrade or dissolving grade). Mills that chemically pulp wood using kraft, semi-chemical, sulfite, or soda processes are referred to in later sections as MACT I mills. Mills that mechanically pulp wood, or that pulp secondary fiber or non-wood fibers, or that produce paper or paperboard from purchased pulp are referred to in later sections as MACT III mills.

The emission control requirements for new and existing sources within each subcategory are the same, except that more emission points are covered for sources subject to the new source provisions. Where two or more subcategories are located at the same mill site and share a piece of equipment, that piece of equipment would be considered a part of the subcategory with the more stringent MACT requirements for that piece of equipment. For example, the foul condensates from an evaporation set processing both kraft weak black liquor and spent liquor from a semi-chemical process would have to comply with the kraft subcategory requirements for foul condensate. This more stringent requirement is appropriate because there is no way to isolate the emissions for each pulping source to determine compliance separately.

These standards do not address emissions from recovery area combustion sources (referred to in later sections as MACT II). These sources are being regulated under a separate NESHAP, which is proposed elsewhere in today's **Federal Register**. A summary of the specific provisions that apply to each of the subcategories is given in the later parts of this section.

a. Definition of Affected Source. At chemical wood pulping mills, the affected source is all emission points in the pulping and bleaching systems. At mills that mechanically pulp wood, secondary fibers, or non-wood materials, the affected source is all emission points in the bleaching system. For kraft mills complying with the clean condensate alternative, the affected source is the pulping system, bleaching system, causticizing system, and papermaking system.

b. New Source MACT. New source MACT applies to: (1) An affected source that commenced construction or reconstruction after initial proposal; (2) pulping or bleaching systems that are reconstructed after initial proposal; and (3) new pulping systems, pulping lines, bleaching systems, and bleaching lines that are added to existing sources after initial proposal. The initial proposal date for mills that chemically pulp wood is December 17, 1993. The initial proposal date for mills that mechanically pulp wood, pulp secondary fibers, or pulp non-wood materials is March 8, 1996.

Descriptions of equipment in each subcategory subject to new source MACT requirements are presented in later sections of this preamble.

c. Compliance Times. The rule requires existing sources to comply with the NESHAP no later than April 16, 2001, except for the following cases. Existing kraft sources are required to control all the equipment in the HVLC collection system no later than April 17, 2006. Dissolving-grade mills are required to comply with bleaching system standards no later than three years after publication of the wastewater effluent limitations guidelines and standards under 40 CFR part 430, subparts A and D.

In addition, the NESHAP sets out a two-phased standard for existing source papergrade kraft and soda bleach mills that elect, under the Voluntary Advanced Technology Incentives Program, to control wastewater discharges to levels surpassing today's BAT baseline. The first phase for existing source MACT requires 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 Voluntary Advanced Technology BAT requirements. EPA has determined that immediate compliance with this requirement is practicable because the requirement reflects, for each mill, the performance level it is presently achieving. Therefore, the effective date of the first phase requirements is June 15, 1998. The second phase of existing source MACT requires the mill either to comply with BAT for all pollutant parameters at the baseline level for the Bleached Papergrade Kraft and Soda subcategory, or to certify that chlorine and hypochlorite are not used in the bleach plant, in order to achieve the MACT standard for chloroform emission reduction; it also requires the mill to apply controls for other chlorinated HAPs. All such mills that enroll in the Voluntary Advanced Technology Incentives Program must comply with the second phase of existing source MACT no later than April 15, 2004.

Once today's rules take effect on June 15, 1998, new sources must comply with applicable MACT requirements upon start-up.

d. Kraft Pulping Standards. For existing sources, the kraft pulping standards promulgated today apply to the following equipment systems: The low volume high concentration (LVHC) system, the pulp washing system, the oxygen delignification system, decker systems that do not use fresh water or whitewater from papermaking systems or that use process water with HAP concentrations greater than or equal to 400 parts per million by weight (ppmw), and knotter systems and screening systems that have total system emissions greater than or equal to 0.05 and 0.10 kilograms of HAP per megagram of oven-dried pulp (ODP) produced, respectively (or have total [i.e., knotter and screening] system emissions greater than or equal to 0.15 kilograms of HAP per megagram of ODP produced combined). For new sources, the kraft pulping standards apply to the equipment systems listed above for existing sources, plus weak liquor storage tanks, all knotter systems, all screening systems, and all decker systems.

Sources subject to the kraft pulping standards must enclose open process equipment and route all emissions through a closed-vent system to a control device. The closed-vent system must be designed and operated with no detectable leaks. The rule provides three control device options, as follows: (1) Reduce the HAP content by 98 percent by weight (or, for thermal oxidizers, to a level of 20 parts per million volume [ppmv] of total HAP, corrected to 10 percent oxygen on a dry basis); (2) reduce HAPs by using a properly operated design thermal oxidizer (operated at a minimum temperature of 1,600 °F and a minimum residence time of 0.75 seconds); or (3) reduce HAPs by using a boiler, lime kiln, or recovery

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furnace that introduces all emission streams to be controlled with the primary fuel or into the flame zone.

The kraft condensate standards apply to condensate streams generated in the following kraft pulping processes: Digester system, evaporator system, turpentine recovery system, LVHC collection system, and the high volume-low concentration (HVLC) collection system. The HAP mass loading in the condensates from these systems must be reduced by 92 percent, based upon performance of steam stripping. The NESHAP also includes the following four alternative ways to meet the kraft condensate standard: (1) Recycle applicable condensate streams to process equipment that is controlled in accordance with the kraft pulping standards; (2) reduce the concentration of HAP (measured as methanol) in the condensate to 330 ppmw for kraft mills with bleaching systems, or 210 ppmw for kraft mills without bleaching systems; (3) remove at least 5.1 kilograms of HAP (measured as methanol) per megagram of ODP produced for kraft mills with bleaching systems, or remove at least 3.3 kilogram of HAP per megagram of ODP produced for kraft mills without bleaching systems; or (4) discharge pulping process condensates to a biological treatment system achieving at least 92 percent destruction of total HAP.

The pulping process condensates must be conveyed to the treatment system in a closed collection system that is designed and operated to meet the individual drain system requirements specified in §§ 63.960, 63.961, 63.962, and 63.964 of subpart RR. These essentially require that the means of conveyance be leak-free. Air emissions of HAP from vents on any condensate treatment systems (except biological treatment systems) that are used to comply with the standards must be routed to a control device meeting the kraft pulping standards.

All the pulping process condensates from the LVHC and HVLC collection systems must be treated. However, the facility has the option of minimizing the condensate volume sent to treatment from the digester system, turpentine recovery system, and weak liquor feed stages in the evaporator system (i.e., condensate segregation). If sufficient segregation is not achieved, then the entire volume of condensate from the digester system, turpentine recovery system, and weak liquor feed stages in the evaporator system and the LVHC and HVLC collection systems must be treated.

Two options are provided in the rule for determining if sufficient segregation has been achieved. The first option is to isolate at least 65 percent of the total HAP mass in the total of all condensates from the digester system, turpentine recovery system, and weak liquor feed stages in the evaporator system.

The second option requires that a minimum total HAP mass from the high HAP-concentrated condensates from the digester system, turpentine recovery system, and weak liquor feed stages in the evaporator system and the LVHC and HVLC collection system condensates be sent to treatment.

e. Clean Condensate Alternative Standards for Kraft Pulping. The final rule provides an alternative compliance option to the kraft pulping standards for subject equipment in the HVLC systems. This alternative compliance option is referred to as the clean condensate alternative (CCA). The CCA focuses on reducing the HAP concentration in process water (such as from the digestion and liquor evaporation areas) that is introduced into process equipment throughout the mill. By reducing the amount of HAP in the process water, reductions in HAP emissions will also be achieved since less HAP will be available to volatilize off the process to the atmosphere. To demonstrate compliance, the mass emission reduction of HAPs achieved by the alternative technology must equal or exceed that which would have been achieved by implementing the kraft pulping vent controls.

Eligibility for this compliance alternative is determined on a case-by-case basis during the permitting process.

For purposes of developing a compliance strategy, sources may use either emission test data or engineering assessment to determine the baseline HAP emission reductions that would be achieved by complying with the kraft pulping vent standard. To demonstrate that the alternative technology complies with the emission reduction requirements of the standards, emission test data must be used. Two conditions must be met for a CCA compliance demonstration: (1) Owners and operators that choose this alternative must first comply with pulping process condensate standards before implementing the alternative technology; and (2) the HAP emission reductions cannot include reductions associated with any control equipment required by local, state, or Federal agencies' regulations or statutes or with emission reductions attributed to equipment installed prior to December 17, 1993 (i.e., the date of publication of the proposed rule).

For purposes of the CCA, the rule provides an alternative definition of the affected source. The alternative definition allows for the CCA to apply to process systems outside of the kraft pulping system. The expanded source includes the causticizing system and the papermaking system. The mill must specify the process equipment within the expanded source with which to generate the required HAP emissions reductions using the CCA. The mass emission reduction of HAPs must equal or exceed the reduction that would have been achieved through application of the kraft pulping vent standards. The final determination of equivalency shall be made by the permitting authority based on an evaluation of the HAP emission reductions.

f. Sulfite Pulping Standards. For existing sources, the sulfite pulping standards apply to the digester system vents, evaporator system vents, and the pulp washing system. The sulfite pulping standards also apply to air emissions from the effluent from any equipment used to reduce HAP emissions to comply with the standards (e.g., acid plant scrubber and nuisance scrubber). For new sources, the sulfite pulping standards apply to the equipment systems listed for existing sources, plus weak liquor tanks, strong liquor storage tanks, and acid condensate storage tanks.

Sources subject to the sulfite pulping standards for equipment systems must enclose open process equipment and route all HAP emissions through a closed-vent system to a control device. The closed-vent system must be designed and operated with no detectable leaks. The total HAP emissions from the equipment systems and from the effluent from any control device used to reduce HAP emissions must meet a mass emission limit or a percent reduction requirement. Calcium- and sodium-based sulfite pulping mills must meet an emission limit of 0.44 kilograms of methanol per megagram of ODP or achieve a 92 percent methanol reduction. Ammonium- and magnesium-based sulfite pulping mills must meet an emission limit of 1.1 kilograms of methanol per megagram of ODP limit or achieve an 87 percent methanol removal.

g. Semi-Chemical Pulping Standards. For existing sources, the semi-chemical pulping standards apply to the LVHC vent system. For new sources, semi-chemical pulping standards apply to the LVHC system and the pulp washing system.

Sources subject to the semi-chemical pulping standards must enclose open process equipment and route all emissions through a closed-vent system

to a control device. Positive-pressure portions of the closed-vent system must be designed and operated with no detectable leaks. The rule provides three control device options, as follows: (1) Reduce the HAP content by 98 percent by weight (or, for thermal oxidizers, to a level of 20 ppmv of total HAP, corrected to 10 percent oxygen on a dry basis); (2) reduce HAPs by using a properly operated thermal oxidizer (operated at a minimum temperature of 1,600 °F and a minimum residence time of 0.75 seconds); or (3) reduce HAPs by using a boiler, lime kiln, or recovery furnace that introduces all emission streams to be controlled with the primary fuel or into the flame zone.

h. Soda Pulping Standards. For existing sources, the soda pulping standards apply to the LVHC vent system. For new sources, the soda pulping standards apply to the LVHC system and the pulp washing system.

Sources subject to the soda pulping standards must enclose open process equipment and route all emissions through a closed-vent system to a control device. Positive pressure portions of the closed-vent system must be designed and operated with no detectable leaks. The rule provides three control device options, as follows: (1) Reduce the HAP content by 98 percent by weight (or, for thermal oxidizers, to a level of 20 ppmv of total HAP, corrected to 10 percent oxygen on a dry basis); (2) reduce HAPs by using a properly operated thermal oxidizer (operated at a minimum temperature of 1,600 °F and a minimum residence time of 0.75 seconds); or (3) reduce HAPs by using a boiler, lime kiln, or recovery furnace that introduces all emission streams to be controlled with the primary fuel or into the flame zone.

i. Bleaching System Standards. The bleaching provisions apply to bleaching systems that use elemental chlorine to bleach pulp. At kraft, sulfite, and soda pulping processes, the bleaching system provisions also apply to bleaching systems that use chlorinated compounds to bleach pulp. At mechanical pulping, non-wood fiber pulping, and secondary fiber pulping mills, only bleaching systems that use elemental chlorine or chlorine dioxide to bleach pulp are subject to the NESHAP. Bleaching systems that do not use chlorine or chlorinated compounds are considered to be in compliance with the bleaching system requirements. For the applicable systems (i.e., bleaching or brightening in the different subcategories), the chlorinated HAP emissions from bleaching systems that use elemental chlorine or chlorinated compounds must be controlled. Existing source and new source requirements are the same.

Sources subject to the bleaching system standards must enclose process equipment in the bleaching stages and route all emissions through a closed-vent system to a control device that achieves either a 99 percent reduction of chlorinated HAP's (other than chloroform), an outlet concentration at or below 10 ppmv total chlorinated HAP (other than chloroform), or a mass emission limit at or below 0.001 kg of total chlorinated HAP (other than chloroform) per Mg ODP produced. Chlorine may be used as a surrogate for measuring total chlorinated HAP. The closed-vent system must be designed and operated with no detectable leaks.

With respect to chloroform emissions from bleaching systems, EPA is closely correlating the air and water standards. This is because EPA is relying on the same process change technology basis to control both chloroform emissions to air and pollutant discharges to water. Thus, MACT to control chloroform for bleaching systems requires a mill either to meet the applicable baseline effluent limitations guidelines and standards for all pollutants being promulgated today under the Clean Water Act or to certify that chlorine and hypochlorite are not used in the bleaching system.

However, EPA at present lacks sufficient information to establish new effluent limitations guidelines and standards for dissolving grade mills, and also lacks information to reliably ascertain what a MACT standard for chloroform air emissions would be for this unit operation. (It is not appropriate to set MACT standards for chloroform based on the control technology in use today to comply with current effluent limitations guidelines and standards for dissolving grade mills because these technologies are at the wastewater treatment system, rather than in the bleaching process where the chloroform-emitting vents are located.) EPA intends to set new effluent limitations guidelines and standards for dissolving grade mills after analyses currently underway by EPA are complete, and is deferring establishing MACT standards for chloroform until these effluent limitations guidelines and standards are established. Therefore, dissolving grade mills will be required to control chloroform air emissions three years after the new effluent limitations guidelines and standards are promulgated.

In a related action, EPA is also deferring establishing MACT for chlorinated HAPs other than chloroform from dissolving grade bleaching operations until three years after promulgation of new effluent limitations guidelines and standards for mills performing those operations. The Agency is doing so in order to avoid imposition of CAA requirements which would be inconsistent with, or superseded by, forthcoming CWA regulations.

EPA is not aware of any control presently in place or any available control technology for reducing chloroform air emissions at mechanical, secondary fiber, and non-wood pulping mills. Therefore, MACT for chloroform at these mills is no control. Today's water rule does not set new effluent limitations guidelines and standards for control of chloroform at mechanical, secondary fiber, and non-wood pulping mills, but EPA will evaluate whether it is appropriate to do so at a later time. At that time, EPA will also determine whether it is appropriate to revise MACT (pursuant to CAA section 112(d)(6)) in order to control chloroform emissions at those mills.

In addition, EPA is establishing MACT in two phases for bleach plant emissions from existing source papergrade kraft and soda bleaching plants which elect, under the Voluntary Advanced Technology Incentives Program, to control wastewater discharges to levels surpassing the baseline BAT limitations being promulgated today under the CWA. Phase one represents the present MACT floor for existing sources, i.e., no backsliding from existing controls during the initial period when a mill is working toward meeting its Voluntary Advanced Technology BAT requirements; phase two requires the mill either to meet baseline BAT requirements for all pollutants for bleached papergrade kraft and soda mills or to certify that chlorine and hypochlorite are not used in the bleaching system. EPA is establishing MACT in two phases in order to avoid discouraging plants from electing environmentally superior levels of wastewater treatment represented by the Voluntary Advanced Technology Incentives Program. These points are discussed in detail in section VI.A.7.

j. Mechanical Pulping Mill, Secondary Fiber Pulping Mill, Non-wood Pulping Mill, and Papermaking System Standards. Mechanical pulping (groundwood, thermomechanical, pressurized) mills, secondary fiber pulping mills, and non-wood pulping mills must comply with the bleaching system standards described in section II.B.2.i. There are no control requirements for pulping systems or process condensates at these mills. For

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papermaking systems, there are no control requirements.

k. Test Methods. The standards specify test methods and procedures for demonstrating that process equipment and condensate streams are in compliance with the MACT standards or are exempt from the rule. The rule also includes provisions to test for no detectable leaks from closed-vent systems. Because the majority of all non-chlorinated HAP emissions from process equipment and in pulping process condensates is methanol, in most cases the owner or operator has the option of measuring methanol as a surrogate for total HAP. For demonstrating compliance using biological treatment or the CCA, the owner or operator must measure total HAP. To demonstrate compliance with the concentration limit requirements, mass emission limit requirements, and percent reduction requirements for bleaching systems, chlorine may be measured as a surrogate for total chlorinated HAP emissions (other than chloroform).

l. Monitoring Provisions. Sources subject to the NESHAP are required to continuously monitor specific process or operating parameters for control devices and collection systems. Continuous emissions monitoring is not required, except as an alternative to certain control requirements. Parameter values are to be established during an initial performance test. Alternative monitoring parameters must be demonstrated to the Administrator's satisfaction to comply with the standards. As at proposal, excursions outside the selected parameter values are violations except for biological treatment systems. If a biological treatment system monitoring parameter is outside the established range, a performance test must be performed. The parameters that must be monitored for vent and condensate compliance are explained below.

Mills using a thermal oxidizer must install, calibrate, maintain, and operate a temperature monitoring device and continuous recorder to measure the temperature in the firebox or in the ductwork immediately downstream of the firebox before any substantial heat exchange occurs. Mills using gas scrubbers at bleaching systems or sulfite processes must install, calibrate, maintain, and operate a device to monitor and continuously record (1) pH or the oxidation/reduction potential of scrubber effluent, (2) vent gas inlet flow rate, and (3) scrubber liquid influent flow rate. As an alternative to monitoring these parameters, mills complying with the bleaching system outlet concentration option must install, calibrate, maintain, and operate a device to monitor and continuously record the chlorine outlet concentration. Mills complying with the bleaching system outlet mass emission limit option must install, calibrate, maintain, and operate a device to monitor and continuously record the chlorine outlet concentration and the scrubber outlet vent gas flow. Bleached papergrade kraft and soda mills enrolling in the Voluntary Advanced Technology Incentives Program in the effluent limitations guidelines and standards portion of today's rule must monitor the application rates of chlorine and hypochlorite to demonstrate that no increase in chlorine or hypochlorite use occurs between June 15, 1998 and April 15, 2004.

Mills using steam strippers must install, calibrate, maintain, and operate a device to monitor and continuously record process water feed rate, steam feed rate, and process water feed temperature. As an alternative to monitoring those parameters, mills complying with the steam stripper outlet concentration option may install, calibrate, maintain, and operate a device to monitor the methanol outlet concentration. In addition to monitoring around the stream stripper, mills that choose to treat a smaller, more concentrated volume of condensate rather than the whole volume of subject condensates must also continuously monitor the condensates to demonstrate that the minimum mass or percent of total mass is being treated. This practice is often referred to as condensate segregation. Mills complying with the condensate segregation requirements shall install, calibrate, maintain, and operate monitors for appropriate parameters as determined during the initial performance test.

Mills using a biological treatment system to treat pulping process condensates must monitor on a daily basis samples of outlet soluble BOD_5 concentration (maximum daily and monthly averages), inlet liquid flow, mixed liquor volatile suspended solids (MLVSS), liquid temperature, and the horsepower of aerator units. Additionally, inlet and outlet grab samples from each biological treatment system unit must be collected and stored for 5 days. These samples must be collected and stored since some of the monitoring parameters (e.g., soluble BOD_5) cannot be determined within a short period of time. These samples are to be used in conjunction with the WATER8 emissions model to demonstrate compliance if the soluble BOD_5, MLVSS, or the aerator horsepower monitoring parameters fall outside the range established during the initial performance test.

Monitoring requirements for the pulping process condensate collection systems include initial and monthly visual inspections of individual drain system components and vent control devices (if used), and repair of defects. Additionally, inspection and monitoring requirements from § 63.964 of subpart RR (National Emission Standards for Individual Drain Systems) are incorporated in the final rule. Monitoring requirements for vent collection systems are (1) a visual inspection of the closed-vent system and enclosure opening seals initially and every 30 days, (2) demonstration of no detectable leaks initially and annually for positive pressure systems or portions of systems, and (3) repair of defects and leaks as soon as practical.

For the CCA, EPA is not specifying the parameters to be monitored in the final rule since the types of equipment that would be used in the CCA are not known at this time. Consequently, the final rule specifies that owners or operators choosing to use the CCA must conduct an initial performance test to determine the appropriate parameters and corresponding parameter values to be monitored continuously. Rationale for the parameter selection must also be provided for the Administrator's approval.

m. Reporting and Recordkeeping Provisions. Sources subject to the NESHAP are required to comply with recordkeeping and reporting provisions in the part 63 General Provisions, and other specified requirements in the NESHAP.

Sources subject to the rule are required to keep readily accessible records of monitored parameters. The monitoring records must be maintained for five years (two years on-site, three years off-site). For each enclosure opening, closed-vent system, and pulping process condensate storage tank, the owner or operator must record the equipment type and identification; results of negative pressure tests and leak detection tests; and specific information on the nature of the defect and repairs. The position of bypass line valves, the condition of valve seals, and the duration of the use of bypass valves on computer controlled valves must also be recorded.

Sources subject to the NESHAP are required to submit the following types of reports: (1) Initial Notification, (2) Notification of Performance Tests, (3) Exceedance Reports, and (4) Semi-annual Summary Reports. Exceedance and summary reports are not required

for emission points that are exempt from the rule. Kraft mills must also submit, initially and bi-annually, a non-binding compliance strategy report for pulping sources electing to comply with the eight-year compliance extension (including the CCA) and for bleaching sources at bleached papergrade kraft and soda mills electing to comply with the Voluntary Advanced Technology BAT requirements. The compliance strategy report must contain, among other information, a description of the emission controls or process modifications selected for compliance and a compliance schedule indicating when each step toward compliance will be reached. For mills complying with the CCA, the report must contain a description of alternative control technology used, identify each piece of equipment affected by the alternative technology, and estimate total HAP emissions and emission reductions.

C. Effluent Limitations Guidelines and Standards

1. Subcategorization and Schedule

EPA is replacing the subcategorization scheme under the former effluent limitations guidelines for this industry (in 40 CFR parts 430 and 431) with a revised subcategorization scheme. EPA is redesignating the Builders' Paper and Roofing Felt category, formerly regulated in 40 CFR part 431, to a subcategory in part 430. This eliminates CFR part 431. The Agency is also redesignating the previous subpart numbers and section numbers, which are shown in Table II–2.

EPA is making no substantive changes to the limitations and standards for any newly redesignated subcategory except for the Bleached Papergrade Kraft and Soda subcategory (new subpart B) and the Papergrade Sulfite subcategory (new subpart E). The rationale for changing the existing subcategorization scheme is discussed in the proposal (58 FR at 66098–66100), the Development Document for Proposed Effluent Limitations Guidelines and Standards for the Pulp, Paper and Paperboard Point Source Category, also referred to as the proposal Technical Development Document (EPA 821–R93–019), and EPA's response to comments on this issue (DCN 14497, Vol. 1).

Although the Agency is codifying the revised subcategorization scheme for the whole industry today, EPA will promulgate revised effluent limitations guidelines and standards, as appropriate, for this industrial category in stages consisting of several subcategories at a time. The Agency has labeled these groupings of subcategories as ''Phase I,'' ''Phase II,'' and ''Phase III.'' The schedule for these phases is explained below and in the following table.

TABLE II–2.—FINAL CODIFIED SUBCATEGORIZATION SCHEME (WITH PREVIOUS SUBPARTS NOTED) AND SCHEDULE FOR PROMULGATING EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS (BY PHASE)

Final codified subpart	Final subcategorization scheme	Types of facilities covered including previous subcategories (with previous 40 CFR part 430 subparts noted)	Promulgation schedule (phase)*
A	Dissolving Kraft	Dissolving Kraft (F)	III
B	Bleached Papergrade Kraft and Soda.	Market Bleached Kraft (G), BCT Bleached Kraft (H), Fine Bleached Kraft (I), Soda (P).	I**
C	Unbleached Kraft	Unbleached Kraft (A) Linerboard Bag and Other Products Unbleached Kraft and Semi-Chemical (D, V)	II
D	Dissolving Sulfite	Dissolving Sulfite (K) Nitration Viscose Cellophane Acetate	III
E	Papergrade Sulfite Calcium-, Magnesium-, and Sodium-based pulps. Ammonium-based pulps. Specialty grade pulps.	Papergrade Sulfite (J, U) Blow Pit Wash Drum Wash	I**
F	Semi-Chemical	Semi-Chemical (B) Ammonia Sodium	II
G	Mechanical Pulp	Groundwood-Thermo-Mechanical (M), Groundwood-Coarse, Molded, News (N), Groundwood-Fine Papers (O), Groundwood-Chemi-Mechanical (L).	II
H	Non-Wood Chemical Pulp	Miscellaneous mills not covered by a specific subpart	II
I	Secondary Fiber Deink	Deink Secondary Fiber (Q) Fine Papers Tissue Papers Newsprint	II
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)	II
K	Fine and Lightweight Papers from Purchased Pulp.	Non integrated Fine Papers (R) Wood Fiber Furnish Cotton Fiber Furnish Nonintegrated Lightweight Papers (X) Lightweight Papers Lightweight Electrical Papers	II

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TABLE II–2.—FINAL CODIFIED SUBCATEGORIZATION SCHEME (WITH PREVIOUS SUBPARTS NOTED) AND SCHEDULE FOR PROMULGATING EFFLUENT LIMITATIONS GUIDELINES AND STANDARDS (BY PHASE)—Continued

Final codified subpart	Final subcategorization scheme	Types of facilities covered including previous subcategories (with previous 40 CFR part 430 subparts noted)	Promulgation schedule (phase)*
L	Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp.	Non integrated Tissue Papers (S) Filter and Non-Woven (Y) Paperboard (Z)	II

*Phase I: Promulgation today; Phases II and III: Promulgation dates to be determined.
**Certain parameter limits to be promulgated as part of Phase II.

a. Bleached Papergrade Kraft and Soda Subcategory and Papergrade Sulfite Subcategory (subparts B and E). Under the consent decree entered in the case *Environmental Defense Fund and National Wildlife Federation* v. *Thomas,* Civ. No. 85–0973 (D.D.C.), and subsequently amended, EPA was required to use its best efforts to promulgate regulations addressing discharges of dioxins and furans from 104 bleaching pulp mills by June 17, 1995. Despite making its best efforts, EPA was not able to promulgate final effluent limitations guidelines and standards applicable to those mills by that date. However, in today's rule, EPA is promulgating effluent limitations guidelines and standards for mills in the Bleached Papergrade Kraft and Soda subcategory (subpart B) and the Papergrade Sulfite subcategory (subpart E), thereby addressing discharges from 96 of the mills covered by the consent decree. Regulating the discharge of dioxins and furans from the mills in the dissolving kraft and dissolving sulfite subcategories remains a very high priority; as discussed in more detail below, EPA will promulgate effluent limitations guidelines and standards for discharges of dioxins and furans from those mills as soon as possible.

b. Dissolving Kraft Subcategory and Dissolving Sulfite Subcategory (subparts A and D). EPA is evaluating comments and preliminary new data received since proposal affecting the Dissolving Kraft and Dissolving Sulfite subcategories. The Agency anticipates that the final effluent limitations guidelines and standards for these subcategories will be based on different technologies than those that served as the basis for the proposed limitations and standards. For example, EPA has received data suggesting that oxygen delignification is not a feasible process for making some dissolving pulp products, particularly high grade products. In addition, some use of hypochlorite appears to be necessary to maintain product quality for some products. Affected companies have undertaken laboratory studies and mill trials to develop alternative bleaching processes and to document the effects on wastewater and air emissions. The Agency expects to receive data on these studies and trials as the companies' efforts progress.

Because EPA's record presently is incomplete, EPA is not promulgating final effluent limitations guidelines and standards for these subcategories now. Even in the absence of these limitations and standards, however, EPA anticipates that alternative bleaching processes developed as a result of these studies and trials should contribute to substantial reductions in the generation and release of pollutants, when compared to current operating practices. Among the pollutants EPA expects to be reduced are dioxin, furan, and chlorinated phenolic pollutants at levels comparable to those achieved by subpart B mills. The Agency also expects to see significant reductions in AOX and chloroform. EPA encourages mills in these subcategories to expeditiously complete developmental work that will facilitate installation of alternative process technologies that achieve these pollution prevention goals.

As defined today, the Dissolving Sulfite subcategory (subpart D) applies to discharges from dissolving sulfite mills, including mills that manufacture dissolving grade sulfite pulps and papergrade sulfite pulps at the same site. See 40 CFR 430.40. This definition is based on EPA's analysis of data collected in the ''1990 National Census of Pulp, Paper, and Paperboard Manufacturing Facilities.'' Data from the survey indicate that most sulfite mills that produce dissolving grade pulp do so at a very high percentage (typically greater than 85 percent) of their total pulp output. It has come to EPA's attention, however, that some specialty grade papergrade sulfite mills now have the capability to produce low percentages of dissolving grade pulp. EPA does not intend for these mills to be regulated under subpart D; rather, they are specialty grade sulfite mills within the Papergrade Sulfite subcategory (subpart E).

c. Schedule for the Remaining Subcategories. EPA is assessing comments and data received since proposal for the remaining eight subcategories. These eight subcategories are: (1) Unbleached Kraft; (2) Semi-Chemical; (3) Mechanical Pulp; (4) Non-Wood Chemical Pulp; (5) Secondary Fiber Deink; (6) Secondary Fiber Non-Deink; (7) Fine and Lightweight Papers from Purchased Pulp; and (8) Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp. For example, EPA has received additional information from an industry-sponsored survey of secondary fiber non-deink mills. The Agency also has received additional data from mills in other subcategories, including semi-chemical, unbleached kraft, and secondary fiber deink. EPA plans to promulgate effluent limitations guidelines and standards for these subcategories in the near future. It should be noted that air emission standards are being promulgated today for these subcategories.

2. Best Practicable Control Technology Currently Available (BPT) and Best Conventional Pollutant Control Technology (BCT) for the Bleached Papergrade Kraft and Soda Subcategory and the Papergrade Sulfite Subcategory

Although the Agency has the statutory authority to revise BPT effluent limitations guidelines, the Agency is exercising its discretion not to revise BPT for Subparts B and E at this time. In addition, none of the technologies that EPA evaluated for the purpose of setting more stringent effluent limitations for the conventional pollutants biochemical oxygen demand (BOD_5) and total suspended solids (TSS) passed the BCT cost test for either subcategory. Therefore, EPA is not revising BCT effluent limitations guidelines for Subparts B and E in this rulemaking.

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3. Final Regulations for the Bleached Papergrade Kraft and Soda Subcategory (Subpart B)

a. Pollutants Regulated. In this rule, EPA is promulgating effluent limitations guidelines and standards for 2,3,7,8–TCDD (''dioxin''), 2,3,7,8–TCDF (''furan''), 12 specific chlorinated phenolic pollutants, the volatile organic pollutant, chloroform, and adsorbable organic halides (AOX). EPA is also promulgating new source performance standards for BOD_5 and TSS. As explained in section VI.B.3 below, the Agency is not promulgating effluent limitations guidelines and standards for chemical oxygen demand (COD) at this time. EPA is also not promulgating effluent limitations guidelines and standards for methylene chloride, methyl ethyl ketone (MEK), acetone, or color. See Section VI.B.3.

b. Best Available Technology Economically Achievable (BAT). After re-evaluating technologies for mills in the Bleached Papergrade Kraft and Soda subcategory, EPA has determined that the model technology for effluent limitations based on best available technology economically achievable (BAT) should be complete (100 percent) substitution of chlorine dioxide for chlorine as the key process technology, along with other in-process technologies and existing end-of-pipe biological treatment technologies. See Section VI.B.5.a.

c. New Source Performance Standards. The Agency has determined that the technology basis defining new source performance standards (NSPS) for toxics and non-conventional pollutants is the BAT model technology with the addition of oxygen delignification and/or extended cooking. See Section VI.B.5.b. EPA is also promulgating NSPS for the conventional pollutants BOD_5 and TSS.

As discussed elsewhere in today's **Federal Register**, EPA also is soliciting comment and intends to gather additional data with respect to totally chlorine-free processes that may be available for the full range of market products. EPA will determine whether to propose revisions to NSPS based upon TCF and, if appropriate, flow reduction technologies.

In this rule, NSPS are effective June 15, 1998. A source is a new source if it meets the definition of new source in 40 CFR 430.01(j) and if it commences construction after that date.

d. Pretreatment Standards. The Agency is promulgating pretreatment standards for existing sources (PSES) based on the BAT model technology, excluding biological treatment. EPA is promulgating pretreatment standards for new sources (PSNS) based on the model technology for NSPS, excluding secondary biological treatment. A source is a new source for purposes of PSNS if it meets the definition of new source in 40 CFR 430.01(j) and if it commences construction after the date of proposal, i.e., December 17, 1993. However, a new indirect discharger is not required to meet PSNS for subpart B until those standards become effective, i.e., June 15, 1998.

e. Voluntary Incentives Program Based on Advanced Technology. As noted earlier in this notice, EPA's vision of long-term environmental goals for the pulp and paper industry includes continuing research and progress toward environmental improvement. EPA recognizes that technologies exist, or are currently under development at some mills, that have the ability to surpass the environmental protection that would be provided by compliance with the baseline BAT effluent limitations guidelines and NSPS promulgated today. The Agency believes that individual mills could be encouraged to explore and install these advanced technologies. Accordingly, EPA is establishing a Voluntary Advanced Technology Incentives Program for direct discharging mills in the Bleached Papergrade Kraft and Soda subcategory. This program is discussed in Section IX.

4. Final Regulations for the Papergrade Sulfite Subcategory (Subpart E)

a. Segmentation of Subpart E and Best Available Technology Economically Achievable (BAT). After assessing comments and data received after the proposal, EPA is segmenting the Papergrade Sulfite subcategory to account for production of specialty grade pulps and the applicability of technologies to ammonium-based pulping processes.

The Agency is segmenting this subcategory and establishing BAT technology bases set forth below. (EPA has established the same segments for new source performance standards and pretreatment standards for subpart E.)

(1) For production of pulp and paper at papergrade sulfite mills using an acidic cooking liquor of calcium, magnesium, or sodium sulfite (unless the mill is a specialty grade sulfite mill), the BAT technology basis is totally chlorine-free bleaching. EPA is promulgating limitations for AOX for this segment. See Section VI.B.6.b.

(2) For production of pulp and paper at papergrade sulfite mills using an acidic cooking liquor of ammonium sulfite (unless the mill is a specialty grade sulfite mill), the BAT technology bases for this segment are elemental chlorine-free (ECF) technologies (complete substitution of chlorine dioxide for elemental chlorine, peroxide enhanced extraction, and elimination of hypochlorite) and biological wastewater treatment. EPA is promulgating effluent limitations for dioxin, furan, and 12 chlorinated phenolic pollutants for this segment, but is reserving promulgation of chloroform, AOX, and COD limitations until sufficient performance data are available. See Section VI.B.6.b.

(3) For production of pulp and paper at specialty grade sulfite mills, the BAT technology bases for this segment are ECF technologies (complete substitution of chlorine dioxide for elemental chlorine, oxygen and peroxide enhanced extraction, and elimination of hypochlorite) and biological wastewater treatment. EPA is promulgating effluent limitations for dioxin, furan, and 12 chlorinated phenolic pollutants for this segment, but is reserving promulgation of chloroform, AOX, and COD limitations for this segment until sufficient performance data are available. See Section VI.B.6.b.

b. New Source Performance Standards. For each segment identified above, EPA is establishing NSPS based on the model BAT technologies selected for the particular segment. The pollutants are the same as those regulated by BAT for the applicable segment. EPA is also exercising its discretion not to revise NSPS for BOD_5, TSS, and pH. See Section VI.B.6.c.

c. Pretreatment Standards. The Agency is promulgating pretreatment standards for the segments identified above. The pretreatment standards for existing sources (PSES) control the same pollutants controlled by BAT for the particular segment. EPA is promulgating pretreatment standards for new sources (PSNS) for the same toxic and nonconventional pollutants controlled by NSPS for the particular segment. A source is a new source for purposes of PSNS if it meets the definition of new source in 40 CFR 430.01(j) and if it commences construction after the date of proposal, i.e., December 17, 1993. However, a new indirect discharger is not required to meet PSNS for subpart E until those standards become effective, i.e., June 15, 1998. The technology bases for PSES and PSNS for the Papergrade Sulfite subcategory are the same as those chosen for the particular segments at the BAT and NSPS levels, respectively, excluding secondary biological treatment. For the ammonium-based and specialty grade segments, EPA is deferring making a pass-through determination, and hence,

promulgating pretreatment standards, for chloroform and AOX until it has sufficient performance data to set limitations and standards for those parameters. EPA is promulgating pretreatment standards for AOX for the calcium-, magnesium-, and sodium-based sulfite segment. EPA has made no pass-through determination at this time for COD for any segment. More details are described below in section VI.B.6.d.

5. Best Management Practices for the Bleached Papergrade Kraft and Soda Subcategory and the Papergrade Sulfite Subcategory

EPA is codifying best management practices (BMPs) applicable to direct- and indirect-discharging mills in the Bleached Papergrade Kraft and Soda and Papergrade Sulfite subcategories. In response to comments, EPA changed the scope of the BMPs to focus on spent pulping liquor, turpentine, and soap control and to allow for more flexibility in implementation. See Section VI.B.7.

III. Background

A. Prior Regulations, Proposal, Notices of Data Availability, and Public Participation

The regulations that EPA developed for the pulp, paper, and paperboard industry prior to this date are discussed in the proposal. See 58 FR at 66089–92.

In a **Federal Register** notice published on December 17, 1993 (58 FR 66078), EPA proposed integrated air and water rules that included proposed limitations and standards to reduce the discharge of toxic, conventional, and nonconventional pollutants in wastewaters and to reduce emissions of hazardous air pollutants from the pulp, paper, and paperboard industry. These proposed integrated regulations subsequently became known as ''the Cluster Rules.'' EPA held a public hearing in Washington, D.C., on February 10, 1994, to provide interested persons the opportunity for oral presentation of data, views, or arguments concerning the proposed pretreatment standards. On March 17, 1994 (59 FR 12567), EPA published a correction notice to the proposed rules and extended the comment period to April 18, 1994.

In the preamble to the proposed rules, EPA solicited data on various issues and questions related to the proposed effluent limitations guidelines and standards and air emissions standards. The Agency received and added new material to the Air and Water Dockets. In a notice of data availability published on February 22, 1995 (60 FR 9813), EPA announced the availability of new data related to the proposed air emissions standards. Those new data are located in Air Docket A–92–40.

In a second notice of data availability published on July 5, 1995 (60 FR 34938), EPA announced the availability of new information and data related to the proposed effluent limitations guidelines and standards. Those new data are located starting at Section 18.0 of the Post-Proposal Rulemaking Record, which is a continuation of the proposal record. The Post-Proposal Rulemaking Record is located in the Water Docket. EPA did not solicit comment on the new air and water data in either notice.

On March 8, 1996, EPA published a **Federal Register** notice pertaining to the air portions of the proposed rules and announced the availability of supplemental information (61 FR 9383). The comment period for that notice closed on April 8, 1996. EPA also proposed MACT standards for mechanical pulping mills, secondary fiber pulping (deinked and non-deinked) mills, and non-wood mills, and asked for additional information on these mills. Furthermore, EPA announced that it was continuing to investigate paper machines and that no MACT standard for paper machines was being proposed at the time. EPA acknowledged an industry testing program was underway; EPA also acknowledged its request to States for data on non-wood pulping mills. EPA requested additional data on HAP emissions from, and control technologies for, paper machines to supplement information previously collected under the MACT process.

On July 15, 1996, the Agency published a **Federal Register** notice announcing the Agency's thinking, based on preliminary evaluation of the supplemented record and stakeholder discussions, regarding the technology options being considered as a basis for final effluent limitations guidelines and standards for the proposed Bleached Papergrade Kraft and Soda and Papergrade Sulfite subcategories (61 FR 36835). Data were added to the record and comments were solicited from interested parties. The comment period for that notice closed on August 14, 1996.

The Agency has held numerous meetings on these proposed integrated rules with many pulp and paper industry stakeholders, including a trade association (American Forest and Paper Association, or AF&PA), numerous individual companies, environmental groups, States, laboratories, consultants and vendors, labor unions, and other interested parties. EPA has added materials to the Air and Water Dockets to document these meetings.

B. Clean Air Act Statutory Authority

Section 112(b) of the CAA lists 189 HAPs and directs EPA to develop rules to control all major and some area sources emitting HAPs. Major sources are facilities that emit 10 tons of any single HAP or 25 tons of total HAPs annually. On July 16, 1992 (57 FR 31576), EPA published a list of major and area sources for which NESHAP are to be promulgated. The goal of NESHAP is to require the implementation of maximum achievable control technology (MACT) to reduce emissions and, therefore, reduce public health hazards from pollutants emitted from stationary sources. Pulp and paper production was listed as a category of major sources. On December 3, 1993 (58 FR 83941), EPA published a schedule for promulgating standards for the listed major and area sources. Standards for the pulp and paper source category were scheduled for promulgation by November 1997.

NESHAP established under section 112 of the Act reflect MACT or:

> * * * the maximum degree of reduction in emissions of the [HAP] * * * that the Administrator, taking into consideration the cost of achieving such emission reduction, and any nonair quality health and environmental impacts and energy requirements, determines is achievable for new or existing sources in the category or subcategory to which such emission standard applies * * * (See CAA section 112(d)(2)).

C. Clean Water Act Statutory Authority

The objective of the Clean Water Act (CWA) is to ''restore and maintain the chemical, physical, and biological integrity of the Nation's waters.'' CWA Section 101(a). To assist in achieving this objective, EPA issues effluent limitations guidelines, pretreatment standards, and new source performance standards for industrial dischargers. The statutory requirements of these guidelines and standards are summarized in the proposal. See 58 FR at 66088–89.

D. Other EPA Activities Concerning the Pulp and Paper Industry

1. Land Disposal Restrictions Activities

At the time of proposal, it appeared that many of the surface impoundments used for wastewater treatment in the pulp and paper industry might become subject to Resource Conservation and Recovery Act (RCRA) regulation under the Land Disposal Restriction (LDR) program. See 58 FR at 66091. This program establishes treatment standards that hazardous wastes must meet before

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they can be land disposed—placement in surface impoundments being a type of land disposal. This requirement extends not only to wastes that are identified or listed as hazardous under the RCRA rules when they are land disposed, but also to wastes that are hazardous when generated, cease to be hazardous as a result of dilution, and are then disposed. *Chemical Waste Management* v. *EPA,* 976 F.2d 2 (D.C. Cir. 1992), *cert. denied,* 507 U.S. 1057 (1993).

The pulp and paper industry has many mills that fit this pattern: Numerous wastewater streams are generated, some of them exhibit a characteristic of hazardous waste (corrosivity or toxicity in particular), the streams are commingled before centralized wastewater treatment occurs, and, in the course of commingling, the wastes no longer exhibit the characteristic, and the commingled wastewaters are then treated in a surface impoundment. EPA actually took action to temporarily defer applying LDR rules to this type of situation in the pulp and paper industry in order to allow unhindered promulgation of these Cluster Rules. See 61 FR at 15660, 15574 (April 8, 1996).

This issue, however, is now moot, at least for the time being. As discussed in the April 8, 1996, notice partially withdrawing the LDR Phase III final rule, 61 FR 15660, the Land Disposal Program Flexibility Act of 1996 provides, among other things, that RCRA characteristic wastewaters are no longer prohibited from land disposal once they are rendered nonhazardous, provided that they are managed in either a treatment system whose ultimate discharge is regulated under the CWA (including both direct and indirect dischargers), a CWA-equivalent treatment system, or a Class I nonhazardous injection well regulated under the Safe Drinking Water Act. Under the Land Disposal Program Flexibility Act of 1996, the LDR treatment standards for RCRA characteristic wastes in the pulp and paper industry (or any other industry) do not apply if the characteristic is removed and the wastes are subsequently treated in a surface impoundment that is part of a wastewater treatment system whose ultimate discharge is regulated by the CWA, or if a mill's treatment system provides wastewater treatment that is CWA-equivalent.

It should be noted that the Act requires EPA to undertake a five-year study to determine any potential risks posed by cross-media transfer of hazardous constituents from surface impoundments that accept these ''de-characterized'' wastes and warrant RCRA regulation. The findings of this study, begun by the Agency in April 1996, could eventually result in RCRA regulations for these units.

2. Land Application of Sludges

Under the Consent Decree entered in the case *Environmental Defense Fund and National Wildlife Federation* v. *Thomas,* Civ. No. 85–0973 (D.D.C.), EPA was required to propose rules under section 6 of the Toxic Substances Control Act (TSCA) to regulate the use of sludge produced from the treatment of wastewater effluent of pulp and paper mills using chlorine and chlorine-derivative bleaching processes (56 FR 21802; Docket OPTS–62100). EPA published the proposed rules on May 10, 1991. The proposed regulations sought to establish a final maximum dioxin and furan soil concentration of ten parts per trillion (ppt) toxic equivalents (TEQ) and site management practices for the land application of bleached kraft and sulfite mill sludge. EPA originally planned to promulgate the rule by November 1992.

On December 11, 1992, EPA informed the plaintiffs of the Consent Decree that the decision on the promulgation of the proposed sludge land application rule was deferred pending promulgation of the integrated rulemaking for effluent limitations guidelines and standards and national emission standards. EPA reasoned that the effluent limitations guidelines and standards and air emissions standards would have the potential to result in bleach plant process changes that EPA expected would result in reduced dioxin and furan contamination levels in sludge. In addition, EPA was awaiting the results of its dioxin reassessment activities.

In light of the anticipated impact of the effluent limitations guidelines and standards and air emissions standards on reducing dioxin in pulp and paper mill sludges, as well as reduction in sludge dioxin levels from industry-initiated improvements, EPA chose to defer the decision on promulgation of the final sludge land application rule. When EPA has determined the final impact of today's effluent limitations guidelines and standards on sludge dioxin concentration, EPA will re-evaluate the risk from sludge land application and will choose the appropriate regulatory or non-regulatory mechanism to address the situation.

Prior to that determination, however, EPA has taken action to achieve risk reduction for situations where sludge is being applied to land.

While awaiting completion of the effluent limitations guidelines and standards, air emission standards and the dioxin reassessment, EPA has promoted the establishment of an industry environmental stewardship program for the practice of sludge land application.

3. Hazardous Listing Determination

Under the consent decree entered in the case of *Environmental Defense Fund* v. *Browner,* Civ. No. 89–0598 (D.D.C.), ''EPA shall promulgate a listing determination for sludges from pulp and paper mill effluent on or before the date 24 months after promulgation of an effluent guideline regulation under the Clean Water Act for pulp and paper mills. This listing determination shall be proposed for public comment on or before the date 12 months after promulgation of such effluent guideline regulation. However, EPA shall not be required to propose or promulgate such a listing determination if the final rule for the pending effluent guideline rulemaking (amending 40 CFR part 430) under the Clean Water Act to regulate the discharge of dioxins from pulp and paper mills is based on the use of oxygen delignification, ozone bleaching, prenox bleaching, enzymatic bleaching, hydrogen peroxide bleaching, oxygen and peroxide enhanced extraction, or any other technology involving substantially similar reductions in uses of chlorine-containing compounds. If EPA concludes that the final effluent guideline regulation is based on use of such a process and that, as a result, no listing determination is required, EPA shall so inform plaintiff in writing within 30 days of the promulgation of the effluent guideline regulation.''

At this time, EPA is assessing whether the technology bases for the effluent limitations guidelines and standards promulgated today would fulfill the condition described in the Consent Decree. If so, the Agency would conclude that a listing determination is not warranted. If EPA concludes it does not fulfill the condition, a listing determination would be conducted.

4. Dioxin Reassessment

In the spring of 1991, EPA initiated an effort to reassess the scientific bases for estimating dioxin risk. The activities associated with the dioxin reassessment before proposal are described in the proposal. See 58 FR at 66092–93. After the proposal, in September 1994, EPA published a public review draft of this effort, which is commonly referred to as the EPA Dioxin Reassessment. The draft reassessment addressed not only the health effects of dioxin-like chemicals

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but also dioxin sources and pathways for human exposure. Since the draft documents were released, EPA received thousands of pages of public comments. EPA submitted the documents to formal peer review by the EPA Science Advisory Board (SAB). The SAB was supportive of the overall reassessment effort and endorsed the major conclusions of the exposure document and chapters one through seven of the health document. They did, however, believe that additional work was needed on the dose-response modeling chapter and the risk characterization chapter.

The reassessment is currently being revised and updated in response to public comments. The two chapters singled out by the SAB are being revised by specially established panels composed of scientists from both inside and outside the Agency. Once the work of the special panels is completed these two revised chapters will be examined by peer review panels, and then resubmitted to the SAB for final review. EPA currently anticipates completion and release of the dioxin reassessment in the spring of 1998.

5. Clean Water Act Section 307(a) Petition

On September 14, 1993, the Natural Resources Defense Council and the Natural Resources Council of Maine filed with EPA on behalf of 57 individuals and environmental groups a petition to prohibit the discharge of dioxin by pulp and paper mills. The petitioners ask EPA to accomplish this prohibition by prohibiting the use of chlorine and chlorine-containing compounds as inputs in the manufacturing process. The petitioners believe that the prohibition is warranted by the dangers to human health and the environment posed by dioxin. The petitioners invoke CWA section 307(a)(2) for authority for such a prohibition.

Authority for the petition and requested prohibition derives from a different section of the Clean Water Act than today's technology-based effluent limitations guidelines and standards. However, because the petition raised many issues related to the effluent guidelines rulemaking, EPA solicited comment on the issues raised in the petition at the time it proposed effluent limitations guidelines and standards for the pulp and paper industry. See 58 FR at 66174. EPA received thousands of pages of comments and expects to issue a decision granting or denying the petition after completion of the dioxin reassessment.

6. Cooling Tower Intake Assessment

EPA is developing regulations under section 316(b) of the Clean Water Act, which provides that any standard established pursuant to Section 301 or 306 and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. Section 316(b) applies only to the intake of water, not the discharge. A primary goal of the regulation that EPA is developing would be to minimize the destruction of fish and other aquatic organisms as they are drawn into an industrial facility's water intake. EPA plans to conduct screening level and detailed surveys to estimate the number and type of facilities that utilize cooling water intake structures and thus are within the scope of Section 316(b). The pulp and paper industry uses a significant amount of cooling water. EPA intends to gather data on pulp and paper facilities during the Section 316(b) rulemaking through questionnaires and site visits. The Section 316(b) regulation is scheduled for proposal in 1999 with the final rule due in 2001.

IV. Changes in the Industry Since Proposal

A description of the pulp and paper industry, including manufacturing processes, pulping processes, bleaching processes, and papermaking is included in the proposal. See 58 FR at 66095–96.

The proposed water regulation encompassed the entire pulp and paper industry of approximately 500 facilities. The proposed air regulations (MACT I and MACT III) covered approximately the same number. Under today's action, approximately 490 mills will be covered by the final MACT I and MACT III rules. Of these mills, 155 will be affected by MACT standards for mills that chemically pulp wood. A subset of these mills—96 mills—will be covered by the final effluent limitations guidelines and standards promulgated today.

Since the proposal, some facilities have modified their processes. There has been a substantial move toward elemental chlorine-free (ECF) bleaching, and mills are continuing to increase their substitution of chlorine dioxide for chlorine. Additionally, more mills are utilizing oxygen delignification and extended cooking than at proposal. All these developments result in decreased discharges of dioxins and furans to receiving waters.

The U.S. pulp and paper industry's involvement with totally chlorine-free (TCF) bleaching has not changed substantially since proposal. As was the case at the time of proposal, only one U.S. mill produces TCF kraft pulp; however, this mill is now able to attain higher brightness than was achieved at the time of the proposal.

The number of companies in the industry is constantly changing as new companies enter the market and other companies leave the industry or merge with other companies. In the subcategories now designated as Subparts B and E, only one mill has closed since proposal and one has changed subcategories. No new Subpart B or E mills have commenced construction since the time of proposal.

For more details on the technology status of mills covered by the final Cluster Rules, see the ''Supplemental Technical Development Document,'' DCN 14487.

V. Summary of Data Gathering Activities Since Proposal

A. Data Gathering for the Development of Air Emissions Standards

To develop today's standards, extensive data collection and technical analyses were conducted. Prior to proposal, EPA used information in a 1990 census of pulp and paper mills, a 1992 voluntary mill survey, an EPA sampling program, site visits at a number of mills, and a review of State and local regulations to obtain information on emissions, emission control technologies, and emission control costs for pulp and paper mill emission points. After proposal, EPA obtained additional information from the industry. This information included test reports from a variety of testing programs, as well as numerous reports, studies, and memoranda on other issues related to the development of emission control requirements. The information collected before and after proposal was used as the technical basis in determining the MACT level of control.

EPA also used information on pulp and paper mill production processes available in the general literature and information on control technology performance and cost information developed under other EPA standards to determine MACT.

Industry commenters indicated that they would be completing a comprehensive emission testing program after proposal, and EPA considered this information to be vital to the development of the final regulation. Therefore, EPA agreed to consider the new data and issued two notices of availability of supplemental information on February 22, 1995 (60 FR 9813) and March 8, 1996 (61 FR

9383) announcing the information and offering the likely implications to the final rule. The opportunity for a public hearing was offered on the March 8, 1996 action, but no request for a hearing was received. Public comments on the March 8, 1996 action were accepted from March 8, 1996 to April 8, 1996. Commenters included industry representatives, States, environmental organizations, and other members of the public.

In the March 8, 1996 supplemental notice, EPA solicited additional data and comments on proposed changes to the December 17, 1993 proposed rule.

Data added to Air Docket A–92–40 since the March 8, 1996 supplemental notice are located in section IV of this docket. These items include additional information on sulfite mills (IV–D1–98, IV–D1–100), comments on definitions (IV–D1–97, IV–D1–99, IV–D1–104), comments on the emission factor document (IV–D1–102), clarification of the 1992 MACT survey responses (IV–D1–101), and other information.

B. Data Gathering for the Development of Effluent Limitations Guidelines and Standards

EPA has gathered a substantial amount of new information and data since proposal in connection with today's water regulations. Much of this information was collected with the cooperation and support of the American Forest and Paper Association (AF&PA) and the National Council of the Paper Industry for Air and Stream Improvement (NCASI), and with the assistance of many individual mills in the United States. Additional information also has been submitted by environmental groups. EPA has gathered additional information from pulp and paper mills outside of the United States, primarily in Canada and Europe.

Some of the new information and data were generated through EPA-sponsored field sampling or visits at individual mills in the United States, Canada, and Europe. Additional sampling data were voluntarily supplied by many facilities, and information from laboratory and pilot-scale studies was shared with the Agency. In order to clarify comments on the proposal, the Agency also gathered information from several surveys administered by AF&PA and NCASI, including data on secondary fiber mill processes, recovery furnace capacities, best management practices, capital and operating costs, process operations, and impacts of technology on the recovery cycle.

The data gathering activities for this final rule are summarized in detail in the proposal, see 58 FR at 66096, and in the July 15, 1996, notice of data availability, see 61 FR at 36837.

VI. Summary of the Major Changes Since Proposal and Rationale for the Selection of the Final Regulations

A. Air Emission Standards

At proposal, the standards for mills that chemically pulp wood were based on the MACT floor control level. A uniform set of requirements would have applied to all mills that chemically pulp wood using the kraft, sulfite, soda, or semi-chemical process. The proposed standards would have required that, with the exception of some with very low volumetric and mass flow rates, all emission points in the pulping and bleaching area of these mills be controlled. The proposed standards also would have required that all wastewater streams produced in the pulping area of the mill be controlled except for those with a specified low concentration of hazardous air pollutants (HAPs). The proposed control technology basis was to enclose any open process equipment in the pulping and bleaching areas and route all vents and pulping wastewater to a control device. The proposed control technology basis was combustion for pulping area vent sources, scrubbing for bleaching area vent sources, and steam stripping for pulping wastewater.

Following proposal, EPA received a large number of comments and data to support the need for subcategories with separate MACT standards for each. After considering the data and comments, the final rule specifies separate MACT requirements for each of the four types of pulping processes subject to the standard. The low volumetric and mass flow rates for pulping and bleaching vents and the low concentration value for pulping wastewater are no longer used to determine applicability to the standard. Rather, for each subcategory, the standard lists the specific equipment and pulping area condensates that require control.

For each subcategory, the Agency determined the MACT floor level of control for existing and new sources, and analyzed the cost and impacts for control options more stringent than the floor. This analysis is presented in chapter 20 of the background information document for the promulgated NESHAP, and is also discussed in the proposal preamble. Based on the results of this analysis, the Agency determined that it was not reasonable to go beyond the MACT floor level of control for sources at kraft, semi-chemical, and sulfite pulp mills, bleaching systems, or kraft condensate systems. The Agency determined that control beyond the floor at soda mills was technically feasible and could be achieved at a reasonable cost. A discussion of the Agency's decision for soda mills is presented in the March 8 supplemental notice and in section VI.A.5.

In response to comments received on the proposed standards, several changes have been made to the final rule. While some of these changes are clarifications designed to make the Agency's intent clearer, a number of them are significant changes to the compliance requirements. A summary of the substantive comments and changes made since the proposal are described in the following sections. Detailed Agency responses to public comments and the revised analysis for the final rule are contained in the background information document and docket. See Section X.A.

1. Definition of Source

At proposal, EPA defined a single broad source that was subject to both existing and new source MACT. That single source included the pulping processes, the bleaching processes, and the pulping and bleaching process wastewater streams at a pulp and paper mill. EPA also considered and solicited comments on the concept of multiple smaller sources that would be subject to the existing and new source MACT requirements.

In defining the source at proposal, EPA considered the impact of the definition on mills making changes to existing facilities. In general, the narrower the definition of source, the more likely it is that changes to existing facilities would be deemed ''new sources'' under the CAA. With limited exceptions, these new sources must be in compliance with new source MACT standards on the date of startup or June 15, 1998, whichever is later. However, the CAA and the CWA differ regarding applicability requirements and compliance deadlines for new sources. As such, EPA was concerned that a pulp and paper mill planning to construct or reconstruct a source of HAPs between proposal and promulgation of these integrated regulations would find it necessary to plan for compliance with the NESHAP (required on the date it becomes effective) without knowing the requirements of the effluent guidelines for the industry. This situation appeared to be inconsistent with one objective of the integrated rulemaking: allowing facilities to do integrated compliance planning. EPA thus determined that the

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best solution to these concerns was to define a single broad source at proposal.

In the March 8, 1996 supplemental notice, EPA indicated a continuing inclination for a broad, single source definition. EPA also discussed broadening the source definition further to include papermaking systems and causticizing equipment and solicited comments on these additions. EPA's reason for considering the addition of these two equipment systems was to facilitate implementation of the clean condensate alternative for kraft mills.

Commenters on the proposed standards and on the March 8 notice largely agreed with the broad, single source definition. One commenter supported a narrow source definition, noting it was inappropriate for new construction at an existing source to be classified as a modification (and hence subject to existing source MACT). The commenter further stated that the final regulation should specify a narrow source definition for determining applicability to new source MACT. Some commenters also stated that EPA should clarify for the final regulation that mill processes not included in the source definition should not be subject to future case-by-case MACT requirements under CAA section 112(g).

EPA considered all of the comments received on this issue since proposal and maintains that the definition of source should be broad enough such that small changes to an existing mill do not trigger new source requirements in the NESHAP. However, EPA also agrees with the commenter that at some point, changes to an existing mill are substantial enough that new source MACT should apply.

In considering how best to define the source, EPA did not want to define it so narrowly that changes to or additions of individual pieces of equipment would be subject to new source MACT and be required to be in compliance with new source MACT at startup. In fact, EPA was concerned that to do so could discourage mills from implementing pollution-prevention changes as soon as practicable after promulgation of the Cluster Rules. Such changes might include replacing an existing rotary vacuum washer system with a low-flow washer system or installing an oxygen delignification system, both of which, if subject to existing source requirements, would get the eight-year compliance time, discussed later in section VI.A.3.b. Once mills are complying with the existing source MACT requirements, it also did not seem reasonable that they should have to tear out and rebuild that vent collection system to accommodate small equipment changes in the future unless those changes occurred along with other substantial changes that would justify rebuilding the vent collection system.

For the final regulation, EPA is defining the affected source to which existing MACT requirements apply to include the total of all HAP emission points in the pulping and bleaching systems (including pulping condensates). In considering how mills might engineer their vent collection systems and control devices, EPA has concluded that the following actions occurring after proposal are substantial enough that new source MACT requirements apply:

- A pulping or bleaching system at an existing mill is constructed or reconstructed; or
- A new pulping line or bleaching line is added to an existing mill.

The proposal date for mills that chemically pulp wood is December 17, 1993. The proposal date for mills that mechanically pulp wood, pulp secondary fibers, or pulp non-wood materials is March 8, 1996.

The final regulation also provides for an alternative definition of source to facilitate implementation of the clean condensate alternative. For mills using the alternative to comply with the kraft pulping standards, the final regulation defines a single broad source that includes the total of all pulping, bleach, causticizing, and papermaking systems. A more detailed discussion of the clean condensate alternative is given in section VI.A.3.d.

EPA agrees with the commenters that certain emission points that are excluded from the definition of affected source in today's rule, or are subject to a determination that MACT for these operations is no control, should not be required to undergo CAA section 112(g) review. The sources that have been so identified are wood yard operations (including wood piles); tall oil recovery systems at kraft mills; pulping systems at mechanical, secondary fiber, and non-wood fiber pulping mills; and papermaking systems. With regard to wood yard operations, tall oil recovery systems, and pulping systems at mechanical, secondary fiber, and non-wood fiber pulping mills, EPA has determined that these sources do not emit significant quantities of HAPs and EPA is not aware of any reasonable technologies for controlling HAPs from these sources. For papermaking systems, EPA has not identified any reasonable control technology, other than the clean condensate alternative, that can reduce HAP emissions attributable to HAPs present in the pulp arriving from the pulping and bleaching systems. Additionally, EPA has determined that the use of papermaking systems additives and solvents do not result in significant emissions of HAPs (Air Docket A–92–40, IV–B–27). Therefore, based on the applicability requirements of section 112(g) [40 CFR 63 part B, 63.40(b)], the following sources would not be required to undergo section 112(g) review: wood yard operations; pulping systems at mechanical, secondary fiber, and non-wood fiber mills; tall oil recovery systems; and papermaking systems.

2. Named Stream Approach

At proposal, the rule proposed applicability cutoff values (i.e., volumetric flow rate and mass flow rate) as a way to distinguish the vent and condensate streams that would be required to meet the rule. Since proposal, the pulp and paper industry submitted additional data that allowed EPA to better characterize the vent and condensate streams that should be controlled.

In the final rule, the applicability cutoffs contained in the proposed rule have been replaced in favor of specifically naming process equipment and condensate streams that would be required to meet the rule, with the exception of decker, knotter, and screen systems at existing sources. For these systems, the additional industry data was used to determine applicability cutoffs in the form of HAP emission limits (for knotter and screen systems) and HAP concentration limits in process water (for decker systems) to identify the systems that should be controlled at existing sources. A description of the vent and condensate streams to be controlled is presented in sections II.B.2, VI.A.3.a, and VI.A.4–7. The Agency added language in the definitions for the named systems to make the definitions applicable to equipment that serves a similar function as those specifically listed. This addition was made because there are no standard names for process equipment. The EPA's intent was to include the equipment that function the same as the equipment specifically named in the definitions, even though the mill may use a different name for that piece of equipment.

The different approach used in the final rule does not significantly change the number of emission points controlled from those intended to be controlled in the proposed rule. The emission points and condensate streams that are being controlled in the final rule are fundamentally the same emission sources that EPA intended to be controlled in the proposed rule. EPA

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concluded that the revised approach is easier and less costly to implement, for both the affected industry and the enforcement officials, since extensive emission source testing is not required to identify the vent and condensate streams to be controlled.

3. Kraft Pulping Standards

a. Applicability for Existing Kraft Sources. In the December 17, 1993 proposal, all pulping system equipment, with some exceptions, would have been required to be controlled. The exceptions were for deckers and screens at existing sources and small vents below specified volumetric mass flow rates and mass loadings. EPA proposed to require that treatment of all pulping wastewater streams except those with HAP concentrations below 500 ppmw and flow rates below 1.0 liter per minute.

In the March 8, 1996 supplemental notice, the Agency presented potential changes to the kraft mill standards. These changes included specifically naming equipment systems and pulping wastewater subject to the standards. For existing sources, the named equipment systems in the supplemental notice included: the LVHC system, pulp washing system, oxygen delignification system, the pre-washer knotter and screening system, and weak liquor storage tanks. The subject wastewater streams are the pulping process condensates from the digester, evaporator, turpentine recovery, LVHC collection, and the HVLC collection systems. EPA identified these systems and condensates to be controlled based on information presented in responses to industry surveys available prior to proposal and on updates and clarifications to survey responses submitted by the pulp and paper industry after proposal. At proposal, EPA did not have sufficient information to define these equipment systems.

At proposal, the Agency solicited comments on its determination of the control technology basis for the MACT floor and for MACT. The proposed MACT floor level of control at existing kraft sources was 98 percent reduction of emissions from the LVHC system, pulp washing system, and oxygen delignification system. In considering information received after proposal, the Agency continued to have questions, which were discussed with representatives of the pulp and paper industry, on the data provided in the survey responses on weak liquor storage tanks, the knotter and screening system, and the decker system at existing sources (Air Docket A–92–40, IV–D1–101). In the March 8, 1996 notice, the Agency requested further information on whether to distinguish between types or ages of weak liquor storage tanks, methods and costs of controlling them, and the level of control that represents the MACT floor for the different tanks. The Agency also requested data on the type of controls present on knotter and screening systems.

Commenters to the March 8 notice provided additional information on the kraft mills which control vents from knotter system, screen systems, decker systems, weak liquor storage tanks, and oxygen delignification systems. The commenters noted that many of the mills surveyed originally had misinterpreted survey questions for these systems. The commenters concluded that the revised information indicated that less than 6 percent of the knotter and screen systems, decker systems, and weak liquor storage tanks were actually controlled; they concluded, therefore, that the existing source floor for these vents is no control. Additionally, the commenters asserted that it would not be cost-effective to go beyond the floor to control weak liquor storage tanks because tanks at existing sources would not have the structural integrity to withstand a vacuum on them caused by the vent collection system. The commenters asserted that, to control emissions, these tanks would either need to be replaced or be retrofitted with expensive add-on controls that would not be cost-effective. One commenter supported using age as a means to indicate structural integrity and, therefore, rule applicability for weak liquor storage tanks. Several commenters disagreed that age was an appropriate indicator.

The Agency has evaluated the information submitted by the commenters on the control level for the knotter system, screen system, decker system, and weak liquor storage tanks. Information submitted by the commenters indicated that of the 597 weak liquor storage tanks in the survey only 28 (4.7 percent) actually had emissions routed to a control device (Air Docket A–92–40, IV–D1–106). Some respondents had previously included other types of controlled tanks, such as washer filtrate tanks, in their totals because EPA's original survey did not provide a definition of weak liquor storage tanks. The Agency, therefore, has concluded that the MACT floor level of control for weak liquor storage tanks at existing sources is no control. While some tanks are controlled, available information does not support the supposition that age is a good parameter for distinguishing structural integrity. In addition, the Agency evaluated the cost of going beyond the floor to control weak liquor tanks. The results of EPA's analysis indicated that a significant cost would be incurred for a limited emission reduction. This analysis is presented in Chapter 20 of the background information document for the promulgated NESHAP. Therefore, the Agency agrees with the commenters that control beyond the floor is not justified. Weak liquor tanks at new sources are required to be controlled.

The Agency disagrees with the comments that decker systems are not controlled at the floor at existing sources. Information supplied by the pulp and paper industry indicates there are 170 decker systems in mills responding to EPA's industry survey questionnaires. All the decker systems are associated with bleached mills. Of the 170 decker systems, 14 are controlled (8 percent) (Air Docket A–92–40, IV–B–16).

The majority of decker systems controlled at the floor (10 systems) are associated with oxygen delignification systems or are being used as an additional stage of pulp washing. The Agency believes that these types of decker systems are operated similarly to and have similar emissions as pulp washers. Decker systems used in this manner receive contaminated condensates or filtrates that may be recycled from other processes, such as the oxygen delignification system or combined condensate tanks. The process water may have a HAP concentration that would release significant amounts of HAP to the air from the air-water interface. The Agency characterized the emissions from this source to identify the types of decker systems with high emissions. Information supplied in NCASI technical bulletin 678 provided a relationship between air emissions and methanol concentrations in process water used in rotary vacuum drums. EPA evaluated this relationship and determined that decker controls and higher HAP emission rates were associated with deckers that used process water with HAP concentrations greater than or equal to 400 ppmw, or that did not use fresh water or ''whitewater'' from papermaking systems (Air Docket A–92–40, IV–B–22).

Therefore, the Agency has determined that it is appropriate to make a distinction among types of decker systems at existing sources for the purpose of setting the MACT standard. Decker systems at existing sources using fresh water or ''whitewater'' from papermaking systems, or using process

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water with HAP concentrations less than 400 ppmw, are not required to be controlled. Decker systems at new sources are required to be controlled regardless of the HAP concentration in the process water introduced into the decker.

EPA has reviewed available data on knotter and screen systems and has concluded that these systems are controlled sufficiently to establish a MACT floor level of control, and also that control more stringent than the floor is not warranted. Data used to reach this conclusion include survey responses from the 1992 voluntary survey, follow-up telephone surveys conducted by the National Council of the Paper Industry for Air and Stream Improvement (NCASI), and emissions data from the NCASI 16-mill study. Although the data indicate that many of these systems are currently controlled to some degree, the survey responses were not detailed enough in their equipment system descriptions and the test data were too limited for the Agency to use these two sources of information alone to develop the MACT control requirements. Because these equipment systems, nomenclature, and control configurations vary across the industry, the Agency decided that a HAP emissions limit would be the best way for mills to determine which systems would require control. EPA lacks sufficient data, however, to pinpoint any single value that represents the MACT floor. Rather, based on the survey and test data, there are a range of values from which EPA could choose. EPA further considered the costs of control in choosing from this zone of reasonable values.

Of the 171 knotter systems reported in the 1992 voluntary survey, 12 knotter systems at 5 mills were reported as controlled and ducted into the noncondensible gas (NCG) collection system and another 49 knotter systems at 23 mills were reported as having no vents. NCASI followed up by telephone surveys with these 28 mills (Air Docket A–92–40, IV–D1–101, IV–D1–112, IV–D1–114). The follow-up surveys indicated a fair amount of misreporting at these 28 mills. NCASI did not resurvey for all 171 knotter systems. Therefore, the following knotter system floor determination assumes that the mills not resurveyed that originally reported no knotter system controls did not control any vents.

From the 28 mills resurveyed, it was determined that six knotter systems or 3.6 percent (6/171) route all vents into the NCG collection system; another two knotter systems or 1.2 percent (2/171) route all knotter hood vents into the NCG collection system; another eight knotter systems or 4.7 percent (8/171) use only pressure knotters; and another two knotter systems or 1.2 percent (2/171) route all vents to the smelt dissolving tank scrubber. Industry collected data at seven pressure/open (also referred to as pressure/vibrating) knotter systems and found the methanol emissions to range from 0.005–0.07 kilograms per megagram of oven-dried pulp (ODP) produced, and collected data at one pressure knotter system and found the methanol emissions to be 0.0042 kilograms per megagram ODP produced. Emissions data are summarized in the Chemical Pulping Emission Factor Development Document (Air Docket A–92–40, IV–A–8). Because the pressure knotter system emissions were lower than the emissions at the pressure/open systems, pressure systems can be considered a type of controlled system. Therefore, 18 or 10.5 percent (6+2+8+2 = 18/171) of the knotter systems have some level of emissions control. The Agency believes that this estimate of the number of knotter systems controlled may be somewhat low because it is uncertain how many of the mills not resurveyed may have had the lower emitting pressure systems.

The 1992 voluntary MACT survey responses indicated that 96 screening systems out of the 199 reported are not vented. NCASI resurveyed by telephone 41 of these 96 mills. Assuming that the 55 mills not resurveyed look similar to the 41, the follow-up survey determined that seven percent ($6/41 \times 96/199$) route their vents to the NCG collection system and 41 percent ($35/41 \times 96/199$) have closed screens that vent through auxiliary tanks. Therefore, 48 percent of the screening systems have some level of control.

Industry collected data at one closed screen system and one open screen system. The closed screen system tested had methanol emissions of 0.004 kilograms per megagram of ODP produced. The open screen system tested had methanol emissions of 0.22 kilograms per megagram of ODP produced.

The Agency considered how best to characterize the average emissions limitation achieved by the best controlled 12 percent of the knotter systems and screen systems given the wide variety of control scenarios present in the industry. Either collecting and controlling vents on an open system or using closed equipment results in lower air emissions. The Agency decided to select the emissions limitation using the test data from the closed and open equipment systems. The Agency's decision is due in part to the fact that the technology basis for the effluent limitations guidelines and standards being promulgated in these Cluster Rules at 40 CFR Part 430 for bleached papergrade kraft and soda mills include closing the screening areas and returning wastewater to the recovery system. Thus, it is likely that many mills will move toward wider use of the lower air emitting pressure systems.

Because there is only one test data point for the pressure knotter systems and that emissions value is similar to the low end of the range of data points for the pressure/open knotter systems, the Agency did not believe it would be appropriate to set the emission limit equal to the one pressure knotter system. Similarly, because there is only one test data point for closed screens, the Agency did not believe it would be appropriate to use that single data point to set the emission limit for screening systems. The Agency could have selected any emission limit within the range of all available data for knotters (i.e., 0.0042 to 0.07 kilograms per megagram of ODP produced) and screens (i.e., 0.004 to 0.22 kilograms per megagram of ODP produced). However, recognizing the limited data available, the Agency also considered the cost effectiveness of controlling these systems to aid in setting the emission limits within the range of reasonable values (Air Docket A–92–40, IV–B–21).

Based on considering all available data, the final rule requires that existing kraft sources are required to control knotter systems with total mass emission rates greater than or equal to 0.05 kilograms of HAP per megagram ODP produced. Existing kraft sources are required to control screening systems with total mass emission rates greater than or equal to 0.10 kilograms of HAP per megagram ODP produced. Since it is often difficult to distinguish between the knotter system and screening system at mills, a mill may also choose to meet a total mass emissions limit of 0.15 kilograms of HAP per megagram ODP produced across the knotting and screening combined system. New sources are required to control all knotter and screen systems, regardless of emissions level.

b. Compliance Times for Kraft Mills. In the March 8, 1996 supplemental notice, the Agency discussed that it was considering allowing kraft mills an extended compliance time of five additional years (eight years total) for pulp washing and oxygen delignification systems (61 FR at 9394–95). The notice discussed how the additional time would encourage the

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maximum degree of overall multi-media pollution reduction and, in particular, would avoid discouraging mills from installing oxygen delignification equipment to reduce water pollution. The notice recognized the time constraints mills would face in trying to comply with both air and water rules essentially at the same time and that too short a compliance time could preclude mills from considering pollution prevention techniques with considerable environmental benefits, such as oxygen delignification and low-flow washers. These technologies reduce the amount of pollutants discharged into the wastewater. The March 8, 1996 notice also solicited comment on whether this compliance extension should be extended only to mills that commit to install these technologies (if EPA were to decide not to include that equipment as part of its BAT model technology).

Commenters supported the extension of compliance time for pulp washing and oxygen delignification systems at existing sources. Several commenters also requested that the compliance time be extended for weak liquor tanks, knotter and screening systems, and other HVLC vent streams because emissions from these sources will be transported and controlled by the same HVLC collection and incineration system as the pulp washing and oxygen delignification systems. The commenters noted that extension of the compliance period for all HVLC sources also allows for proper consideration of the full range of emerging innovative water and air pollution control options. Comments were not received on whether to provide the compliance extension only to mills that elect to install more stringent control technologies than necessary to comply with the baseline BAT requirements.

The Agency reviewed the comments and agrees that vents included in the HVLC system should be allowed a similar compliance time as the pulp washing and oxygen delignification systems. The majority of emissions and vent gas flow from equipment associated with the HVLC vent streams occur from the pulp washing system and the oxygen delignification system. Therefore, the design of the HVLC collection and transport system would be significantly influenced by these two systems. The Agency determined if different compliance times were provided for the components of the HVLC system, an affected source would expend significant amounts of capital to control systems required to comply in the three-year time frame. The source would have to re-design the gas transport and control devices five years later to accommodate controlling the washing system and oxygen delignification system. This entire cost could discourage the implementation of low-flow washing systems and oxygen delignification.

This would serve as an obvious disincentive to installation of advanced wastewater treatment technology since mills would be understandably reluctant to replace a newly installed air pollution control system. Therefore, EPA concluded that additional compliance time is appropriate and necessary for the remaining equipment controlled by the HVLC collection and transport system as well as the pulp washing system and the oxygen delignification system. See generally 61 FR at 9394–95. The final rule thus allows affected sources to control all the equipment in the HVLC system at kraft pulping systems at the same time, not later than April 17, 2006. A mill that installs an oxygen delignification system at an existing source after April 17, 2006 must comply with the NESHAP upon commencing operation of that system.

Regarding EPA's solicitation of comments on providing a compliance extension to all kraft mills, no negative comments were received. Therefore, EPA has decided to extend the compliance time for all kraft mills.

The final rule includes requirements for kraft mills to submit a non-binding control strategy report along with the initial notification required by the part 63 General Provisions. The purpose of the control strategy report is to provide the Agency and the permitting authority with the status of progress towards compliance with the MACT standards. The control strategy report must contain, among other information, a description of the emission controls or process modifications selected for compliance with the control requirements and a compliance schedule. The information in the control strategy report must be revised or updated every two years until the mill is in compliance with the standards.

c. Condensate Segregation. The proposed standards for process wastewater would have required that all pulping wastewaters that met the mass emission rate and flow rate applicability criteria had to be treated to achieve the specified control options. Comments and data submitted to EPA indicated that kraft mills typically steam stripped the condensates from the digester, turpentine recovery, LVHC, and HVLC systems, and certain evaporator condensates. The data also indicated that mills that use steam strippers also practiced varying degrees of condensate segregation in order to minimize the flow rate and maximize the HAP mass in condensate streams sent to treatment.

In the March 8, 1996 **Federal Register** supplemental notice, EPA presented a discussion of condensate segregation and included definitions for condensate segregation and a segregated condensate stream. Commenters on the March 8 notice supported the definitions for condensate segregation and segregated condensate stream. Commenters also submitted additional information suggesting definitions for condensate segregation and segregated condensate stream as well as options for demonstrating compliance with the condensate segregation requirements. EPA evaluated the information and included some of the concepts in the final rule.

The final rule states that the condensates from pulping process equipment at kraft mills must be treated and allows a number of alternative methods of complying with the standards, all of which represent MACT. The final rule also states that the entire volume of condensate generated from the named pulping process equipment at kraft mills must be treated unless the volume from the digester, turpentine recovery, and weak liquor feed stages in the evaporator systems can be reduced using condensate segregation. If adequate segregation (as specified in the rule) is performed, only the high-HAP fraction streams from the digester system, turpentine recovery system, and the weak liquor feed stages in the evaporator system and the non-segregated streams from the LVHC and HVLC collection systems must be sent to treatment.

Discussions with the pulp and paper industry after the March 8, 1996 supplemental notice indicated that some mills might not be able to achieve the proposed 65 percent mass isolation with their existing equipment even though they are achieving high levels of HAP removal in the steam stripper system (Air Docket A–92–40, IV–E–84). Therefore, the final rule contains two options for demonstrating compliance with the segregation requirements. The first option is to isolate at least 65 percent of the HAP mass in the total of all condensates from the digester system, turpentine recovery system, and the weak liquor feed stages in the evaporator system (condensate streams from the LVHC and HVLC collection systems are not segregated). The second option requires that a minimum total HAP mass from the high HAP concentrated condensates from the digester system, turpentine recovery

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system, and the weak liquor feed stages in the evaporator system and the total LVHC and HVLC collection system condensates be sent to treatment. The second option was included in the final rule because it achieves the same objective by sending a large enough mass to treatment to meet the floor-level control requirements.

For a detailed explanation of the concept of condensate segregation readers are referred to the docket (Air Docket A–92–40, IV–D1–107).

d. Clean Condensate Alternative. The proposed rule did not contain any provisions for emissions averaging. Industry comments on the proposal indicated support for incorporating an emission averaging approach in the final rule. After the public comment period, the pulp and paper industry submitted a comparison between an option developed by industry and the proposed MACT standards. The option formed the basis for the clean condensate alternative (CCA) in the final rule. The CCA focuses on reducing HAP emissions throughout the mill by reducing the HAP mass in process water streams that are recycled to various process areas in the mill. By lowering the HAP mass loading in the recycled streams, less HAP will be volatilized to the atmosphere.

The March 8, 1996 **Federal Register** supplemental notice presented a discussion of the industry's alternative (referred to as the ''clean water alternative'' in the notice). In the March 8 notice, EPA indicated that while the industry's concept was innovative, additional information would need to be submitted to the Agency to make the concept a viable compliance option, such as specific design parameters and data supporting the relationship between condensate stream HAP concentrations and HAP emissions from process equipment receiving the condensates.

Design specifications for the CCA were not available since no mills to date have implemented such a technology. However, the test data collected by the pulp and paper industry following the December 17, 1993 proposal included data on vent emissions and process water HAP concentrations that were used by industry to develop equations showing the relationship between HAP emissions from specific process equipment (e.g., pulp washers) and the HAP concentrations present in the process water sent to the equipment.

EPA evaluated these data and concluded that sufficient relationship appears to exist between HAP concentrations in recycled process wastewater and HAP emissions from process equipment, such that the CCA has the potential to achieve or exceed the requirements of the final standards. However, EPA has determined that the correlation equations developed by industry, because they were derived from small data sets, would not be sufficient for demonstrating compliance or equivalency with the final standards at a specific mill. Variability at a specific mill, such as types of process equipment, operating practices, process water recycle practices, and even type of wood pulped, can strongly influence the relationship between concentration in the process water and the process emissions.

The final rule contains provisions for using the CCA as a compliance option to the kraft pulping standards for the subject equipment in the HVLC system. An owner or operator must demonstrate to the Administrator's satisfaction that the total HAP emissions reductions achieved using the CCA are equal to or greater than the total HAP emission reductions that would have been achieved by compliance with the kraft pulping system standards for equipment in the HVLC system. The baseline HAP emissions for each equipment system and the total of all equipment systems in the CCA affected source (which is the existing MACT affected source expanded to include the causticizing and papermaking systems) must be determined after compliance with the pulping process condensate standards; after consideration of the effects of the effluent limitations guidelines and standards in 40 CFR part 430, subpart B; and after all other applicable requirements of local, State, and Federal agencies or statutes have been implemented. While engineering assessments or test data may be used to determine the feasibility of using the CCA, only test data may be used to demonstrate compliance with the kraft pulping system standards using the CCA.

e. Biological Treatment. At proposal, owners or operators using a biological treatment system to comply with the MACT requirements for pulping wastewater would have been required to measure the HAP or methanol concentration in the influent and effluent across the unit every 30 days and to identify appropriate parameters to be monitored to ensure continuous compliance. The proposed standards would have required that during the initial performance test, mills collect samples and analyze them using Method 304 to calculate a site-specific biorate constant. That constant, along with the operating parameters associated with the biological treatment system were to be entered into the WATER7 (updated to WATER8 since proposal) emissions model to demonstrate that the biological treatment system could achieve the treatment level required by the standards. Those operating parameters measured during the initial performance test were then to be monitored continuously to demonstrate compliance.

EPA acknowledged at proposal that industry was collecting information on the performance of biological treatment systems and monitoring techniques. EPA also noted that the industry was investigating the possibility of monitoring inlet and outlet soluble biochemical oxygen demand (BOD_5). EPA requested comments on applicable monitoring parameters for biological treatment systems and supporting data on biorates and corresponding parameters for monitoring.

EPA received a number of comments on testing and monitoring requirements for biological treatment systems. The industry submitted studies on biological treatment systems and on monitoring soluble BOD_5. Discussions were also held with the industry representatives on this issue.

In general, commenters objected to the proposed requirements to use Method 304 to calculate the site-specific biorate constants. Commenters felt that the laboratory-scale simulation of the biological treatment unit, which is basically what Method 304 requires, does not accurately reflect the biological degradation rates of the full-scale system. Commenters also stated that according to data collected, performance testing to demonstrate that biological treatment systems can meet the standards does not appear to be warranted given that methanol is highly biodegradable. Commenters further requested that if they had to conduct a performance test, they should also be permitted to use the inlet and outlet concentration procedures for calculating a site-specific biological degradation rate (biorate) constant as set forth in Appendix C of the Hazardous Organic NESHAP (HON). See 59 FR 19402 (April 22, 1994). Commenters also objected to having to demonstrate continuous compliance with the operating parameters, pointing out that a parameter could be exceeded and the biological treatment system could still be meeting the standards.

Following proposal, industry also submitted data on soluble BOD_5 across biological treatment system units. Industry stated that their data indicated that as long as the biological treatment system was achieving at least 80 percent

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removal of soluble BOD_5, the biological treatment system was operating properly and that the unit would be meeting the standards. However, industry argued that soluble BOD_5 removal should not be a continuous monitoring parameter that if exceeded, would indicate a violation of the standards. Rather, a mill should be allowed to start measuring methanol removal across the system to verify compliance.

The Agency considered the comments and data received and agrees that the provisions in Appendix C of the HON are an acceptable alternative to Method 304 for calculating site-specific biorate constants. However, EPA disagrees with the commenters on the issue of the need to conduct performance testing. While EPA agrees that methanol degrades more rapidly than many compounds, there are other HAPs present in the condensate streams subject to the standards, and biological treatment systems can vary widely in their operation and performance, depending on their design, maintenance, and even their geographical location. As such, the final regulation retains the proposed requirements for performance testing.

EPA also became concerned that allowing the use of methanol as a surrogate for total HAP may not be appropriate for this particular treatment technology. Because methanol is one of the most difficult HAPs to remove with a steam stripper (the technology on which the standards are based), even greater removals of total HAP would occur when a steam stripper is used. Thus, methanol is a reasonable surrogate under such conditions. The opposite is true for biological treatment systems, where methanol is one of the easier HAPs to degrade. As such, the final regulation specifies that a total HAP removal (not just methanol) of 92 percent be achieved by biological treatment systems.

EPA agrees with the commenters that soluble BOD_5 is an appropriate monitoring parameter for biological treatment systems. However, EPA disagrees with the commenters on their position regarding the monitoring of soluble BOD_5 and operating parameters for demonstrating continuous compliance. After discussion with the industry on this issue, EPA has concluded that soluble BOD_5 and operating parameters are the most appropriate means available for monitoring to demonstrate continuous compliance (A–92–40, IV–E–87). EPA understands the concerns raised on this point, and as such the final regulation provides flexibility. The regulation allows mills to establish, through performance testing, their own range of treatment system outlet soluble BOD_5 and operating parameter values to monitor. The final rule also allows owners and operators to demonstrate compliance with the standard using the WATER8 model and inlet and outlet samples from each biological treatment system unit when the specified monitoring parameters are outside of the range established during the initial performance test.

4. Sulfite Standards—Emission Limits for Sulfite Pulping Processes

In the March 8, 1996 supplemental notice (61 FR 9383), the Agency presented potential changes to the proposed standards for sulfite pulping processes. EPA had proposed that all pulping equipment at kraft, sulfite, soda, and semi-chemical processes must be enclosed and routed to a control device achieving 98 percent reduction in emissions. In the March 8 notice, the Agency proposed that the MACT floor level of control at existing sulfite processes was control of vents from the digester system, evaporator system, and pulp washing system. The MACT floor level of control at new sulfite processes would be control of the equipment systems listed for existing sources, plus weak liquor tanks, strong liquor storage tanks, and acid condensate storage tanks. In the March 8 notice, the Agency discussed in detail its preliminary determination that the sulfite standards should instead apply to the total emissions from specific named vents and to any wastewater emissions associated with air pollution control devices used to comply with the rule. For calcium-based sulfite pulping processes, the new proposed emission limit was 0.65 lb methanol/ODTP and the percent reduction was 92 percent. For ammonium-and magnesium-based sulfite pulping processes, the new proposed emission limit was 1.10 lb methanol/ODTP, and the percent HAP reduction was 87 percent. The Agency developed applicability cutoffs based on methanol because only methanol emissions data were obtained for all of the equipment systems and wastewater streams considered for control at sulfite mills. The test data from sulfite mills also indicated that for the equipment systems tested for other HAPs, methanol comprised the majority of HAP emissions. Therefore, the Agency believes that the maximum control of HAP emissions will be achieved by controlling methanol as a surrogate.

Several commenters objected that the proposed emission limits were not appropriate because they were based on data that only indicated possible levels of methanol emissions and not a rigorous assessment of emission rates. The commenters contended that the proposed emission limits were derived from limited data which may not be representative of the range of mills in the industry; therefore, they argued, the limits did not account for variability in emissions and are not achievable. The commenters provided the Agency with emissions test data that illustrated fluctuations in the methanol mass emissions over an extended time period due to variations in products and process conditions.

The Agency evaluated the information provided by the commenters and subsequently agreed with the commenters regarding process variability at sulfite mills. The Agency determined the amount of variability associated with a 99.9 percent confidence level in the data supplied by the commenters (Air Docket A–92–40, IV–B–20). This amount of variability (confidence interval), therefore, was applied to the average emission limits from the best controlled mills to develop the final emission limit.

For ammonium- and magnesium-based sulfite pulping processes, the final emission limit is 1.1 kilograms of methanol per megagram of ODP produced. After the close of the March 8, 1996, **Federal Register** supplemental notice comment period, additional information was provided to the Agency that indicated that the sodium-based sulfite pulping process is in use at some mills (A–92–40, IV–E–94). No emissions information was available for this process. However, the Agency determined, that due to the similarities in processes between calcium- and sodium-based sulfite pulping processes, the same limit developed for calcium-based mills would be applicable to sodium-based mills. For calcium- and sodium-based sulfite pulping processes, the final emission limit is 0.44 kilograms of methanol per megagram of ODP produced. Because the variability is incorporated into the mass emission limit, these emission limits and corresponding monitoring parameters are never-to-be-exceeded values.

5. Soda and Semi-chemical Mill Standards

The proposed standards would have required the owners or operators of new or existing kraft, semi-chemical, soda, and sulfite mills to comply with the same emission standards. In the March 8, 1996 notice, EPA proposed to subcategorize the pulp and paper industry by pulping type and develop different MACT control requirements for soda and semi-chemical mills based

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on emission characteristics. Existing soda and semi-chemical mills would be required to control the digester and evaporator systems (LVHC system). New soda and semi-chemical mills would be required to control the LVHC and the pulp washing systems. EPA solicited comments on this proposed change.

Information provided by the pulp and paper industry in survey responses and after proposal confirmed that the MACT floor level of control at existing semi-chemical mills is collection and control of the LVHC system. The Agency determined that it was not reasonable to control other emission points at existing semi-chemical mills (Air Docket A–92–40, IV–B–12). Data indicated that the best-controlled semi-chemical mills combust LVHC system emissions and emissions from pulp washing systems. Therefore, the final rule requires that existing semi-chemical mills control the LVHC system, and new semi-chemical mills control the LVHC and the pulp washing systems.

As discussed in the March 8, 1996 notice, the MACT floor level of control for soda mills is no control. The Agency has determined that HAP emissions from soda mills are similar to kraft mills (with the exception that TRS compounds are not emitted from the soda pulping process) and control of LVHC system vents is technically feasible and can be achieved at a reasonable cost. The Agency has also determined that controlling additional vents at existing sources cannot be achieved at a reasonable cost. However, controlling the pulp washing system at new soda mills can be achieved at a reasonable cost (Air Docket A–92–40, IV–B–12). Therefore, the final rule requires that existing soda mills control the LVHC system, and new soda mills control the LVHC and the pulp washing system.

6. Mechanical Pulping Mill, Secondary Fiber Pulping Mill, Non-wood Fiber Pulping Mill, and Papermaking System Standards

In the March 8, 1996 **Federal Register** notice, EPA proposed standards for pulping and bleaching processes at mechanical pulping mills, secondary fiber pulping mills, and non-wood fiber pulping mills. As discussed in the proposal, EPA believes that there are no air pollution control technologies in use on these processes except for those installed on bleaching systems using chlorine. The March 8 notice proposed no add-on controls for pulping systems (and the associated wastewater), papermaking systems, and nonchlorine bleaching systems for these mills. For traditional bleaching systems using chlorine, the proposed control was based on the performance of caustic scrubbers. The proposal stated that EPA would continue to investigate the use of HAP chemicals in papermaking, the magnitude of HAP emissions, and the viability of chemical substitution to reduce HAP emissions from papermaking systems.

Some commenters questioned EPA's proceeding with the rule in advance of the receipt of additional industry data that was being collected. The commenters cautioned that EPA did not have sufficient data on which to base a rule. Since the March 8, 1996 **Federal Register** proposal, EPA has received the results of the NCASI-sponsored testing program from these sources (A–92–40, IV–J–80 through IV–J–85). These data have been used in the determination of the final standards for these sources in today's rule. EPA has concluded that sufficient data have been collected to include these sources in today's action.

Commenters agreed with EPA's March 8, 1996 proposal for bleaching systems at these mills. Comments on the March 8 proposal supported the conclusion that caustic scrubbers are in use only on chlorine and chlorine dioxide bleaching systems. Furthermore, information available to EPA indicate that non-wood pulping mills typically use chlorine or chlorine dioxide bleaching systems. For chlorine and chlorine dioxide bleaching systems, EPA determined that scrubbers are used to control chlorinated compound emissions for process and worker safety reasons. Thus, the control achieved by this technology represents the floor for chlorine and chlorine dioxide bleaching systems at these mills and is the technological basis for the standard in today's rule. As stated in the December 17, 1993 proposal, EPA analyzed more stringent controls, such as combustion of bleaching vent gases after caustic scrubbing, for bleaching systems at kraft, soda, and sulfite mills. EPA has determined that these more stringent options are unreasonable considering cost and environmental impacts. Because of the operational similarities of the chlorine and chlorine dioxide bleaching systems at non-wood fiber mills to those at kraft, soda, and sulfite mills, EPA has concluded that combustion following caustic scrubbers is also not cost-effective at non-wood fiber mills. In addition, data available to EPA indicate that HAP emissions from chlorine bleaching systems at these mills are relatively low. In fact, the data show that the three largest non-wood pulping mills, of the ten currently in operation, use elemental chlorine in their bleaching systems and total HAP emissions from each of these three mills is less than five tons of total HAP per year (Air Docket A–95–31, IV–B–5).

For chlorine and chlorine dioxide bleaching systems at mechanical pulping mills, secondary fiber pulping mills, and non-wood pulping mills, today's rule requires the same level of control required for bleaching systems at kraft, soda, and sulfite mills. Those requirements are specified in § 63.445 (a)–(c) of today's rule. However, § 63.445 (d) and (e) do not apply to these mills since there are no effluent limitation guidelines for control of chloroform at mechanical, secondary fiber, and non-wood fiber pulping mills. Additional requirements for the control of chloroform emissions, based on the effluent limitation guidelines for best available technology economically achievable, are required in the standards for bleaching systems for kraft, soda, and sulfite mills. However, EPA is not aware of any controls presently in place or available for reducing chloroform air emissions at mechanical, secondary fiber, and non-wood pulping mills. Therefore, MACT is no control for chloroform air emissions from bleaching systems at mechanical, secondary fiber, and non-wood fiber pulping mills.

Since the March 8 proposal, EPA has also determined that while mechanical pulping, secondary fiber pulping, and other non-wood pulping mills do not typically use chlorine or chlorine dioxide bleaching, these mills may brighten the pulp stock through the use of hypochlorite and non-chlorine bleaching compounds. However, data available to EPA indicate that HAP emissions from these systems are relatively low, and that none of the bleaching systems that use hypochlorite and non-chlorine compounds have installed emission controls. Based on these findings, EPA established the MACT floor for bleaching systems at these mills that use hypochlorite and non-chlorine bleaching to be no control. EPA considered going beyond the floor and requiring HAP control through incineration of vent streams for these sources but determined that the minimal level of HAP emission reductions that would be achieved did not justify going beyond the floor (Air Docket A–95–31, IV–B–5).

In the March 8, 1996 **Federal Register** notice, EPA proposed no standards for papermaking systems. The three potential sources of HAP emissions from papermaking systems are HAPs contained in the pulp stock, HAPs contained in the whitewater, and HAPs from additives and solvents. Information available to EPA indicated no papermaking systems are operating with HAP controls; thus the floor level

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of control for papermaking systems is no control. EPA evaluated two possible control options for papermaking systems: (1) Removal of HAPs from the pulp stock and whitewater before the papermaking system; and (2) control of papermaking system vent streams. Analysis of these control options showed that there are no demonstrated methods for removing HAPs from the pulp stock or whitewater and that applying HAP control to the vent streams of papermaking systems is not cost-effective (Air Docket A–95–31, IV–B–8). Therefore, EPA is not requiring HAP control beyond the floor.

In the March 8, 1996 notice, EPA indicated that it was investigating the use of HAP-containing additives in papermaking systems, the magnitude of HAP emissions resulting from the use of papermaking system additives, and the viability of a MACT standard based on additive substitution. EPA has concluded that based on emission test reports and a survey conducted on additive use, additives do not contribute significantly to HAP emissions (Air Docket A–95–31, Item IV–B–6). The amount of HAPs contained in additives used by the paper industry for papermaking systems is relatively low, an estimated 236 tpy in 1995. Furthermore, less than 20 percent of HAPs contained in the additives is emitted to the air. About 80 percent of the HAPs remain on the paper or in the whitewater. Consequently, total annual HAP emissions attributable to additives are an estimated 50 tons per year, industry-wide. In comparison to the baseline emission level of 210,000 tons per year of total HAPs from the entire pulp and paper industry, the contribution of HAPs from papermaking system additives is negligible (Air Docket A–95–31, IV–B–6).

In a meeting between EPA and several representatives of the Chemical Manufacturers Association (CMA), CMA stated that members have been working to reduce HAP and solvent use in papermaking system additives over the past 15 years, even in the absence of regulations. Reductions have been achieved and CMA expects these efforts to continue. CMA noted that HAP-free alternatives may not be possible for all types of additives, as some HAPs are critical to product performance. EPA believes that low-HAP additive substitution is product-specific and it is not clear from the available information that substitution options are technically feasible (Air Docket A–95–31, IV–E–5). Therefore, EPA has concluded that a MACT standard for papermaking systems based on low-HAP additive substitution is not warranted.

In the March 8, 1996 notice, EPA proposed no standards for pulping systems at mechanical, secondary fiber, or non-wood fiber pulping mills. Information available to EPA indicated that no pulping systems at these mills are operating with HAP controls. Therefore, EPA has concluded that the floor for pulping systems at these mills is no control. EPA evaluated the feasibility of going beyond the floor and requiring HAP controls for these sources. Specifically, EPA investigated the feasibility of routing vent streams from these pulping systems to a combustion device for HAP control. EPA determined that the cost of combusting the vent streams was not justified by the HAP emission reductions achieved, and that requiring HAP control beyond the floor was not justified. Furthermore, pulping chemical usage, which correlates with HAP emission levels at kraft, semi-chemical, soda, and sulfite pulping mills, is much lower at non-wood fiber and secondary fiber pulping mills and minimal at mechanical pulping mills; thus the potential for HAP emissions is lower (Air Docket A–95–31, IV–B–7).

7. Bleaching System Standards

In the proposed rule, bleaching systems would have been required to control all HAP emissions by 99 percent using a caustic scrubber. In the March 8, 1996 supplemental notice, the Agency revised the proposal for the bleaching system requirements based on information and comments received after proposal. The new data indicated that caustic scrubbing reduces emissions of chlorinated HAP compounds (except chloroform), but does not control non-chlorinated HAP emissions. The Agency determined that no other option was feasible to control non-chlorinated HAPs. EPA has determined that reduction of chloroform emissions through the use of additional, add-on air pollution control technology is cost prohibitive. The only feasible option for controlling chloroform emissions is process modification, such as chlorine dioxide substitution and elimination of hypochlorite use.

In the March 8 notice, the Agency proposed to require chlorinated HAP emissions other than chloroform to be controlled by 99 percent (with chlorine as a surrogate for chlorinated HAP) based on the performance of a caustic scrubber. As an alternative to the percent reduction standard, the Agency also proposed an emission limit of 10 ppmv chlorinated HAP at the caustic scrubber outlet (with chlorine as a surrogate for chlorinated HAP). The Agency also solicited comments on providing a mass emission limit alternative to the percent reduction and the outlet concentration standards.

Commenters on the March 8, 1996 notice supported the changes to the scrubber requirements in the proposed rule. Commenters also expressed concern that bleaching systems with new low-flow vent systems would not be able to meet either the percent reduction or the outlet concentration standards. Therefore, they asserted, these standards would discourage the use of new low-flow bleaching vent technologies. Based on this concern, one commenter advocated a chlorinated HAP mass emission limit for bleaching systems of 0.023 lb of chlorinated HAP (excluding chloroform) per ODTP produced. The commenter claimed that a mass emission limit would not penalize new low-flow bleaching vent systems.

Based on available data, the Agency has concluded that low-flow bleaching vent systems can achieve the 99 percent reduction and the 10 ppmv outlet concentration requirements for total chlorinated HAP (other than chloroform). Based on a review of the information provided by the commenter and the available data on bleaching system emissions, the Agency has concluded that the commenter's recommended mass emission limit of 0.023 lb of chlorinated HAP (excluding chloroform) per ODTP produced is too high. The Agency evaluated the available data used to develop the percent reduction and outlet concentration requirements for bleaching systems (A–92–40, II–I–24). From this evaluation, the Agency determined that a scrubber outlet mass emission rate of 0.001 kg of total chlorinated HAP (other than chloroform) per Mg ODP produced (0.002 lb/ODTP) would provide reductions equivalent to 99 percent reduction standard (A–92–40, IV–B–29). The mass emission limit of 0.001 kg of chlorinated HAP (other than chloroform) per Mg ODP produced represents a mass emission limit achievable by all units that also achieved 99 percent reduction of chlorine. Furthermore, the available data show that some of the scrubbers achieving the 99 percent chlorine reduction standard, and the 10 ppmv outlet concentration limit, were also operating on low-flow bleaching vent systems.

For the final rule, the Agency has provided a mass emission limit option for bleaching systems of 0.001 kg of chlorinated HAP (excluding chloroform) per Mg ODP produced (0.002 lb/ODTP). The Agency maintains that this option

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allows more flexibility for sources affected by this rule, does not penalize bleaching systems operating with low-flow technology, and will provide reductions in chlorinated HAP emissions (other than chloroform) equivalent to the 99 percent reduction standard. Therefore, the final rule allows sources to comply with the bleaching system requirements if they achieve an scrubber outlet mass emission limit at or below 0.001 kg of total chlorinated HAP (other than chloroform) per Mg ODP produced. Chlorine may be used as a surrogate for measuring total chlorinated HAP.

After proposal, the Agency also evaluated the effect of process modifications on chloroform emissions. The results of this analysis indicated that the technology basis for MACT control of chloroform is complete chlorine dioxide substitution and elimination of hypochlorite as a bleaching agent. These process modifications were determined to reduce chloroform emissions significantly. At the same time, EPA was proposing complete chlorine dioxide substitution and hypochlorite elimination as the technology bases for the effluent limitations guidelines and standards under Subparts B and E (see 58 FR at 66109–11, 14–15). Since the control technologies that would be installed to comply with effluent limitations guidelines and standards and MACT would likely be the same for these bleached papergrade mills, EPA therefore proposed in the March 8 notice that chloroform air emissions at bleached papergrade mills be controlled by complying with the effluent limitations guidelines and standards applicable to those mills. No adverse comments were received on this proposal.

In the March 8, 1996 notice, the Agency solicited comments on whether an alternative numerical air emission limit for chloroform (i.e., besides complying with the effluent limitations guidelines and standards) was needed. Some commenters contended that a numerical air emissions limit for chloroform would be unnecessary because the effluent limitations guidelines and standards would achieve the requisite reductions. The Agency did not receive any indication of any benefit from a numerical air emission limit for chloroform. Additionally, the Agency did not have sufficient data and did not receive any further data after the March 8 notice to develop a numerical air emission limit (and hence is finding that a numerical standard is not feasible for purposes of CAA § 112(h)). Therefore, the final rule does not include a numerical air emission limit for chloroform (see the proposal at 58 FR 66142 for a discussion on setting MACT standards in a format other than an emission standard). The Agency is, however, providing an alternative compliance mechanism in the form of a work practice standard of complete substitution of chlorine dioxide for elemental chlorine and complete hypochlorite elimination—the technical basis for BAT. (EPA also notes that although the Agency's technical judgment is that compliance with BAT also will result in control of air emissions to reflect the MACT level of control, the Agency will continue to investigate whether this proves correct as the rule is implemented.)

Because MACT for new sources is equivalent to MACT for existing sources, the new source MACT standards for bleaching systems require compliance with BAT/PSES requirements (or implementation of 100 percent substitution and elimination of hypochlorite). This requirement applies even if the mill or bleaching system also meets the definition of new source under the effluent guidelines limitations and standards, and thus is required to meet the more stringent new source effluent requirements of NSPS/PSNS. Although achievement of the NSPS/PSNS may result in installation of technologies that reduce effluent loading beyond what is achieved by 100 percent substitution and elimination of hypochlorite, EPA is not aware that these advanced technologies will provide air emission reductions beyond what the BAT/PSES requirements will achieve.

EPA notes that an affected bleached papergrade mill must comply with the existing source MACT requirements no later than April 16, 2001 even if the mill's existing Clean Water Act NPDES permit does not yet reflect the corresponding effluent limitations guidelines and standards because its existing terms have not expired or it has been administratively extended. Put another way, even if a mill's existing NPDES permit serves as a shield (until reissuance) against imposition of new limits based on new effluent limitations guidelines (see CWA Section 402(k)), the MACT requirement for bleached papergrade mills to control chloroform emissions through compliance with all parameter requirements in the effluent limitations guidelines and standards takes effect to satisfy the requirements of the Clean Air Act. Similarly, if a bleached papergrade mill's NPDES permit is reissued sooner than the expiration of the 3-year compliance schedule authorized for the chloroform MACT requirements and calls for immediate compliance with the BAT limitations, that deadline would prevail. The same principles will apply when effluent limitations guidelines and MACT standards are promulgated for dissolving grade mills. EPA's plans for promulgating MACT standards for these mills are discussed immediately below.

An additional issue relating to compliance dates concerns bleaching systems at existing source papergrade kraft and soda mills which have elected, under the Clean Water Act portion of this rule, to treat wastewater to levels surpassing baseline BAT requirements (such as adding oxygen delignification prior to bleaching, and in some cases, engaging in additional reduction of process wastewater and further reductions in chlorinated bleaching chemicals used and bleaching system modifications than are necessary to meet BAT baseline limitations). As an incentive to make this election, EPA is not requiring participating mills to achieve compliance with the more stringent portions of the ''Advanced Technology'' BAT limitations for six, eleven, and sixteen years (for Tiers I, II, and III, respectively) in order to afford these mills sufficient time to develop, finance, and install the Advanced Technologies. In light of this, the Agency is concerned that requiring bleached papergrade kraft and soda mills to comply in three years with MACT standards based on process substitution of chlorine dioxide for elemental chlorine would discourage these mills from electing to participate in the Advanced Technology program. This is largely because a mill that implements process substitution before it installs oxygen or other extended delignification systems is likely to construct more chlorine dioxide generating capacity than it ultimately will need. A mill thus compelled to invest first in process substitution may be very reluctant to abandon a portion of that investment soon afterwards in order to participate in the voluntary incentives program.

EPA also believes that requiring compliance in three years with a chloroform MACT standard based on baseline BAT for bleached papergrade kraft and soda mills would present similar disincentives to achieving greater effluent reductions. A mill in those circumstances will have made a substantially larger capital investment than it will need to control chloroform once its array of advanced water technologies is installed. Also, depending on the degree of process modifications the mill makes, the mill may need a much smaller scrubber for

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the non-chloroform chlorinated HAPs and, in some cases, a scrubber may not be needed at all to meet the MACT standards for chlorinated HAP concentration limit. Thus, a mill otherwise interested in participating in the Voluntary Advanced Technology Incentives Program will find itself diverting capital to environmental controls that it ultimately will not need, instead of employing that capital to make more advanced process modifications that will benefit both the water and the air.

Under these unusual circumstances where imposition of MACT requirements could likely result in foregoing substantial cross-media environmental benefits, EPA believes that a two-stage MACT compliance scheme is justified for existing sources at bleached papergrade kraft and soda mills that enroll in the water Voluntary Advanced Technology Incentives Program (see 61 FR 9394 for a similar argument relating to compliance with MACT for washers and oxygen delignification systems). The first stage is an interim MACT of no backsliding—which reflects the current level of air emissions control. The second stage requires compliance with revised MACT based on baseline BAT requirements for all parameters for bleached papergrade kraft and soda mills. (The second stage in effect revises MACT to reflect the control technologies which will be available at this later date. See CAA § 112 (d)(6).) The no-backsliding provisions apply to the period from June 15, 1998 until compliance with the second-stage MACT standards is required April 15, 2004. This two-step alternative is available only to bleached papergrade kraft and soda mills actually making the binding decision to comply with Tier I, II, or III water limitations.

EPA believes that providing these mills six years to comply with second-stage MACT (i.e., baseline BAT requirements for all parameters) is an appropriate and logical outgrowth of the discussions set forth in the March 8, 1996 supplemental MACT notice (61 FR 9393) and the July 15, 1996 supplemental effluent guidelines notice (61 FR 36835–58). In the March 8 notice, EPA solicited comments on its preliminary findings that MACT for chloroform air emissions should be compliance with baseline BAT. Commenters agreed with this preliminary determination. In the July 15 notice, EPA set forth its vision of more stringent BAT for mills that voluntarily enter the Advanced Technologies Incentives program. As part of that voluntary program under the water standards, EPA is promulgating a requirement that mills in Tiers II and III, at a minimum, meet all the limitations promulgated as baseline BAT no later than April 15, 2004. See Section IX.A. Thus, more stringent air emission controls than stage one MACT will likewise be available at this time since compliance with these interim BAT limitations will result in compliance with MACT. For Tier II and Tier III mills, this means that the second stage MACT requirement is compliance with the baseline BAT limitations by April 15, 2004. The same is the case for Tier I mills, even though under the water regulation Tier I mills will be required to achieve more stringent limitations at that time. EPA is defining MACT to be the baseline BAT limitations even in this situation because compliance with the more stringent AOX limitations and other requirements unique to Tier I are unnecessary to control chloroform emissions at these mills.

EPA further believes that most plants likely to elect to comply with a tier option already control air emissions of chlorinated HAPs (both chloroform and other chlorinated HAPs) through application of the MACT technologies (process substitution for chloroform and caustic scrubbing for the remaining chlorinated HAPs). Thus, there will be some control of the emissions from these bleaching operations during the time preceding compliance with the second stage of MACT. To ensure that there is no lessening of existing controls, EPA also is promulgating a no backsliding requirement as an interim MACT—reflecting current control levels. During the extended compliance period, mills thus 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.

In the March 8 notice, the Agency proposed making a distinction between requirements for bleaching systems at papergrade and dissolving grade mills. The Agency solicited data concerning chloroform emissions from dissolving grade bleaching processes and requested comment on an appropriate chloroform MACT for dissolving grade bleaching systems. Several commenters suggested that a separate MACT standard for chloroform be developed for bleaching systems at dissolving grade mills. Some commenters requested that the Agency defer chloroform control requirements for dissolving grade mills until effluent limitations guidelines and standards are established at those mills.

As stated in the July 15, 1996 **Federal Register** notice (61 FR 36835), EPA is evaluating new data on the technical feasibility of reducing hypochlorite usage and implementing high levels of chlorine dioxide substitution on a range of dissolving grade pulp products. Therefore, EPA is deferring issuing effluent limitations guidelines and standards for dissolving grade mills until the comments and data can be fully evaluated. EPA expects to promulgate final effluent limitations guidelines and standards for dissolving grade subcategories at a later date.

EPA has decided to delay establishing these MACT standards for chloroform and for other chlorinated HAPs for dissolving grade bleaching operations until promulgation of effluent limitations guidelines and standards for those operations, for the following reasons. With respect to the MACT standard for chloroform, first, as explained above and in the March 8 notice, the control technology basis for the effluent limitations guidelines and standards and the MACT requirements will be the same. Second, at present, the Agency is unsure what level of chlorine substitution and hypochlorite use is achievable for dissolving grade mills. Thus, although EPA has a reasonably good idea what the technology basis of MACT and effluent limitations guidelines and standards is likely to be for dissolving grade mills, the precise level of the standards remains to be determined. Consequently, at present, EPA is unable to establish what the MACT floor would be for chloroform emissions from bleaching systems at these mills, and there is no conceivable beyond-the-floor technology to consider. EPA will make these determinations based on data being developed, and then promulgate for these mills effluent limitations guidelines and standards and, concurrently, MACT standards based on those effluent limitations guidelines and standards. Covered mills would therefore be required to comply with the MACT standards reflecting performance of the effluent limitations guidelines and standards no later than three years after the effective date of those standards, pursuant to CAA section 112(i)(3)(A).

The basis for delaying MACT requirements for chlorinated HAPs other than chloroform (again, from dissolving-grade bleach operations only) differs somewhat. As noted above, the technology basis for control of these HAPs is use of a caustic scrubber. However, when plants substitute chlorine dioxide for chlorine and eliminate hypochlorite (in order to control chloroform emissions and discharges to water, as explained above), a different scrubber will be needed that can adequately control both the chlorine dioxide emissions for

worker safety reasons and the emissions of chlorinated, non-chloroform HAPs. The Agency's concern (shared by the commenters who addressed this question) is that immediate control of the non-chloroform chlorinated HAPs could easily result in plants having to install and then replace a caustic scrubber system in a few years due to promulgation of effluent limitations guidelines and standards and MACT requirements for chloroform. This result would be an inappropriate utilization of scarce pollution control resources.

8. Test Methods

At proposal, the Agency proposed to require that Methods 308 and 26A be used to test for compliance with the provisions of the NESHAP. Method 308 is used to measure methanol in the vent stream. Method 308 had not been validated using Method 301 at the time the NESHAP was proposed. Method 26A is used to measure chlorine in vent streams.

At proposal, commenters objected to the rule referencing an unvalidated test method (Method 308). The commenters also contended that Method 26A should not be used for measuring chlorine in the bleaching system because chlorine dioxide, which is expected to be present in bleaching system vents, is listed as a possible interferant in Method 26A. The commenters suggested using a modified Method 26A developed by the pulp and paper industry.

Since proposal, Method 308 was revised to incorporate suggestions made and data provided by representatives of the pulp and paper industry.

Since proposal, Method 308 has also been validated using Method 301 validation criteria. The validation was conducted by the Atmospheric Research and Environmental Analysis Laboratory in EPA's Office of Research and Development. The results of the validation were reported in the January 1995 issue of the *Journal of the Air and Waste Management Association*. The Agency has also evaluated the commenters' claims regarding Method 26A. The Agency agrees that chlorine dioxide is a potential positive interferant to the method (i.e., concentration measurement could potentially be higher than actual emissions). The final rule includes modifications to Method 26A (based on an NCASI method) to eliminate potential problems with chlorine dioxide interference.

In March 1997, industry informed EPA that it had not used Method 305 to obtain the methanol steam stripper performance data (which was used as the basis for the proposed pulping process condensate standards). For the liquid sampling analysis, NCASI used a direct aqueous injection gas chromatography/flame ionization detection (GC/FID) method described in NCASI Technical Bulletin No. 684, Appendix I. Consequently, the industry contends that Method 305 should not be specified in the final rule for determining compliance with the pulping process condensate standards. However, the NCASI test method has not been validated using EPA Method 301 procedures and it is unlikely that the test method validation would be completed before promulgation of the MACT standard.

The Agency has considered industry's argument and has decided to proceed with specifying Method 305 in the final rule to demonstrate compliance with the pulping process condensate standards. However, if the Agency approves the Method 301 validation procedures for NCASI's GC/FID test method, this method will be referenced as either an alternative or a replacement for Method 305 (for determining methanol concentration only) with a supplemental **Federal Register** notice. EPA believes that this course of action will adequately address the industry's concerns. This decision was reached since the Method 301 validation procedures for NCASI's GC/FID method would likely be completed before kraft mills would have to demonstrate compliance with the pulping process condensate standards.

9. Backup Control Devices and Downtime

The proposal would have required emission limits for the NESHAP to be met at all times, except during periods of startup, shutdown, or malfunction. Allowance for control device or collection system downtime was not specified in the proposed rule, and the need for backup control devices was not addressed.

Commenters asserted that EPA should recognize that control technologies on which the proposed rule was based are not designed to operate 100 percent of the time. Therefore, commenters requested downtime allowances to account for safety related venting and periods when the control device is inoperable. Otherwise, the commenters asserted that costly backup control devices would be necessary to achieve compliance with the NESHAP at all times. They further contended that the environmental benefit for the additional cost associated with the backup controls would be minimal. Commenters recommended a one percent downtime for the LVHC system, four percent for the HVLC system, and ten percent for steam stripper systems. Commenters contended that while most of the LVHC systems had backup controls, very few of the HVLC systems had backup controls. Several commenters added that the Part 63 General Provisions do not address safety venting and downtime necessary for trouble-shooting. Another commenter contended that the Part 63 General Provisions already allow significant emissions and should not be further weakened.

Since proposal, EPA has re-evaluated the need to incorporate downtime or excess emission allowances for LVHC, HVLC, and steam stripper systems into the final rule. Based on data submitted by the pulp and paper industry, EPA has concluded that some allowance for excess emissions is part of the MACT floor level of control. For the final rule, EPA established appropriate excess emission allowances to approximate the level of backup control that exists at the best-performing mills and the associated period of time during which no control device is available. The excess emission allowances in the final rule include periods when the control device is inoperable and when the operating parameter values established during the initial performance test cannot be maintained at the appropriate level.

Based on an analysis of the public comments and the available data regarding excess emissions and the level of backup control in the industry, EPA has determined that an appropriate excess emissions allowance for LVHC systems would be one percent of the operating hours on a semi-annual basis for the control devices used to reduce HAP emissions. The best-performing mills achieve a one percent downtime in their LVHC system control devices. For control devices used to reduce emissions from HVLC systems, EPA has concluded that an appropriate excess emissions allowance would be four percent. The best-performing mills achieve a four percent downtime in the control devices used to reduce emissions from their HVLC system to account for flow balancing problems and unpredictable pressure changes inherent in HVLC systems. For control devices used to control emissions from both LVHC and HVLC systems, the Agency has determined that a four percent excess emissions allowance is appropriate. This decision was made because the control device would be used for the HVLC system, which has the higher emissions allowance. For LVHC and HVLC system control devices, the excess emissions allowances do not include scheduled

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maintenance activities that are discussed in the Part 63 General Provisions. The allowances address normal operating variations in the LVHC and HVLC system control devices for which the equipment is designed. The variations would not be considered startup, shutdown, or malfunction under the Part 63 General Provisions (Air Docket A–92–40, IV–D1–103, IV–D1–110, IV–D1–115, IV–E–85, and IV–E–88).

The appropriate excess emissions allowance for steam stripper systems was determined to be 10 percent. The allowance accounts for stripper tray damage or plugging, efficiency losses in the stripper due to contamination of condensate with fiber or black liquor, steam supply downtime, and combustion control device downtime. This downtime allowance includes all periods when the stripper systems are inoperable including scheduled maintenance, malfunctions, startups, and shutdowns. The startup, shutdown, malfunction allowances are included in the stripper allowances because information was not available to differentiate these emissions from normal stripper operating emissions.

Regarding the commenters' discussion of whether the startup, shutdown, or malfunction provisions of the General Provisions would cover maintenance and troubleshooting downtime, EPA has taken public comment and is currently revising the requirements of the General Provisions. Among the changes to the language, EPA intends to incorporate safety-related venting requirements into the General Provisions. However, scheduled maintenance activities are not considered by EPA to qualify for excess emissions allowances. The start-up, shutdown, and malfunction plan specified in the General Provisions should address the periods of excess emissions that are caused by unforeseen or unexpected events.

10. Equipment Enclosures, Closed-Vent Systems, and Control Equipment, and Condensate Conveyance System

a. Requirements for Closed-Vent Systems. At proposal, the Agency required specific standards and monitoring requirements for closed-vent systems. The standards required: (1) Maintaining a negative pressure at each opening, (2) ensuring enclosure openings that were closed during the performance test be closed during normal operation, (3) designing and operating closed-vent systems to have no detectable leaks, (4) installing flow indicators for bypass lines, and (5) securing bypass line valves. Monitoring requirements included visual inspections of seal/closure mechanisms and closed-vent systems, and demonstrations of no detectable leaks in the closed-vent system.

Commenters to the proposed NESHAP contended that visual inspections were not necessary due to durability of the materials used by this industry to construct the collection system. In addition, commenters contended that leak detections were not necessary since systems are typically operated at negative pressure. The commenters also opposed requirements for seals and locks on bypass lines because the bypass lines are installed for purposes of personnel safety, equipment protection, and to prevent explosions.

The Agency evaluated the comments and has decided to make the following changes to the closed-vent system requirements. The Agency agreed with the commenters that most closed-vent systems will be under negative pressure. Any leaks, therefore, would pull air into the collection system rather than release HAPs to the atmosphere. Therefore, the Agency revised the requirement for demonstration of no detectable emissions to apply only to portions of the closed-vent system operated under positive pressure. The Agency also agreed that requiring a lock and key-type seal on bypass lines would be overburdensome and could potentially pose a safety hazard. The intention of the requirements was to prevent circumvention of the control device by venting directly to the atmosphere. The Agency believes that this assurance can be achieved using car seals or seals that could easily be broken, to indicate when a valve has been turned. Proper recordkeeping is also necessary to demonstrate proper operation. Therefore, the Agency revised the bypass line requirements to allow the use of car seals but require log entries recording valve position, flow rate, and other parameters. The Agency has modified the enclosure requirements to allow for short-term openings for pulp sampling and maintenance.

The final rule retains the visual monitoring requirements. The requirements are necessary to ensure proper operation of collection systems and can be conducted at a reasonable cost.

b. Concentration Limit for Combustion Devices and Design Incinerator Operating Parameters. At proposal, the NESHAP would have required vent streams to be controlled in a combustion device that achieves 98 percent reduction of HAPs or outlet HAP emission concentrations of 20 ppmv corrected to three percent oxygen. Alternatively, mills could comply with the control requirements by routing vent streams to a design incinerator operating at 1,600 °F and a residence time of 0.75 seconds, or to a boiler, lime kiln, or recovery furnace.

Commenters on the proposed rule objected to the 20 ppmv limit at a three percent oxygen correction factor. Some commenters claimed that incinerator exhaust streams in the pulp and paper industry have an oxygen content in excess of 10 percent. Therefore, if the outlet concentration was corrected to three percent oxygen, the concentration level would not be achievable. Some commenters recommended increasing the correction factor to 10 percent oxygen.

The 20 ppmv limit represents the performance that is achieved on low concentration streams by a well designed combustion device. This limit was based on previous EPA studies (Air Docket A–79–32, II–B–31). The three percent oxygen correction factor at proposal was based on stream characteristics of other industries, such as the synthetic organic chemical manufacturing industry. The three percent correction factor has been used on many previous standards for controlling organic pollutants. EPA re-evaluated the three percent correction factor to ensure that it is appropriate for the pulp and paper industry. Test data supplied by the industry confirmed their comments that the oxygen content of the incinerator flue gas is typically greater than ten percent at pulp and paper mills. Based on the industry data and the thermodynamic models, EPA changed the oxygen correction factor to ten percent (Air Docket A–92–40, IV–B–19). Therefore, the final rule allows combustion devices to be in compliance if they reduce HAP concentrations to 20 ppmv at ten percent oxygen. Information supplied by the pulp and paper industry indicates that many of the existing incinerators meet this limit.

Commenters on the proposed rule objected that the requirements for the design incinerator were too stringent and that equivalent control could be achieved at lower temperatures. Many commenters requested that the Agency allow incinerators meeting the operating conditions in the kraft NSPS of 1,200 °F and 0.5 seconds residence time to be used for the NESHAP.

EPA has decided not to change the proposed design incinerator operating parameters for the NESHAP because the parameters are necessary to meet the MACT floor. EPA would first like to clarify that the final rule does not limit owners or operators of incinerators to operate at the specified temperatures and residence times. Any control device

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that is demonstrated to achieve 98 percent destruction of HAPs will comply with the rule. Any thermal oxidizer which reduces HAP emissions to a concentration of 20 ppmv at ten percent oxygen will also comply with the rule. The 98 percent destruction requirement represents the control level achieved by well-operated combustion devices. The 20 ppmv limit represents the performance achieved by well-operated combustion devices on low concentration vent streams.

Second, EPA has made this part of the rule as flexible as possible while still achieving a level of control reflecting MACT. In the December 17, 1993 proposal and in this final rule, EPA developed compliance alternatives in order to reduce the compliance testing burden. The compliance alternatives (i.e., operating thermal oxidizers at a temperature of 1,600 °F and a residence time of 0.75 seconds) were developed to ensure that the thermal oxidizers perform at a level that would meet the destruction efficiency requirements. The operating parameters are based on previous Agency studies that show that these conditions are necessary to achieve 98 percent destruction of HAPs. However, the NSPS operating parameters (1,200 °F and 0.5 seconds residence time) do not destroy HAPs to this extent.

The purpose of the kraft NSPS was to reduce emissions of TRS compounds. EPA has evaluated the temperature and residence time required by the NSPS to determine whether the NSPS temperature and residence time are sufficient to achieve 98 percent reduction of HAPs. EPA's analysis indicates that while the NSPS requirements are sufficient to achieve 98 percent destruction of TRS compounds, kinetic calculations for methanol (the majority of HAP in pulping vent gases) show that the NSPS criteria will not achieve 98 percent reduction of HAPs (Air Docket A–92–40, IV–B–18). Additionally, EPA evaluated incinerator performance data submitted by industry (Air Docket A–92–40, IV–J–33). The data indicated that the NSPS operating parameters were not sufficient for achieving 98 percent destruction of methanol. This conclusion was reached by EPA since the operating conditions (i.e., temperature and residence time) of the incinerators that achieved 98 percent methanol destruction were greater than the levels specified in the kraft NSPS. Therefore, the NSPS specifications will not meet the requirements of MACT for new and existing sources.

c. Condensate Collection System. In the December 17, 1993 proposal, EPA proposed to require pulping process condensate collection systems to be designed and operated without leaks. EPA proposed that all tanks, containers, and surface impoundments storing applicable condensate streams were required to be enclosed and all vent emissions must be routed to a control device by means of a closed-vent system. A submerged fill pipe would have been required on containers and tanks storing an applicable condensate stream or any stream containing HAP removed from a condensate stream. All drain systems that received or managed applicable condensate streams would have been required to be enclosed with no detectable leaks and any HAP emissions from vents were required to be routed to a control device. Several commenters on the proposed pulp and paper NESHAP contended that the proposed requirements were overly burdensome and, in some cases, unnecessary.

After the pulp and paper NESHAP was proposed, the Agency promulgated a separate rulemaking in 40 CFR Part 63, Subpart RR (National Emission Standards for Individual Drain Systems). This rule established emission control, inspection and monitoring, and recordkeeping and reporting requirements for individual drain systems. The individual drain system requirements specify that air emissions from collection systems must be controlled using covers or seals, hard-piping, or venting of individual drain systems through a closed-vent system to a control device or a combination of these control options. The emission control techniques specified in the individual drain system standard (i.e., covers/seals and vent combustion) are common techniques that are applicable to a variety of wastewater collection systems, regardless of the type of process that produced the wastewater streams.

EPA compared the collection system requirements contained in the proposed pulp and paper NESHAP with the individual drain system requirements in subpart RR. Since the subpart RR requirements are consistent with the intent of the proposed standards, EPA concluded that the requirements of subpart RR constitute MACT for the pulp and paper industry. The control costs presented in the ''Pulp, Paper, and Paperboard Industry-Background Information for Promulgated Air Emission Standards, Manufacturing Processes at Kraft, Sulfite, Soda, Semi-Chemical, Mechanical, and Secondary and Non-wood Fiber Mills, Final EIS''(EPA–453/R–93–050b) were based on industry estimates for hard-piping systems. The Agency has concluded that these costs would be the same or greater than would be needed for complying with the requirements of subpart RR.

The final pulp and paper NESHAP references 40 CFR Subpart RR for the standards for individual drain systems for the pulping process condensate closed collection system. The Subpart RR standards provide uniform language that simplifies compliance and enforcement.

The final rule requires tanks to be controlled as at proposal, but containers and surface impoundments are not required to be controlled. Public comments indicated that containers are not used in the pulp and paper industry. The Agency's intention in the proposed rule was not to require surface impoundments to be controlled, except when used as part of the condensate collection system. After further review of this issue, the Agency has determined that mills do not use and are unlikely to use surface impoundments as part of their closed collection system for condensate streams and therefore that the language on control of surface impoundments does not need to appear in the rule.

11. Interaction With Other Rules

a. Prevention of Significant Deterioration/New Source Review (PSD/NSR). To comply with the MACT portion of the pulp and paper cluster rule, mills will route vent gases from specified pulping and condensate emission points to a combustion control device for destruction. The incineration of these gases at kraft mills has the potential to generate sulfur dioxide (SO_2) and, to a lesser degree, nitrogen oxides (NO_X). The emission increases of SO_2 and NO_X may be of such magnitude to trigger the need for preconstruction permits under the nonattainment NSR or PSD program (hereinafter referred to as major NSR).

Industry and some States have commented extensively that in developing the rule, EPA did not take into account the impacts that would be incurred in triggering major NSR. Commenters indicated that major NSR would: (1) Cost the pulp and paper industry significantly more for permitting and implementation of additional SO_2 or NO_X controls than predicted by EPA; (2) impose a large permitting review burden on State air quality offices; and (3) present difficulties for mills to meet the proposed NESHAP compliance schedule of 3 years due to the time required to obtain a preconstruction permit. Industry commenters have stated that the pollution control project

(PCP) exemption allowed under the current PSD policy provides inadequate relief from these potential impacts and recommended including specific language in the pulp and paper rule exempting MACT compliance projects from NSR/PSD.

In a July 1, 1994 guidance memorandum issued by EPA (available on the Technology Transfer Network; see ''Pollution Control Projects and New Source Review (NSR) Applicability'' from John S. Seitz, Director, OAQPS to EPA Regional Air Division Directors), EPA provided guidance for permitting authorities on the approvability of PCP exclusions for source categories other than electric utilities. In the guidance, EPA indicated that add-on controls and fuel switches to less polluting fuels qualify for an exclusion from major NSR. To be eligible to be excluded from otherwise applicable major NSR requirements, a PCP must on balance be ''environmentally beneficial,'' and the permitting authority must ensure that the project will not cause or contribute to a violation of a national ambient air quality standard (NAAQS) or PSD increment, or adversely affect visibility or other air quality related values (AQRV) in a Class I area, and that off-setting reductions are secured in the case of a project which would result in a significant increase of a non-attainment pollutant. The permitting authority can make these determinations outside of the major NSR process. The 1994 guidance did not void or create an exclusion from any applicable minor source preconstruction review requirements in an approved State Implementation Plan (SIP). Any minor NSR permitting requirements in a SIP would continue to apply, regardless of any exclusion from major NSR that might be approved for a source under the PCP exclusion policy.

In the July 1, 1994 guidance memorandum, EPA specifically identified the combustion of organic toxic pollutants as an example of an add-on control that could be considered a PCP and an appropriate candidate for a case-by-case exclusion from major NSR. For the purposes of the pulp and paper MACT rule, EPA considers that combustion for the control of HAP emissions from pulping systems and condensate control systems to be a PCP, because the combustion controls are being installed to comply with MACT and will reduce emissions of hazardous organic air pollutants. EPA also considers the reduction of these pollutants to represent an environmental benefit. However, EPA recognizes that the incidental formation of SO_2 and NO_X due to the destruction of HAPs will occur. Consistent with the 1994 guidance, the permitting authority should confirm that, in each case, the resultant emissions increase would not cause or contribute to a violation of a NAAQS, PSD increment, or adversely affect an AQRV.

The EPA believes that the current guidance on pollution control projects adequately provides for the exclusion from major NSR of air pollution control projects in the pulp and paper industry resulting from today's rule. Such projects would be covered under minor source regulations in the applicable state implementation plan (SIP), and permitting authorities would be expected to provide adequate safeguards against NAAQS and increment violations and adverse impacts on air quality related values in Federal Class I areas. Only in those cases where potential adverse impacts cannot be resolved through the minor NSR programs or other mechanisms would major NSR apply.

The EPA recognizes that, where there is a potential for an adverse impact, some small percentage of mills located near Class I PSD areas might be subject to major NSR, i.e., the permitting authority determines that the impact or potential impact cannot be adequately addressed by its minor NSR program or other SIP measures. If this occurs, there is a question whether MACT and NSR compliance can both be done within the respective rule deadlines. EPA believes, however, that the eight year compliance deadline provided in the final MACT rule for HVLC kraft pulping sources substantially mitigates the potential scheduling problem. The equipment with the eight year compliance deadline are the primary sources of the additional SO_2 and NO_X emissions. The additional time should be sufficient to resolve any preconstruction permitting issues.

While the Agency believes that eight years is sufficient for kraft mills with HVLC systems to meet permitting requirements, industry has raised concerns that there could be a potential problem for a few mills in Class I attainment areas that are required to comply with the final rule in three years. The PCP exemption and extended compliance schedule may not resolve all NSR conflicts for every mill. Although too speculative to warrant disposition in this rule, EPA is alert to this potential problem and will attempt to create implementation flexibility on a case-by-case basis should a problem actually occur.

Commenters requested that the PCP exclusion also be expanded to actions undertaken at mills that enroll in the Voluntary Advanced Technology (AT) Incentives Program in the effluent limitations guidelines and standards portion of today's rule. In the July 23, 1996 notice on changes to the NSR Program (61 FR 38250), EPA solicited comments on the appropriate scope of the PCP exclusion. EPA also solicited comments in the July 15, 1996 supplemental pulp and paper effluent guidelines notice (61 FR 36857) on whether advanced water pollution control technologies implemented by the pulp and paper industry should be eligible for an exclusion from major NSR and if so, whether the exclusion should be implemented under the provisions of the PCP exclusion under the NSR proposed regulations. In the context of these notices, EPA received several comments in favor of extending the PCP exclusion to multi-media activities, such as those that would be undertaken for the Voluntary Advanced Technology Incentives Program but received little information on appropriate criteria for determining the relative benefits of reduced water pollution to potential coincident increases in air pollution.

The Agency believes that, depending on the control technologies selected by a mill, the potential exists for an overall environmental benefit to result from control strategies implemented under the Voluntary Advanced Technology Incentives Program. However, unlike the MACT rule in today's action, where the controls that would be installed to reduce hazardous air pollutants are fairly well known and the potential pollutant tradeoffs within the same environmental media are fairly well understood, the Agency is less certain about the controls that might be installed to comply with this Voluntary Advanced Technology Incentives Program and the potential pollutant tradeoffs that may occur across environmental media. Therefore, while the Agency is continuing to consider extending this PCP status to activities undertaken to implement the Voluntary Advanced Technology Incentives Program, the Agency is not extending that status in today's action because the Agency currently lacks sufficient information to establish a process and set of criteria by which a determination could be made as to whether these advanced control technologies result in an overall environmental benefit at individual mills that participate in this program. The Agency intends to continue discussions with stakeholders on a process and set of criteria by which a determination could be made as to the appropriateness of extending the PCP exclusion to controls installed at

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individual mills to comply with the Voluntary Advanced Technology Incentives Program. Because the control technologies that could be installed to implement the Voluntary Advanced Technology Incentives Program may vary significantly from one mill to another, mills that want controls implemented within the context of the Voluntary Advanced Technology effluent program to be considered PCP will likely need to make a site-specific demonstration that such controls result in an overall environmental benefit. When a mill would need to make such a demonstration would depend upon that particular mill's compliance timeline—dictated by the AT Incentives Tier to which they commit and the time necessary to get applicable permits approved. While it is not possible at this time to identify the criteria the Agency would use for approving a PCP exclusion, the Agency would not consider projects which result in any increases in emissions of highly toxic compounds to be an acceptable candidate PCP. For example, the Agency believes it would not be environmentally acceptable to give the PCP exclusion to an activity which results in a chlorinated material being sent to a boiler that would result in the release of a chlorinated toxic air pollutant. The Agency also believes that the public should be provided an opportunity to review and comment on mill-specific cases where a PCP exclusion is being considered for these advanced water technologies, particularly if there would be a potentially significant emissions increase of criteria air pollutants such as SO_2 or NO_X.

Since mills must declare within one year of promulgation of the cluster rules whether they will participate in the Voluntary AT Incentives Program, the Agency is aware that mills would like to know whether a mechanism exists whereby they may apply for a PCP exclusion among the many factors that may influence their participation in this incentives program. In order for the Agency to proceed further on this issue, the Agency again is requesting that interested stakeholders submit information on the types of control technologies that could be installed under the Voluntary AT Incentives Program along with information on the type and potential magnitude of collateral air pollutant increases that may occur at mills. The Agency requests information from stakeholders that could be useful for developing a process by which mills would apply for the PCP exclusion and for setting forth criteria for determining whether an activity performed under the Voluntary AT Incentives Program qualifies for the PCP exclusion. Given the potentially varying control strategies that could be adopted by participating mills, the Agency also requests information that may be useful in assessing whether generic guidance on when a PCP exclusion may be appropriate should be set forth within the context of the NSR Reform effort or whether NSR determinations should more appropriately be made in the context of mill-specific applications. The EPA needs this information within 60 days of the publishing of this notice to evaluate the information and proceed with this issue in a useful time period for mills to make their decisions on participation in the Voluntary AT Incentives Program. Stakeholders should submit information on this topic directly to Ms. Penny Lassiter, Emission Standards Division (MD–13), U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

b. Resource Conservation and Recovery Act (RCRA)/Boilers and Industrial Furnaces (BIF). One of the options for controlling emissions from pulping process condensates is to steam strip HAPs, primarily methanol, from kraft pulping process condensate streams. After the HAPs are removed, the vent gas from the steam stripper is required to be sent to a combustion device for destruction. Several commenters pointed out that some mills may choose to concentrate the methanol in the steam stripper vent gas, using a rectification column, and burn the condensate as a fuel.

However, the concentrated methanol condensate that would be derived from the steam stripper overheads may be identified as hazardous waste under the Resource Conservation and Recovery Act (RCRA) because it exhibits the ignitability characteristic. See 40 CFR 261.21. Boilers burning such a hazardous waste fuel would ordinarily be required to comply with emission standards set out in 40 CFR Part 266 Subpart H (the so-called BIF regulation, i.e., standards for boilers and industrial furnaces burning hazardous waste). Several commenters recommended incorporating a ''clean fuels'' exclusion into the pulp and paper NESHAP so that the condensate can be burned for energy recovery without the combustion unit also being subject to the RCRA rules. The ''clean fuels'' exclusion is a recommendation from EPA's Solid Waste Task Force to allow recovery of energy from waste-derived fuels that are considered hazardous only because they exhibit the ignitability characteristics and do not contain significant concentrations of HAP. For background information see 61 FR at 17459–69 (April 19, 1996), where EPA proposed such an exclusion based on similarity of waste-derived fuels to certain fossil fuels.

The Agency proposed to exclude this practice from RCRA regulation in the March 8, 1996 notice and solicited comments on this determination (61 FR at 9396). All of the comments supported granting this exemption. As stated in the notice, EPA does not believe that RCRA regulation of the rectification and combustion of the condensate is appropriate or necessary. The rectification practice would not increase environmental risk, would reduce secondary environmental impacts, and would provide a cost savings. Moreover, the burning of condensate will not increase the potential environmental risk over the burning of the steam stripper vent gases prior to condensation. (See generally 61 FR at 9397.) Finally, consideration of risk would more appropriately be handled as part of the section 112(f) residual risk determination required for all sources after implementation of MACT standards. For these reasons, EPA will exclude specific sources at kraft mills that burn condensates derived from steam stripper overhead vent gases from RCRA, including condensates from the steam stripper methanol rectification process. The scope of this exclusion is limited to that requested by commenters, combustion at the facility generating the stream. (Limitation of the scope of the exclusion to on-site burning also eliminates questions about whether RCRA regulation is needed to assure proper tracking and transport of the material.)

B. Effluent Limitations Guidelines and Standards

1. Subcategorization

The subcategorization scheme being promulgated today for effluent limitations guidelines and standards for the pulp, paper, and paperboard industry replaces the subcategorization of this industry that dates back to 1974. EPA's reasons for combining and reorganizing the 26 old subcategories (formerly found in Parts 430 and 431) into 12 new subcategories are set forth below, in the proposal, see 58 *FR* at 66098–100, and in ''Selected Issues Concerning Subcategorization'' (DCN 14497, Volume 1).

In reorganizing Part 430 to comport with the new subcategorization scheme, EPA has reprinted in their entirety the current effluent limitations guidelines and standards applicable to the newly

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formed subcategories. The only substantive changes to the current effluent limitations guidelines and standards are the BAT limitations, NSPS, PSES, PSNS, and best management practices being promulgated today for the Bleached Papergrade Kraft and Soda subcategory (subpart B) and the Papergrade Sulfite subcategory (subpart E). In addition, EPA is promulgating the Voluntary Advanced Technology Incentives Program applicable to subpart B. EPA is making no changes to the BPT and BCT limitations previously promulgated for what are now subparts B and E. Similarly, EPA is retaining the NSPS promulgated in 1982 in new Subparts B and E for new sources that commenced discharge that met the 1982 NSPS after June 15, 1988 but before June 15, 1998 provided that the new source was constructed to meet those standards. EPA is also retaining, without substantive revision, the new source pretreatment standards previously promulgated for subparts B and E for facilities constructed between June 15, 1988 and June 15, 1998.

These limitations and standards are recodified at subparts B and E in the form of segments corresponding to the old subcategorization scheme. (In re-codifying these limitations and standards, EPA has simplified the text introducing the limitations tables, but has not changed the former regulations' substance.) Direct discharging mills currently subject to the 1982 NSPS remain subject to those standards until the date ten years after the completion of construction of the new source or during the period of depreciation or amortization of such facility, whichever comes first. See CWA section 306(d). After such time, the BAT limitations promulgated today apply for toxic and nonconventional pollutants. Limitations on conventional pollutants will be based on the formerly promulgated BPT/BCT limitations corresponding to the BPT/BCT segment applicable to the discharger or on the 1982 NSPS for conventional pollutants, whichever is more stringent.

EPA is making no substantive changes to the limitations and standards applicable to any other subcategory. EPA will promulgate new or revised effluent limitations guidelines and standards, as appropriate, for the remaining subcategories at a later date. See Table II–2. Until then, the previously promulgated effluent limitations guidelines and standards remain in effect.

EPA is making one non-substantive revision in each subpart. Where the existing regulation includes a narrative statement describing the procedure to calculate the effluent limitations guidelines and standards for non-continuous dischargers, e.g., 40 CFR 430.13, 430.15, 430.62(a)–(d), 430.65 (1996 ed.), EPA has performed the calculations and presented the results in tables. The resulting effluent limitations and standards are the same; this procedure was done simply to streamline the regulation and to make it easier to apply for the permit writer.

In order to ensure that any facilities that would not have been subject to the previous subparts will not inadvertently be subject to limitations and standards set forth in the newly redesignated subparts, EPA is using the applicability language of each previously promulgated subpart to define the applicability of the newly redesignated subparts that consolidate them. For example, rather than promulgate the applicability statement proposed for subpart C, see 58 FR at 66199, EPA has instead codified as a single applicability statement, the applicability statements of former subparts A, D and V, which new subpart C now comprises. See 40 CFR 430.30.

The Agency received comments that the groupings comprising the new subcategories are unreasonable because they purportedly ignore distinctions among facilities that affect their ability to implement the technologies that form the basis of the effluent limitations guidelines and standards promulgated for subparts B and E. Thus, some commenters asserted, these facilities would be unable to meet the same limits as other mills in the same new subcategory. EPA considered these comments in detail where they involved mills subject to new effluent limitations guidelines and standards promulgated today in order to determine whether the groupings of the mills into subparts B and E were appropriate. In response to these comments, EPA segmented subpart E. See section VI.B.6.a. When EPA develops the final regulations for the remaining subcategories, EPA similarly will consider if it is appropriate to fine-tune these initial groupings to better respond to material differences between facilities.

EPA also acknowledges that the subcategorization scheme promulgated today was developed based on data received in the ''1990 National Census of Pulp, Paper, and Paperboard Manufacturing Facilities,'' and that there have been changes in the industry since that data gathering effort. Because the resubcategorization has no substantive effect on any mill other than those with production in subparts B and E (for whom revised effluent limitations guidelines and standards are promulgated today), EPA believes that changes in the industry affecting the remaining subparts are best addressed when EPA makes the decision whether to revise the regulations for those subcategories.

a. Bleached Papergrade Kraft and Soda subcategory. The Bleached Papergrade Kraft and Soda subcategory, for which regulations are promulgated in this rulemaking at 40 CFR part 430 subpart B, encompasses the former subparts G (market bleached kraft), H (BCT bleached kraft), I (fine bleached kraft), and P (soda). EPA has retained the applicability statements associated with those former subparts. See 40 CFR 430.20. EPA intends for this merged subcategory to apply to mills that chemically pulp wood fiber using a kraft method with an alkaline sodium hydroxide and sodium sulfide cooking liquor to produce bleached papergrade pulp and/or bleached paper/paperboard. It also applies to mills that chemically pulp wood fiber using a soda method with an alkaline sodium hydroxide cooking liquor. Principal products of bleached kraft wood pulp include papergrade kraft market pulp, paperboard, coarse papers, tissue papers, uncoated free sheet, and fine papers, which include business, writing, and printing papers. Principal products of bleached soda wood pulp are fine papers, which include printing, writing, and business papers, and market pulp.

b. Papergrade Sulfite subcategory. The Papergrade Sulfite subcategory, for which regulations are promulgated in this rulemaking, is defined as 40 CFR part 430 subpart E and encompasses former subpart J (papergrade sulfite-blow pit wash) and subpart U (papergrade sulfite-drum wash). EPA has retained the applicability statements associated with those former subparts. See 40 CFR 430.50. EPA intends for this merged subcategory to apply to mills that chemically pulp wood fiber using a sulfite method, with or without brightening or bleaching, using an acidic cooking liquor of calcium, magnesium, ammonium, or sodium sulfites to produce bleached papergrade pulp and/or bleached paper/paperboard. The provisions of this merged subpart apply regardless of whether blow pit pulp washing techniques or vacuum or pressure drum pulp washing techniques are used.

2. BPT/BCT for the Bleached Papergrade Kraft and Soda Subcategory and the Papergrade Sulfite Subcategory

a. Background. EPA proposed to revise effluent limitations for the conventional pollutants biochemical

oxygen demand (BOD_5) and total suspended solids (TSS) based on the best practicable control technology currently available (BPT) for all of the proposed subcategories, including Bleached Papergrade Kraft and Soda and Papergrade Sulfite. As presented in the proposal, 58 *FR* at 66105, EPA highlighted several controversial issues concerning the BPT limitations, their calculation, and their interpretation. EPA also presented a rationale and methodology and identified related controversies for establishing limitations based on the best conventional pollutant control technology (BCT).

b. BPT. In December 1993, the Agency proposed to revise BPT for conventional pollutants for subparts B and E and specifically solicited comment on that proposed decision. See 58 FR at 66105–06. In response, EPA received comments claiming that EPA lacks the legal authority to revise BPT once BPT effluent limitations guidelines have been promulgated. EPA also received other comments asserting that the Clean Water Act compels EPA to revise BPT. Although the Agency believes that it has the statutory authority to revise BPT, the Agency also believes that it has the discretion to determine whether to revise BPT effluent limitations guidelines in particular circumstances. The question of EPA's legal authority is not relevant here, however, because EPA has decided, in the exercise of its discretion, that it is not appropriate to revise BPT effluent limitations guidelines for conventional pollutants for subparts B and E at this time. Instead the current BPT effluent limitations guidelines for conventional pollutants will continue to apply to these subcategories.

EPA bases this decision on its determination that the total cost of applying the proposed BPT model technology is disproportionate in this instance to the effluent reduction benefits to be achieved. See CWA section 304(b)(1)(B). When setting BPT limitations, EPA is required under section 304(b) to perform a limited cost-benefit balancing to make sure that costs are not wholly out of proportion to the benefits achieved. See, e.g., *Weyerhaeuser Co.* v. *Costle*, 590 F.2d 1011 (D.C. Cir. 1978). It therefore follows that EPA is authorized to perform such balancing when determining whether to revise existing BPT limitations.

Mills in subparts B and E have significantly reduced their loadings of BOD_5 and TSS since promulgation of the current BPT effluent limitations guidelines in 1977. Although additional removals could be achieved if BPT were revised, EPA has determined for subpart B and, separately, for subpart E that the costs of achieving that incremental improvement beyond either the current BOD_5 and TSS limitations or the current long term average for BOD_5 and TSS are disproportionate to the benefits. A single mill might have to spend as much as $17.4 million in order to upgrade to advanced secondary treatment. See the Supplemental Technical Development Document, DCN 14487. These expenditures are particularly significant when one considers the cumulative costs of this rulemaking. Therefore, EPA has decided not to revise BPT limitations for conventional pollutants for mills in the Bleached Papergrade Kraft and Soda subcategory and the Papergrade Sulfite subcategory at this time.

EPA's decision not to revise BPT limitations for subpart B at this time is also informed by the Agency's long-term goal for this industry: that the industry will continuously improve its environmental performance primarily through sound capital planning and expenditures. EPA has determined that this interplay between potentially more stringent revised BPT limitations and the industry's long-term environmental improvement is an appropriate factor to be considered in this rulemaking with respect to BPT. See CWA section 304(b)(1)(B). It is also consistent with the Clean Water Act's overarching objective, which calls upon EPA to implement the statute's provisions with the goal of eliminating the discharge of pollutants into the Nation's waters. See CWA Section 101(a). In this rulemaking, EPA has determined that the baseline regulatory requirements—effluent limitations guidelines and standards and air emissions standards—are only one component of the framework to achieve long-term environmental goals. EPA believes that the mills of the future will approach closed loop operations, thus achieving minimal impact on the aquatic environment. To promote this, EPA is promulgating an incentives program to encourage subpart B mills to implement pollution prevention leading to the mill of the future. See Section IX.

EPA believes that near-term investments to achieve more stringent BPT effluent limitations for conventional pollutants would divert limited resources away from environmentally more preferable investments in advanced pollution prevention technologies. Thus, EPA is concerned that revising BPT effluent limitations guidelines at this time could discourage mills from achieving even greater environmental results through the Voluntary Advanced Technology Incentives Program. Moreover, EPA estimates that, even without revising BPT limitations for subpart B, loadings of BOD_5, for example, will decline by approximately 20 percent when mills meet the baseline BAT limitations and best management practices requirements promulgated today. Incidental removals are even greater for subpart B mills implementing more advanced technologies (e.g., loadings of BOD_5 are estimated to decline by approximately 30 percent at the Tier I level, and EPA expects substantially greater reductions from Tiers II and III). See Table IX–1. EPA also expects comparable TSS loading reductions to occur. See the Voluntary Advanced Technology Incentives Program Technical Support Document, DCN 14488. In short, because sufficient additional removals of conventional pollutants from subpart B mills can be obtained without revising BPT at this time, EPA has determined that, on balance, the incremental benefits attributable to revised BPT limits do not justify the comparatively high costs associated with achieving those limits. For these additional reasons, EPA has decided not to revise BPT for conventional pollutants for mills in the Bleached Papergrade Kraft and Soda subcategory at this time.

Finally, if additional removals of BOD_5 and TSS are needed to protect particular receiving waters, CWA section 301(b)(1)(C) requires mills on a case-by-case basis to meet more stringent limitations as necessary to achieve applicable water quality standards.

For the foregoing reasons, therefore, EPA has decided, in the exercise of its discretion, that it is not appropriate to revise BPT limitations for conventional pollutants for subparts B and E at this time. Rather, the BPT effluent limitations guidelines promulgated for former subparts G, H, I, and P (now Bleached Papergrade Kraft and Soda subcategory, subpart B) and former subparts J and U (now Papergrade Sulfite subcategory, subpart E) remain in effect. These limitations are recodified at subparts B and E in the form of segments corresponding to the old subcategorization scheme. See 40 CFR 430.22 and 430.52.

c. BCT Methodology. In considering whether to promulgate revised BCT limits for subparts B and E, EPA considered whether there are technologies that achieve greater removals of conventional pollutants than the current BPT effluent limitations guidelines, and whether those technologies are cost-reasonable according to the BCT cost test. At

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proposal, EPA presented two alternative methodologies for developing BCT limitations. The first assumed that BPT limits would be revised in the final rulemaking; the alternative analysis was based on the assumption that BPT limits would not be revised. See 58 FR at 66106–07. The principal difference between the two methodologies involved the BPT baseline that EPA would use to compare the incremental removals and costs associated with the candidate BCT technologies. Because the Agency is not revising BPT, EPA used the second alternative to determine whether to revise the current BCT limits for subparts B and E.

d. BCT Technology Options Considered. For the Bleached Papergrade Kraft and Soda subcategory, EPA identified two candidate BCT technologies for the final rule. These were: (i) The technology required to perform at the level achieved by the best 90 percent of mills in the subcategory; and (ii) the technology required to perform at the level achieved by the best 50 percent of mills in the subcategory.

The Papergrade Sulfite subcategory was not divided into segments for the purpose of conducting a BCT analysis because EPA found that treatability of BOD_5 and TSS in the wastewater generated by the three segments does not differ. EPA identified one candidate BCT technology for the Papergrade Sulfite subcategory. This was the technology required to perform at the average level achieved by three mills in the subcategory with at least 85 percent of their production in the segment. Development of candidate BCT technology options based on the best 90 and 50 percent of mills, which EPA used for the Bleached Papergrade Kraft and Soda subcategory, is not appropriate for this subcategory because there are only 11 mills in this subcategory and only four of these have at least 85 percent of their production in the subcategory. The wastewater treatment performance of three of these mills was determined to reflect BCT level performance for the Papergrade Sulfite subcategory. EPA did not consider the wastewater treatment performance of the fourth mill to be representative of the subcategory as a whole because it treats wastewater from liquor by-products manufactured on site, and thus is unique among papergrade sulfite mills.

e. Results of BCT Analysis. EPA evaluated the candidate BCT technologies for both the Bleached Papergrade Kraft and Soda subcategory and the Papergrade Sulfite subcategory and concluded that none of the candidate options passed the BCT cost test. For more details, see the Supplemental Technical Development Document, Section 12, DCN 14487. Therefore, at this time, the Agency is not promulgating more stringent BCT effluent limitations guidelines for the newly constituted subparts B and E. Rather, the BCT limitations promulgated for former subparts G, H, I, and P (now Bleached Papergrade Kraft and Soda subcategory, subpart B) and former subparts J and U (now Papergrade Sulfite subcategory, subpart E) remain in effect. These limitations are recodified at subparts B and E in the form of segments corresponding to the old subcategorization scheme. See 40 CFR 430.23 and 430.53.

3. Pollutant Parameters for BAT/NSPS/PSES/PSNS

a. Dioxin, Furan, and Chlorinated Phenolic Pollutants. EPA is promulgating effluent limitations guidelines and standards for 2,3,7,8-TCDD (''dioxin''), 2,3,7,8-TCDF (''furan''), and 12 specific chlorinated phenolic pollutants for subparts B and E (except for those mills regulated by TCF limitations). For a discussion of EPA's rationale for regulating these parameters, see the proposal, 58 FR at 66102–03 and the proposal Technical Development Document (EPA 821–R–93–019). For a discussion of EPA's pass-through analysis regarding these pollutants, see Section VI.B.5.c(2) and VI.B.6.d.

b. Volatile Compounds. EPA is promulgating effluent limitations guidelines and standards for chloroform for subpart B. For a discussion of EPA's rationale for regulating chloroform, see the proposal, 58 FR at 66102 and the proposal Technical Development Document (EPA 821–R93–019). EPA is not promulgating effluent limitations guidelines and standards for chloroform for subpart E at this time. For a discussion of EPA's pass-through analysis regarding chloroform, see Section VI.B.5.c(2). For the reasons set forth below and in the Supplemental Technical Development Document, DCN 14487, EPA is not promulgating effluent limitations guidelines and standards for the discharge of acetone, methylene chloride, and methyl ethyl ketone (MEK). EPA received no adverse comments in response to its preliminary determination, presented in the July 1996 Notice of Availability, 61 FR at 36839, not to regulate these pollutants.

EPA has reviewed data from both hardwood and softwood mills employing a variety of bleaching processes in an effort to identify factors that contribute to the formation of acetone, methylene chloride, and MEK in the bleach plant. The bleaching processes evaluated included bleaching using elemental chlorine, BAT Option A (elemental chlorine-free (ECF) bleaching using 100 percent chlorine dioxide), BAT Option B (oxygen delignification plus ECF bleaching using 100 percent chlorine dioxide), ECF bleaching using ozone, and totally chlorine-free bleaching. The ranges of loadings for each pollutant were similar across the different bleaching technologies and for both hardwood and softwood mills. The average loadings for these pollutants do not exhibit a performance trend with regard to the bleaching technologies.

In the EPA/Industry long-term study, methylene chloride was found to be a sample- and laboratory-contaminant in certain cases. Among the more recent data reviewed by EPA, methylene chloride was detected in the bleach plant effluent at ten percent of the sampled mills. Where detected, methylene chloride was present at low concentrations. Therefore, because methylene chloride is infrequently detected, because its formation processes are not fully understood, and because the cases in which it is detected are often attributed to sample and laboratory contamination, EPA has decided not to promulgate effluent limitations guidelines and standards for methylene chloride in this rulemaking.

EPA had proposed limitations for acetone and MEK based on limited data indicating that these parameters may be affected by the technology options being considered. EPA has decided not to promulgate effluent limitations guidelines or standards for these parameters because additional data have shown that this is not the case. Moreover, EPA believes that the limitations and new source performance standards being promulgated today for adsorbable organic halides for subpart B mills will ensure that mills will continue to operate their biological wastewater systems at levels necessary to achieve very high removals of these pollutants, thus obviating the need for separate limitations.

In view of the efficacy of biological wastewater treatment in removing acetone and MEK and the fact that process changes have no effect on the levels at which they are generated, EPA is not convinced that these pollutants pass through POTWs. Therefore, EPA is also not setting pretreatment standards for acetone or MEK for subpart B at this time.

With respect to papergrade sulfite mills, EPA expects that, once promulgated, the limitations and standards for AOX based on, among other things, efficient biological

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treatment, will ensure that treatment systems are operated at levels necessary to obviate the need for separate limitations for acetone and MEK. Therefore, EPA is deferring its decision on whether to regulate acetone and MEK until that time.

c. Adsorbable Organic Halides (AOX). EPA is establishing BAT limitations, NSPS, and pretreatment standards for the control of adsorbable organic halide (AOX) discharges from mills in the Bleached Papergrade Kraft and Soda subcategory. EPA is also establishing BAT limitations, NSPS, and pretreatment standards to control AOX discharges from mills in the calcium-, magnesium-, or sodium-based segment of the Papergrade Sulfite subcategory. For a discussion of EPA's pass through analysis for AOX discharges from these mills, see Sections VI.B.5.c(2), VI.B.6.d, and the Supplemental Technical Development Document, Section 8, DCN 14487. As discussed in more detail in those sections, EPA is not setting effluent limitations guidelines and standards for AOX for other mills in subpart E at this time.

AOX is a measure of the total chlorinated organic matter in wastewaters. At pulp and paper mills, almost all of the AOX results from bleaching processes. Even though dioxin and furan are no longer measurable using today's analytical methods at the end of the pipe at many mills, the potential for formation of these pollutants continues to exist at pulp and paper mills as long as any chlorine-containing compounds (including chlorine dioxide) are used in the bleaching process. The record demonstrates a correlation between the presence of AOX and the amount of chlorinated bleaching chemical used in relation to the residual lignin in the pulp (expressed as the kappa factor). The record further shows that there is a correlation between the kappa factor and the formation of dioxin and furan. Therefore, EPA concluded that reducing AOX loadings will have the effect of reducing the mass of dioxin, furan, and other chlorinated organic pollutants discharged by this industry. For further discussion of EPA's rationale for regulating AOX, see the Supplemental Technical Development Document (DCN 14487) and response to comments on justification for establishing limitations for AOX (DCN 14497, Vol. I).

EPA's decision to regulate AOX is also based on the fact that AOX, unlike most of the chlorinated organic compounds regulated today, is comparatively inexpensive to monitor for and is easily quantified by applicable analytical methods. Thus, while EPA could have decided to control the formation of dioxin, furan, chloroform, and the 12 regulated chlorinated phenolic pollutants by requiring mills to monitor for those pollutants on a daily basis, EPA also recognizes that testing for those pollutants is expensive and time consuming. In contrast, daily monitoring for AOX as required in today's rule is considerably less expensive. See Section VI.B.8.b(4) and DCN 14487. Additionally, under the Voluntary Advanced Technology Incentives Program, enrolled mills are eligible for reduced AOX monitoring. See Section IX.B.2 and DCN 14488. Moreover, the presence of AOX can be readily measured in mill effluent, in contrast to the presence of many of the chlorinated organic compounds regulated in today's rule, which for the most part are likely to be present at levels that cannot be reliably measured by today's analytical methods. See Section VI.B.5.a(4). Thus, although EPA is not required under the Clean Water Act to consider the environmental or human health effects of its technology-based regulations, EPA has also determined that regulating AOX as part of BAT, NSPS, PSES and PSNS provides further assurance that human health and the environment will be protected against the potential harm associated with dioxin, furan, and the other chlorinated organic pollutants.

d. Chemical Oxygen Demand (COD). The proposed rule included end-of-pipe BAT limitations and PSES for COD. EPA continues to believe that COD limitations can be used to ensure the operation of processes that minimize the discharge of all organic compounds, including toxic organic compounds that are not readily biodegraded. However, the limited data available at this time do not adequately characterize other sources of COD that may be present at some complex mills, although it appears that the COD contributed by these sources may be as great as the COD contribution from the pulp mill and bleach plant areas of the mill. These other sources of COD could include paper machines, mechanical pulping, other on-site chemical pulping, and secondary fiber processing (including deinking). See DCN 13958 and DCN 14495. Even if sufficient data were now available to establish COD limitations and standards for pulp mill operations in subparts B and E, EPA does not have sufficient information at present to evaluate the other sources of COD and the performance of control technologies to limit COD at those sources in order to set national effluent limitations guidelines and standards.

For this reason, EPA is not establishing final effluent limitations guidelines and standards for COD at this time. EPA does, however, intend to promulgate COD limitations and NSPS for the Bleached Papergrade Kraft and Soda and Papergrade Sulfite subcategories in a later rulemaking. For this purpose, EPA will gather additional data to characterize other sources of COD that may be present at complex mills subject to subparts B or E. This effort will be undertaken concurrently with data gathering to assess the need for establishing COD limits for mills operating in other subcategories (Phase II rulemaking). EPA believes that this data-gathering effort will facilitate setting limits in permits for complex mills with other onsite process operations. EPA will also decide as part of the Phase II rulemaking whether COD passes through or interferes with the operation of POTWs and, therefore, whether pretreatment standards for COD would be appropriate for subparts B and E.

While EPA does not have sufficient data to issue national technology-based regulations for COD at this time, EPA strongly urges permitting authorities to consider including COD limitations in NPDES permits for Subpart B and E mills on the basis of best professional judgment. See 40 CFR 125.3(c)(3). Pretreatment authorities should establish COD local limits if COD passes through or interferes with the POTWs within the meaning of the general pretreatment regulations. See 40 CFR 403.5(c). EPA believes that permitting or pretreatment authorities should address COD for the following reasons. Chronic sublethal toxic effects have been found to result from the discharge of treated effluent from bleached and unbleached kraft, mechanical, and groundwood/sulfite pulp mills (see DCNs 3984, 13985, 13975, 13976, 13979, and 00012). These chronic toxic effects were measured as increased liver mixed-function oxydase activity and symptoms of altered reproductive capacity in fish (DCN 60002). This toxicity is associated at least in part with families of non-chlorinated organic materials that are measured by the existing COD analytical method. Some of these materials, including several wood extractive constituents found in pulping liquors, are refractory (i.e., resistant to rapid biological degradation) and thus are not measurable by the five-day biochemical oxygen demand (BOD_5) analytical method.

In order to assist permitting or pretreatment authorities in developing

COD limitations, EPA describes below various processes that mills can use to control COD. The major sources of COD (which includes slowly biodegradable and non-biodegradable organic material) at a pulp mill are the pulp mill and bleach plant areas. Pulping sources of COD include digester condensates and spent pulping liquor. Open screening processes can be a major source of COD discharges. Spent pulping liquor can also be lost from the process through process spills and equipment leaks. Bleach plant filtrates, the recovery area, leaks from turpentine processing areas at softwood mills, and pulp dryers are examples of other sources of COD at pulp mills.

The process changes that form the basis of the effluent limitations guidelines and standards promulgated today include processes that can reduce discharges of primarily non-chlorinated organic compounds. These as yet unidentified refractory organic compounds have been correlated with chronic sublethal aquatic toxicity from pulp mill effluents. By recovering much of the non-chlorinated organic compounds prior to bleaching, discharges of chlorinated organic compounds also are reduced. For example, improved brownstock washing, which is part of the model technology basis for today's regulations, can be operated (for the purposes of achieving COD limitations) to minimize black liquor carryover to the bleach plant and thus reduce the formation of AOX and toxic chlorinated compounds. Another process technology effective at reducing organic discharges associated with pulping liquors is for a mill to return all water from pulp screening to the process, termed a closed screen room.

EPA intends for the best management practices promulgated today for Subparts B and E to lead mills to retain spent pulping liquors in the process, to the maximum extent practicable, through preventing leaks and spills and through capturing those leaks and spills that do occur and returning the organic material to the recovery system. The BMPs are also intended to lead mills to collect intentional diversions of spent pulping liquors and return those materials to the process. However, the BMP regulations do not require that the contained leaked and spilled material be recovered in the process, nor are intentional diversions required to be returned to the process. In the absence of COD limitations, significant quantities of this organic material could be metered to the wastewater treatment system. As a result, while the BMP program will effectively prevent releases of pulping liquors (and soap and turpentine) that would upset or otherwise interfere with the operation of the wastewater treatment system, refractory organic material believed to cause chronic toxic effects could still be discharged at levels greater than the levels achievable through optimized process technologies and effective end--of-pipe treatment. For this additional reason, EPA believes that COD limitations established on a best professional judgment basis would be appropriate.

The COD data considered by EPA are presented in the support document, Analysis of Data for COD Limitations, DCN 13958, for this rule. This support document also presents EPA's estimates (based on data available today) of the ranges of COD effluent load believed to be contributed by other mill operations, which EPA is supplying as limited guidance to permitting and pretreatment authorities. EPA urges permitting authorities to include—and exercise—reopener clauses in NPDES permits for mills subject to Subpart B or E in order to impose or revise COD effluent limitations once effluent limitations guidelines for COD are promulgated.

e. Color and Other Pollutants. EPA proposed BAT limitations and PSES for color for the Bleached Papergrade Kraft and Soda subcategory only. Commenters asserted that EPA should not establish effluent limitations guidelines and standards for color because it is a concern more appropriately addressed in individual permits based on applicable water quality standards. EPA agrees with this comment. The potential for significant aesthetic or aquatic impacts from color discharges is driven by highly site-specific conditions and is best dealt with on a case-by-case basis through individual NPDES permits or, when appropriate, through local limits. Therefore, the Agency is not promulgating technology-based limitations or standards for color. See DCN 14497, Vol. I.

EPA did not propose effluent limitations for four pollutants, including biphenyl, carbon disulfide, dimethyl sulfone, and mercury, and indicated in the Technical Development Document (at Section 7.3.5) that these four pollutants were remaining under consideration for regulation. Based on limited data available to date, EPA has decided not to establish effluent limitations and standards for these pollutants. EPA has reached this decision because these pollutants are not found consistently in effluents and thus they are not directly related to pulping and bleaching processes serving as the basis for BAT and NSPS. EPA notes that where mercury was found to be present, the concentrations at which it was found suggests that a possible source of this pollutant may be contaminants of purchased chemicals. However, the Agency did not obtain any information or data which would either clearly identify the source or sources of mercury or the other pollutants, or provide a basis for identifying applicable control technologies or establishing effluent limitations. Therefore, EPA is not developing effluent limitations and standards. Individual mills may still receive water quality based effluent limitations (Section 301(b)(1)(C)) for any of these pollutants where necessary to protect local water quality.

f. Biocides. EPA is retaining the current effluent limitations guidelines and standards for the biocides pentachlorophenol and trichlorophenol for former subparts G, H, I, and P (now Bleached Papergrade Kraft and Soda subcategory, subpart B) and former subparts J and U (now Papergrade Sulfite subcategory, subpart E). These limitations and standards are recodified at subparts B and E. See 40 CFR 430.24(d), 430.25(d), 430.26(b), 430.27(b), 430.54(b), 430.55(c), 430.56(b), 430.57(b). For subpart B, the limitations and standards are presented in the form of segments corresponding to the old subcategorization scheme. (EPA did not need to track the old subcategorization scheme for subpart E because the limitations and standards for former subparts J and U were the same.) EPA is not codifying any minimum monitoring frequency for these pollutants. See 40 CFR 430.02. In addition, unless the permitting or pretreatment authority decides otherwise, EPA expects that mills would demonstrate compliance with these limitations at the end of the pipe.

As before, the regulations continue to provide that a discharger is not required to meet the biocides limitations or standards if it certifies to the permitting or pretreatment authority that it is not using these compounds as biocides. See, e.g., 40 CFR 430.24(d). (These certification provisions have been approved by the Office of Management and Budget under control number 2040–0033. See 40 CFR 9.1.) EPA notes, however, that mills using chlorine-containing compounds in their bleaching processes are required to meet separate limitations or standards for pentachlorophenol, 2,4,5-trichlorophenol, and 2,4,6-trichlorophenol in connection with the new effluent limitations and standards promulgated today for subparts B and E regardless whether these compounds are

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also used as biocides. See, e.g., 40 CFR 430.24(a)(1). (Those compounds are included within the list of the 12 chlorinated phenolic pollutants discussed in Section VI.B.3.a.) EPA is requiring dischargers to demonstrate compliance with these limitations and standards by monitoring for those pollutants at the point where the wastewater containing those pollutants leaves the bleach plant. See, e.g., 40 CFR 430.24(e).

EPA believes it is appropriate to codify separate limitations and standards for those pollutants, even though in very rare cases a mill may be required to comply with both sets. First, although for the same pollutants the two sets of limitations arise from different chemical applications in different parts of the mill. As biocides, pentachlorophenol or trichlorophenol could be used virtually anywhere in a mill's industrial process, but were typically used as slimicides in whitewater recirculation systems. In the limitations and standards promulgated today, however, pentachlorophenol, 2,4,5-trichlorophenol and 2,4,6-trichlorophenol are being regulated because they are found in bleach plant wastewater when chlorine-containing compounds are used for bleaching. Second, EPA expects these pollutants to be reduced to quantities below the minimum level of the applicable analytical method as a result of bleach plant process changes, which is not the case when they are used as biocides. Thus the different limitations and standards found in subparts B and E for these pollutants respond to different situations and reflect different model process technologies. Finally, EPA believes that mills in the Bleached Papergrade Kraft and Soda subcategory or the Papergrade Sulfite subcategory generally do not use pentachlorophenol or trichlorophenol as biocides today. See the Supplemental Technical Development Document, DCN 14487. Therefore, EPA expects that each mill will be able to certify that it is not using the compounds as biocides and therefore will not be subject to the biocides-related limitations.

4. Analytical Methods

In this rule, EPA is promulgating Method 1650 for the analysis of AOX and Method 1653 for the analysis of certain chlorinated phenolic compounds.

a. Authority. The analytical methods in this final rule are promulgated under the authority of CWA sections 301, 304(h), 307, 308, and 501(a). Section 301 of the Act prohibits the discharge of any pollutant into navigable waters unless the discharge complies with an NPDES permit issued under section 402 of the Act. Section 301 also specifies levels of pollutant reductions to be achieved by certain dates. Section 304(h) of the Act requires the EPA Administrator to ''promulgate guidelines establishing test procedures for the analysis of pollutants that shall include the factors which must be provided in any certification pursuant to section 401 of this Act or permit applications pursuant to section 402 of this Act.'' These test procedures for the analysis of pollutants also assist in the implementation of Section 301. Section 501(a) of the Act authorizes the Administrator to prescribe such regulations as are necessary to carry out her function under this Act.

The Administrator has also made these test procedures (methods) applicable to monitoring and reporting of NPDES permits (40 CFR part 122, §§ 122.21, 122.41, 122.44, and 123.25), and implementation of the pretreatment standards issued under section 307 of CWA (40 CFR part 403, §§ 403.10 and 403.12). Section 308 provides authority for information gathering.

b. Background and History. In the December 17, 1993 proposal, EPA referenced a compendium entitled ''Analytical Methods for the Determination of Pollutants in Pulp and Paper Industry Wastewater.'' This compendium contained methods that had not been promulgated at 40 CFR part 136, but would be applicable for monitoring compliance with the limitations and standards proposed for part 430 at that time. The compendium included methods for the analysis of CDDs and CDFs (i.e., dioxin and furans), AOX, chlorinated phenolics, and color. These methods were proposed for promulgation at 40 CFR part 430 to support the proposed regulation and were included in the docket for the proposed pulp and paper rule.

EPA received more than 200 individual comments and suggestions concerning the proposed analytical methods. Some of these were comments on the methods not being promulgated today. Many of the comments and suggestions were technically detailed, ranging from suggestions on changing the integration time in Method 1650 (for AOX) to reducing the spike levels for labeled compounds used in Method 1653 (for chlorinated phenolics). Other comments raised questions about EPA's approach to technical issues and policies regarding the handling of analytical data. EPA has included a summary of the detailed comments and specific responses to those comments in the record for today's rule.

On July 15, 1996, EPA published a notice of availability that, among other things, summarized the changes the Agency intended to make to the proposed or promulgated analytical methods and stated that detailed revisions to the methods would be added to the record at a later date. See 61 FR at 36848–49. In promulgating today's rule, EPA has implemented the changes identified in the July 1996 Notice. These changes are summarized below and detailed in the response to comments provided in the record.

c. Analytical Methods Promulgated Today. EPA has revised the analytical methods compendium entitled ''Analytical Methods for the Determination of Pollutants in Pulp and Paper Industry Wastewater'' to incorporate revisions to the methods made since proposal. This compendium (EPA–821–B–97–001, August 1997) contains the analytical methods to be used for monitoring compliance with the limitations and standards promulgated today for subparts B and E. The compendium includes Method 1650 for the determination of AOX and Method 1653 for the determination of chlorinated phenolics. These two analytical methods are being promulgated today as appendices to 40 CFR part 430. They have not yet been promulgated at 40 CFR part 136.

(1) Method 1650: AOX by Adsorption and Coulometric Titration

Method 1650 can be used to measure AOX in water and wastewater. AOX is a measure of halogenated organic compounds that adsorb onto granular activated carbon (GAC). The method involves adsorption of the organic halides (chlorine, bromine, iodine) in water onto GAC, removal of inorganic halides by washing, combustion of the organic halides (along with the GAC) to form hydrogen halides, and titration of the hydrogen halides with silver ions in a microcoulometer. The results are reported as organic chlorine even though other halides may be present because chlorine is the halide of concern in pulp and paper wastewaters. EPA studies have demonstrated a Method Detection Limit (MDL) of 6.6 μg/L. Based on this MDL and on calibration of the microcoulometer, the minimum level (ML) in Method 1650 has been determined to be 20 μg/L. The minimum level and other performance attributes for this method have been validated in single laboratory method validation studies and by use in data gathering for today's final rule. All laboratories that used Method 1650 in the data gathering effort calibrated their instruments at the ML.

Since proposal, EPA has made changes to Method 1650 to improve the ease of use and the reliability of this method. These changes are reflected in the version of Method 1650 being promulgated today and they largely reflect comments and suggestions made following proposal of the method. In response to comments, EPA made several changes to Method 1650, including: adjustment of the breakthrough specification to 25 percent based on recent data; allowance of a 100- or 25-mL adsorption volume, provided the sensitivity requirements in the method are met; provision of greater flexibility in allowable glassware sizes; use of 100-mL volumes of standards for calibration and other purposes to conserve reagents; use of only 2-mm columns to make the column procedure more reproducible; adjustment of the QC acceptance criteria based on an industry interlaboratory method validation study; and the addition of a minimum integration time of 10 minutes to assure that all AOX is measured. In addition, the format of the method has been modified to reflect the standardized format recommended by EPA's Environmental Monitoring Management Council (EMMC). For a more detailed discussion of the changes made to Method 1650 since proposal, see DCN 14497, Vol. VII.

EPA disagreed with several comments on EPA's proposed Method 1650 and therefore did not make the changes suggested by commenters. In particular, EPA disagrees that the method detection limit (MDL) should be increased to 20 µg/L to allow for blank contamination. In EPA's view, blank contamination can be controlled to levels well below 20 µg/L. EPA also disagrees that it should eliminate Section 8.1.2 of the proposed method. (Section 8.1.2 contained provisions for flexibility.) EPA has received a large number of requests that analytical methods be ''performance-based,'' and has attempted to implement the means for allowing changes in Section 8.1.2 (Section 9.1.2 in the version of Method 1650 being promulgated today). Under Section 8.1.2, the laboratory can make minor modifications to Method 1650 provided that the laboratory performs all quality control (QC) tests and meets all QC acceptance criteria. In addition, contrary to a suggestion from a commenter, EPA has not included examples of cell maintenance in Method 1650 because EPA believes that analysts who maintain the coulometric cell must be familiar with the cell maintenance procedures provided by the instrument manufacturer. For more information on these issues, see DCN 14497, Vol. VII.

(2) Method 1653: Chlorophenolics by In-Situ Derivatization and Isotope Dilution GC/MS

Method 1653 can be used to measure chlorinated phenolic compounds in water and wastewater amenable to *in situ* acetylation, extraction, and determination by HRGC combined with low-resolution mass spectrometry (LRMS). In this method, chlorophenolics are derivatized *in situ* to form acetic acid phenolates that are extracted with hexane, concentrated, and injected into the HRGC/LRMS where separation and detection occurs.

EPA studies have demonstrated MDLs of 0.09–1.39 µg/L for chlorophenolics in water. Based on these MDLs and on calibration of the GCMS instrument, minimum levels have been determined for the 12 chlorinated phenolics in today's rule. These minimum levels of 2.5 or 5.0 µg/L depend on the specific compound and have been validated in single laboratory validation studies and by use in data gathering for today's final rule. All laboratories that used Method 1653 in the data gathering effort calibrated their instruments at the ML.

Since proposal, EPA has made changes to Method 1653 to improve the reliability of the method and to lower costs of measurements. These changes are incorporated into the version of the method being promulgated today; they largely reflect comments and suggestions made following proposal of the method.

In response to comments, EPA made several specific changes to Method 1653, the most significant of which are as follows: lowering the spike level of the labeled compounds to reduce interferences with trace levels of the analytes of interest and to lower the cost of labeled compounds; specifying more appropriate solvents for the analytical standards containing labeled and native analytes; requiring laboratories to add the labeled compounds to the sample prior to pH adjustment; restating the quality control acceptance criteria for recovery in terms of percent instead of concentration; and reducing method flexibility in certain critical areas. In addition, as with Method 1650, the method has been revised into the standardized EMMC format.

EPA disagreed with several comments on EPA's proposed Method 1653 and therefore did not make changes suggested by commenters. EPA received comments that Method 1653 has not been validated adequately. EPA disagrees. Method 1653 has been validated in multiple single-laboratory method validation studies and extensively validated in field studies for this final rule. EPA believes that these extensive studies are more than adequate to validate Method 1653 for use in data gathering to support this final rule and for use in monitoring under this final rule. EPA also disagrees with comments that Method 1653 is inadequate for chlorocatechols. EPA believes that Method 1653 provides more reliable data for catechols and the other chlorophenolics than any other method available, and the commenter provided no suggestions for how Method 1653 could be improved for determination of chlorocatechols. EPA has, therefore, kept chlorocatechols in Method 1653. EPA also disagrees with comments that initial precision and recovery (IPR) and ongoing precision and recovery (OPR) tests should be replaced with initial calibration (ICAL) and calibration verification (VER) tests. (The ICAL and IPR are different in both form and function. The calibration test is for calibrating the analytical system while the IPR test is conducted to check performance. The OPR and VER tests are the same; only the terminology is different. EPA has retained use of the OPR terminology to be consistent with other methods.) EPA also disagrees with comments that use of labeled compounds is not worth the benefit and that all phenols and guaiacols should be quantitated against 3,4,5-trichlorophenol. EPA believes that data gathered to support today's final rule and in other studies demonstrate that isotope dilution provides the most precise and accurate measurement of chlorophenolics and other compounds determined by gas chromatography/mass spectrometry. EPA also received comments urging EPA not to allow modifications to the method. However, EPA also received a large number of requests that analytical methods be ''performance-based,'' and has attempted to implement the means for allowing changes to improve detection and quantitation or to lower costs of measurements. Limited changes may be made, except where specifically prohibited in Method 1653, provided that the performance tests are repeated and the results produced by the change are equivalent or superior to results produced with the unmodified method. EPA has also decided to retain the mention of field duplicates in the method in the event that a laboratory or discharger desires to measure sampling precision. Finally, EPA has not added the requirement that laboratories should be forced to overcome emulsions. EPA believes that nearly all emulsions can be overcome and provides specific steps in

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the method that the laboratory must take to break the emulsion. However, EPA does not wish to impose such a requirement on laboratories in the event that a future sample is encountered that produces an emulsion that cannot be broken. If all efforts to break the emulsion fail, Method 1653 allows the use of a dilute aliquot. For more discussion, see Comment Response Document, Vol. VII, DCN 14497.

d. Other Methods. In addition to the methods promulgated today, the effluent limitations guidelines and standards also call for the use of Method 1613 (for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and 2,3,7,8-tetrachlorodibenzofuran (TCDF)) and any of the approved methods for chloroform to monitor compliance. These methods are discussed below.

(1) Method 1613: CDDs and CDFs by HRGC/HRMS

Method 1613 uses isotope dilution and high-resolution gas chromatography combined with high-resolution mass spectrometry (HRGC/HRMS) for separation and detection of 17 tetra- through octa-substituted dibenzo-p-dioxin and dibenzofuran isomers and congeners that are chlorinated at the 2, 3, 7, and 8 positions. Separate procedures are available for the determination of these analytes in water and solid matrices. In the procedure, a 1–L sample is passed through a 0.45-µ glass fiber filter. The filter is extracted with toluene in a Soxhlet/Dean-Stark (SDS) extractor. The aqueous filtrate is extracted with methylene chloride in a separatory funnel. Extracts from the SDS and separatory funnel extractions are combined and concentrated. To remove interferences, the combined, concentrated extract is cleaned up using various combinations of acid and base washes, acidic and basic silica gel, gel permeation chromatography (GPC), high-performance liquid chromatography (HPLC), and activated carbon. The cleaned up extract is concentrated to 20 µL and a 1–2 µL aliquot is injected into the HRGC/HRMS.

The MDL determined for TCDD is 4.4 part-per-quadrillion (ppq). Minimum levels for Method 1613 are 10 ppq for TCDD and TCDF. These MLs have been validated through an interlaboratory study and by use in the analysis of mill effluents.

EPA recently promulgated Method 1613 for the determination of CDDs and CDFs at 40 CFR 136, Appendix A in a final rule published on September 15, 1997 (62 FR 48394). Of the 17 congeners that may be measured with this method, only TCDD and TCDF are regulated under this final rule. Method 1613 was first proposed for general use in compliance monitoring and for other purposes at 40 CFR part 136 on February 7, 1991 (56 FR 5090) and was proposed for use in pulp and paper industry wastewaters at 40 CFR part 430 on December 17, 1993 (58 FR 66078). EPA received extensive comments and suggestions on both proposals of Method 1613; in several cases, the same set of comments was submitted. EPA updated the final Method 1613 based on suggestions and comments received on the original proposal (56 FR 5090) and on the proposal of Method 1613 for use at 40 CFR part 430 (58 FR 66078). In the docket supporting promulgation of Method 1613, EPA provided a listing of detailed comments received on both proposals of Method 1613, along with detailed responses to all of those comments. Because Method 1613 was promulgated in a final rule prior to promulgation of today's final rule, and because EPA received comments and provided responses in support of that final rule, EPA is not promulgating Method 1613 as part of today's final rule. See the final rule promulgating Method 1613 (62 FR 48394) for all information concerning that method.

(2) Method 1624: Volatiles by Purge-and-Trap and Isotope Dilution GC/MS

Method 1624 is used for the determination of volatile pollutants in water and wastewater. It employs a gas chromatograph coupled to a mass spectrometer (GC/MS) to separate and quantify volatile pollutants. Detected pollutants are quantified by isotope dilution. Samples of water or solids suspended in water are purged of volatile organic pollutants by a stream of inert gas into the gaseous phase where they are concentrated onto a trap. Subsequent heating of the trap introduces the concentrated volatile organics into a GC/MS for separation and quantification.

With no interferences present, minimum levels of 10–50 µg/L can be achieved, depending on the specific pollutant. For chloroform, the minimum level is 10 µg/L. This minimum level has been validated by use.

When EPA initially proposed today's rule, it proposed to regulate four volatile organic pollutants. Method 1624, Revision C was proposed for monitoring the presence of these pollutants in effluent discharges. Revision C contained updates and improvements to Method 1624, Revision B, which was promulgated October 26, 1984 (49 FR 43234).

In today's final rule, EPA is regulating only one of the originally proposed volatile pollutants (chloroform); this pollutant can be measured by already-approved EPA Methods 601, 624, and 1624B and Standard Methods 6210B and 6230B. Therefore, EPA has not included Method 1624C in today's final rule and has not formally addressed comments concerning Method 1624C. EPA will consider comments on Method 1624C when this version of the method is promulgated for general use at 40 CFR 136 or when the method is further revised.

(3) Other Issues Concerning Analytical Methods Promulgated in Today's Final Rule

The overall comments received from the regulated industry and others provide suggestions for method improvement but, in some cases, question EPA's approach to technical issues in the methods and the handling of data. For example, commenters suggested that quality control tests be performed at the minimum level (ML), that a 3-point calibration should be used for labeled compounds in isotope dilution methods, and that additional QC tests should be required. Commenters also stated that all methods must be subjected to interlaboratory validation, and that the compliance monitoring detection limit (CMDL) and compliance monitoring quantitation limit (CMQL) should be used in place of EPA's method detection limit (MDL) and ML, respectively. EPA responded to these suggestions by providing specific reasons why they are inconsistent with the provisions in other methods, are more extensive than required to assure reliable results, or that they would not substantively alter the conclusions of studies and data gathering used to support this final rule. The detailed responses to these issues are in the record for this rule.

5. Bleached Papergrade Kraft and Soda Subcategory

a. BAT. (1) Technology Options Considered.

(a) Options Proposed. The Agency considered many combinations of pollution prevention technologies as regulatory options to reduce the discharge of toxic and nonconventional pollutants from bleached papergrade kraft and soda mills. These options are discussed in the proposal and the Notice of Availability published on July 15, 1996. See 58 FR at 66109–11 and 61 FR at 36838–39, 36848. Five different options were presented in the proposal.

The Agency proposed BAT effluent limitations guidelines based on an option that included the use of oxygen delignification or extended cooking

with elimination of hypochlorite and complete (100 percent) substitution of chlorine dioxide for elemental chlorine as the key process technologies. Complete substitution of chlorine dioxide for elemental chlorine and elimination of hypochlorite is known as elemental chlorine-free (ECF) bleaching. EPA's definition of ECF bleaching includes high shear mixing to ensure adequate mixing of pulp and bleaching chemicals, as well as other technology elements.

EPA proposed this option because it believed, based on the record at the time, that this combination of technologies was both available and economically achievable and that no other available and economically achievable option resulted in greater effluent reductions. See 58 FR at 66110. In the July 1996 Notice, EPA identified this technology option as Option B. See 61 FR at 36838.

EPA also considered at proposal another option based on conventional pulping—complete substitution of chlorine dioxide for elemental chlorine, but without the use of oxygen delignification or extended cooking (i.e., conventional pulping). See 58 FR at 66111. At the time of proposal, EPA was unable to fully analyze this alternative because very limited performance data were available from mills using this technology. Therefore, EPA solicited further data and comments on this option, Id. In the July 1996 Notice, EPA published preliminary findings regarding this option, which it identified as Option A. See 61 FR at 36838–42.

The Agency also considered a totally chlorine-free (TCF) option for the Bleached Papergrade Kraft and Soda subcategory at proposal. See 58 FR at 66109. TCF bleaching processes are 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. EPA concluded that TCF was not an available pollution prevention technology at the time of proposal because of limited worldwide experience with this process and a lack of data for TCF bleaching of softwood to full market brightness. To encourage continuing innovation in the development of processes to reduce or eliminate the discharge of pollutants from the Bleached Papergrade Kraft and Soda subcategory, however, EPA proposed alternative BAT limits for mills adopting TCF processes.

In the July 1996 Notice, EPA also described an incentives program that it was considering for Subpart B mills in order to promote more widespread use of advanced pollution prevention technologies. See 61 FR at 36849–58. As part of this voluntary program, EPA proposed to establish up to three sets of alternative BAT limitations that would complement the compulsory baseline BAT requirements. EPA identified the proposed alternative BAT limitations as Tier I, Tier II, and Tier III BAT limitations. See 61 FR at 36850. EPA considered basing Tier I limits on BAT Option B technology (if Option A were chosen as the basis for the baseline BAT limitations). The Tier II and Tier III limitations, in turn, would be based on technologies and processes that EPA expected to achieve substantial reductions in pulping area condensate, evaporator condensate, and bleach plant wastewater flow.

(b) Final ECF Options Evaluated. For this final rule, EPA considered two ECF technology options—Option A and Option B—as the basis for BAT effluent limitations. Option A consists of conventional pulping followed by complete substitution of chlorine dioxide for elemental chlorine, as well as the following nine elements:

(i) Adequate chip thickness control;

(ii) Closed brownstock pulp screen room operation, such that screening filtrates are returned to the recovery cycle;

(iii) Use of dioxin- and furan-precursor-free defoamers (i.e., water-based defoamers or defoamers made with precursor-free oils);

(iv) Effective brownstock washing, i.e., washing that achieves a soda loss of less than or equal to 10 kg Na_2SO_4 per ADMT of pulp (equivalent to approximately 99 percent recovery of pulping chemicals from the pulp);

(v) Elimination of hypochlorite, i.e., replacement of hypochlorite with equivalent bleaching power in the form of additions of peroxide and/or oxygen to the first extraction stage and/or additional chlorine dioxide in final brightening stages;

(vi) Oxygen- and peroxide-enhanced extraction, which allows elimination of hypochlorite and/or use of a lower kappa factor in the first bleaching stage;

(vii) Use of strategies to minimize kappa factor and dioxin- and furan-precursors in brownstock pulp;

(viii) High shear mixing during bleaching to ensure adequate mixing of pulp and bleaching chemicals; and

(ix) Efficient biological wastewater treatment, achieving removal of approximately 90 percent or more of influent BOD_5. These elements are discussed in detail in the Supplemental Technical Development Document, DCN 14487. Option B is identical to Option A, with the addition of extended delignification (oxygen delignification and/or extended cooking). EPA also considered a TCF option, see subsection (c) immediately below, and, in the context of the Voluntary Advanced Technology Incentives Program, three sets of voluntary alternative BAT limitations. See Section IX.A.

In a slight change from the definition of the proposed BAT option, EPA has defined Option B not only in terms of the presence of extended delignification technology (i.e., oxygen delignification or extended cooking) but also by the pre-bleaching kappa number achieved by extended delignification. Kappa number is the measure of lignin content in unbleached pulp and is commonly used by the industry. Many researchers have shown (and EPA has confirmed) strong correlations between the kappa number of the pulp entering the first stage of bleaching and the bleach plant effluent loads of AOX and COD. See DCN 14497, Vol. I. EPA concluded that merely employing extended delignification technologies, without reducing the unbleached pulp kappa number, is not sufficient to achieve the low effluent loadings of AOX and COD characteristic of Option B. Therefore, EPA has redefined Option B as ECF with extended delignification resulting in a kappa number at or below 20 for softwoods and below 13 for hardwoods (see the Supplemental Technical Development Document, DCN 14487). EPA found that these kappa numbers are achievable by virtually all mills that currently have installed and are effectively operating extended delignification technology.

As part of the nine elements common to both Option A and Option B, EPA has included strategies for minimizing kappa factor and dioxin- and furan-precursors in brownstock pulp. These strategies are part of Options A and B because EPA has determined that they minimize the generation of dioxin, furan, and AOX and, hence, are part of the model process sequence to achieve those limitations. See 61 FR at 36848 and the Supplemental Technical Development Document, DCN 14487.

Kappa factor, also known as active chlorine multiple, is the ratio of chlorine bleaching power to the pulp kappa number. (The kappa factor is different from the kappa number discussed above.) The kappa factor used on a particular bleach line depends on the fiber furnish, final product specifications, pre-bleaching processes employed, and optimization of bleaching costs. At the mills whose data were used to characterize Option A performance, kappa factors for softwood

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furnish averaged 0.17 and all were less than 0.2. At the mills whose data were used to characterize Option B performance, kappa factors for softwood furnish averaged 0.23, with all but one at less than 0.21. Well-operated and maintained mills using comparable kappa factors will be capable of achieving limitations corresponding to Option A or B, respectively. Based on certain site-specific factors, such as furnish, some mills will be capable of achieving today's limitations with higher kappa factors. There are numerous strategies a mill can employ to minimize its kappa factor. See the Supplemental Technical Development Document, DCN 14487.

In addition, there are numerous strategies a mill can employ to minimize precursors of dioxin and furan contained in brownstock pulp. These strategies include, but are not limited to, improved brownstock washing, improved screening to produce cleaner pulp, eliminating compression wood (knots) from brownstock pulp, and using only precursor-free condensates in brownstock washers. The strategy or strategies appropriate for the production of a given pulp depend on the raw material (wood species and the form it takes, i.e., chips, waste wood, or sawdust), process equipment, and the specifications of the final pulp product (brightness, cleanliness, strength, absorbency, and others). For a discussion of these strategies, see the Supplemental Technical Development Document, DCN 14487.

(c) Totally Chlorine-Free (TCF) Bleaching Option Evaluated. The Agency received many comments that it should continue to investigate TCF bleaching because dioxin and furan are not generated at any level with TCF bleaching, thus assuring that these pollutants are not released to the environment. The Agency conducted two sampling programs at the one U.S. mill that produces TCF bleached kraft softwood pulp. EPA collected samples of bleach plant filtrates but could not collect samples of treated effluent because the mill does not employ secondary treatment. The Agency also conducted a sampling program at a Nordic mill that produces hardwood and softwood kraft pulp on two bleach lines that alternate between ECF and TCF bleaching. Samples collected at this mill could not be used to characterize treated TCF bleaching effluents because they are combined with ECF bleaching effluents for treatment.

Both of the sampled TCF softwood fiber lines employed oxygen delignification followed by multiple stages of peroxide bleaching. The Nordic mill also uses extended cooking, and was able to reduce the lignin content of unbleached pulp to a very low kappa number of four. At the time of sampling, this mill bleached pulp to a brightness of 83 ISO. The U.S. mill's unbleached pulp kappa number was between seven and ten. Bleached pulp brightness was approximately 79 during the first sampling episode at the U.S. mill, but by the time of the second sampling episode, the mill had improved its process to achieve a pulp brightness of 83 ISO.

At both mills, chloroform or chlorinated phenolic pollutants were not detected in samples collected by EPA. At the U.S. mill, dioxin, furan, and AOX were not detected above the analytical minimum level during sampling fully representative of TCF operations. The average bleach plant AOX loading measured by EPA at the Nordic mill was 0.002 kg/ADMT (compared to a long-term average of 0.51 kg/ADMT for Option A). EPA's dioxin sampling results for the Nordic mill were surprising. Dioxin was detected at a concentration just above the minimum level in one sample of combined bleach plant filtrate, when the mill was bleaching without the use of chlorine or any chlorinated compounds. Furan was not detected. EPA believes the dioxin results were unique to the operation of this mill and does not conclude that TCF bleaching generates dioxin.

Neither of the two sampled mills produced softwood pulp at full market brightness. In the last three years, however, several non-U.S. mills have reported the production of TCF softwood kraft pulp at full market brightness. EPA's data are insufficient to confirm that TCF processes are technically available for the full range of market products currently served by ECF processes. See DCN 14497, Vol. I. Further, EPA's data are insufficient to define a segment of the Bleached Papergrade Kraft and Soda subcategory where TCF processing is known to be technically feasible and thus could be the basis of compulsory BAT limitations. Despite these impediments, EPA believes that the progress being made in TCF process development is substantial, and that additional data may demonstrate that TCF processes are indeed available for the full range of market products. For this reason, EPA also evaluated the performance of TCF mills in order to establish alternative limitations for mills that voluntarily choose to employ TCF processes. See Section VI.B.5.a(4).

(2) Costs of Technology Options Considered. The Agency estimated the cost for the Bleached Papergrade Kraft and Soda subcategory to achieve each of the technology options considered today. These estimated costs are summarized in this section and are discussed in more detail in several technical support documents. (See the BAT Cost Model Support Document, DCN 13953; Memorandum: Costing Revisions Made Since Publication of July 15, 1996 Notice of Data Availability, DCN 14493; Supplemental Technical Development Document, DCN 14487; Analysis of Impacts of BAT Options on the Kraft Recovery Cycle, DCN 14490; Effect of Oxygen Delignification on Yield of the Bleached Papergrade Kraft Pulp Manufacturing Process, DCN 14491; and the Technical Support Document for Best Management Practices for Spent Pulping Liquors Management, Spill Prevention, and Control, DCN 14489.) (For a discussion of the costs associated with the Voluntary Advanced Technology Incentives Program BAT technologies, see the Technical Support Document, DCN 14488.) All cost estimates in this section are expressed in 1995 dollars. The cost components reported in this section are engineering estimates of the cost of purchasing and installing equipment and the annual operating and maintenance costs associated with that equipment. See Section VIII of this preamble for a discussion of the costs used in the economic impact analysis.

Because EPA considers efficient biological wastewater treatment to be current industry practice, EPA has not included its costs in the estimates of costs of BAT. See the Supplemental Technical Development Document, DCN 14487. As discussed in Section VI.B.5.c. below, for PSES for the Bleached Papergrade Kraft and Soda subcategory, EPA evaluated the same process change technology options that it evaluated for BAT, with the exception of biological wastewater treatment. As a result, EPA used the same cost model to estimate the costs of PSES and BAT. Set forth below are the total costs for all mills in the subcategory (direct and indirect dischargers) to complete the process changes that are the technology bases for the options considered for BAT and PSES. The costs of complying with today's BMP requirements are also included.

(i) Additional Data Gathering and Analysis Since Proposal. EPA updated its database of mill process information by reviewing comments on the proposed rule and the July 15, 1996 Notice, by examining information from publicly available sources as well as information gathered by AF&PA and NCASI, and by contacting mills directly. The Agency revised the cost estimates it made at

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proposal in many ways but retained two major assumptions: (1) Mills would continue to make the same quantities and grades of pulp; and (2) mills already using the technology bases for the BAT technology options generally would incur only monitoring costs to comply with regulations based on those options. See the Supplemental Technical Development Document, DCN 14487.

EPA received comments that it severely underestimated the costs of its proposed option (now identified as Option B). Commenters contended that this underestimate derived in large part from EPA's underestimate of the increase in load of black liquor solids that will be routed to the recovery system after installation of oxygen delignification, closing screen rooms, improving brownstock washing, and recovering additional pulping liquors through a best management practices (BMP) program. In addition to underestimating the increase in load, commenters claimed that EPA also underestimated the costs for recovery boilers to accommodate the increased load. Commenters asserted that most mills are recovery boiler-limited and, to employ the proposed BAT, would have to install new recovery boilers at a very high cost.

In response to these and other comments on the proposed rule, EPA and NCASI undertook several data gathering efforts aimed specifically at obtaining information to improve EPA's cost estimates. In late 1994, NCASI distributed a survey to collect information about recovery furnace capacity and a second survey about the implementation and cost of pulping liquor spill prevention and control programs (i.e., BMPs).

Based on this and other information, EPA concluded that there is no foreseeable set of circumstances where implementation of either Option A or B would force a mill to replace or even rebuild an existing recovery boiler. Therefore, EPA strongly disagrees with comments that it severely underestimated the costs of what is now known as Option B. Based on data reported in the NCASI survey, almost 60 percent of the recovery boilers operated by the industry have sufficient capacity to accommodate the increased loads that would result from implementing either Option A or B, in combination with the BMP program promulgated today. At most of the remaining 40 percent of the recovery boilers, any increased thermal load can be accommodated through improved boiler operation requiring no capital expenditures, by increasing pulp yield by using anthraquinone, or by reducing the caloric value of the black liquor burned in the boiler by using oxygen-black liquor oxidation. EPA estimates that only one boiler operated by a bleached papergrade kraft and soda mill would need to be upgraded regardless which option is selected as the technology basis for today's rule. The cost of the upgrade is small in comparison to the cost of building or replacing a boiler. See the Supplemental Technical Development Document, DCN 14487, and Analysis of Impacts of BAT Options on the Kraft Recovery Cycle, DCN 14490.

For the purposes of estimating the costs of Option B, EPA estimated costs for implementation of oxygen delignification (OD) based on the record as a whole that shows that OD does not have an impact on yield of bleached pulp. Although some stakeholders asserted that EPA's yield estimates were in error, the entire record on yield supports EPA's basis for estimating the cost of BAT Option B. Some commenters asserted that EPA overestimated the costs for Option B presented in the July 1996 Notice by failing to account for the increase in yield that would result from implementation of OD. Industry commenters asserted that OD would result in reduced bleached pulp yields. In response to these comments, EPA reviewed all available literature reports and contacted companies operating mills with OD systems. Although some laboratory and modeling analyses indicate that OD following a modified kraft cooking could increase yields by one to two percent, EPA found no documentation that full-scale OD systems are being operated in this manner. One of the two U.S. companies that operate more mills with OD systems than any other has found no statistical difference in yield measured at the end of the bleach plant with the installation of OD. The other company offered no specific data on yield, but has seen no substantial impact on recovery boilers, indicating that no appreciable change in yield has been experienced. See DCN 14491.

EPA also collected additional information about the costs of process equipment and updated its information about the costs of chemicals, wood, energy, and labor (record sections 21.1.2 to 21.1.6). EPA used this information to revise the cost model spreadsheet. See the Memorandum: Costing Revisions Made Since Publication of July 15, 1996 Notice of Data Availability, DCN 14493, and BAT Cost Model Support Document, DCN 13953. These changes are discussed immediately below.

(ii) Major Changes Since Proposal. Among other changes since proposal, EPA's cost estimates for Option B now include the costs for new or incremental increases in OD systems for mills unable to achieve the kappa numbers used to characterize the Option B technology. In its July 1996 Notice, EPA described this change and additional changes to the cost model. See 61 FR at 36840–41 and BAT Cost Model Support Document, DCN 13953.

In response to comments on the July 1996 Notice, EPA corrected mill-specific information and made additional changes to the cost model. See the Memorandum: Costing Revisions Made Since Publication of July 15, 1996 Notice of Availability, DCN 14493. Among those changes was a correction of errors in the costs of caustic and hydrogen peroxide that resulted from a unit conversion error (this error carried through the proposal and the Notice cost estimates). As a result of the changes, including the correction made to the cost of caustic and hydrogen peroxide, the net engineering operating and maintenance (O&M) costs for Option B for all mills in the Bleached Papergrade Kraft and Soda subcategory increased from the savings of $7 million/year presented in the July 1996 Notice, to the $2 million/year increased costs estimated today. See the Supplemental Technical Development Document, DCN 14487.

For the purpose of estimating the cost of the regulations, EPA excluded the costs of process changes that were either completed or under construction as of mid-1995. EPA incorrectly stated in the July 1996 Notice that costs for process changes committed to but not yet under construction as of mid-1995 were also excluded from the cost of this regulation. These latter costs have been included. See the Supplemental Technical Development Document, DCN 14487.

(iii) Final Cost Estimates of the Options Considered. EPA's final cost estimates for Option A and B for the Bleached Papergrade Kraft and Soda subcategory (BAT, PSES, and BMPs) follow in Table VI–1.

TABLE VI–1.—TOTAL BLEACHED PAPERGRADE KRAFT AND SODA SUBCATEGORY CAPITAL AND ENGINEERING O&M COSTS FOR BAT, PSES AND BMPS

[1995 dollars]

	Final cost estimates	
	Option A	Option B
Capital ($ million)	966	2,130

TABLE VI–1.—TOTAL BLEACHED PAPERGRADE KRAFT AND SODA SUBCATEGORY CAPITAL AND ENGINEERING O&M COSTS FOR BAT, PSES AND BMPS—Continued

[1995 dollars]

	Final cost estimates	
	Option A	Option B
Engineering O&M ($ million/yr)	113	2.02

For both Option A and Option B, EPA excluded costs for the use of dioxin- and furan-precursor-free defoamers, adequate wood chip size control, and efficient biological wastewater treatment in its estimates of the costs of the final BAT technology options. These processes represent current industry practice. See the Supplemental Technical Development Document, DCN 14487. However, EPA's estimate of the costs of BAT also includes a general allowance for increased technical supervision and process engineering that could be used, in part, to design and implement a chip quality control program or to improve operation of existing biological wastewater treatment. In addition, any mill not currently using dioxin- and furan-precursor-free defoamers can use them without incurring significant costs. See the Supplemental Technical Development Document, DCN 14487. EPA evaluated the costs of retrofitting U.S. bleached papergrade kraft and soda mills to TCF bleaching to provide perspective on the likelihood of TCF processes being found to be economically achievable once they are shown to be technically available. EPA investigated the costs of two TCF bleach sequences. These bleach sequences included all common elements that are part of Option A and Option B (adequate chip thickness control, closed brownstock pulp screen room operation, use of dioxin- and furan-precursor-free defoamers, effective brownstock washing, elimination of hypochlorite, oxygen- and peroxide-enhanced extraction, use of strategies to minimize kappa factor and dioxin- and furan-precursors in brown stock pulp, high-shear mixing during bleaching, and efficient biological wastewater treatment). The bleaching sequences also include medium-consistency oxygen delignification. One TCF bleach sequence was based on peroxide bleaching (OQPP) and the other was based on ozone and peroxide bleaching ($OZE_{op}QPZP$). EPA's final cost estimates for TCF bleach sequences for the total Bleached Papergrade Kraft and Soda subcategory (BAT, PSES, and BMPs) are as follows. See the Supplemental Technical Development Document, DCN 14487.

TABLE VI–2.—TOTAL BLEACHED PAPERGRADE KRAFT AND SODA SUBCATEGORY CAPITAL AND ENGINEERING O&M COSTS OF TCF OPTIONS FOR BAT, PSES, AND BMP

[1995 dollars]

	Estimated costs	
	Peroxide-TCF (OQPP)	Ozone-TCF ($OZE_{op}QPZP$)
Capital ($ million)	3,090	5,630
Engineering O&M ($million/yr)	660	849

(3) Effluent Reductions Associated with Technology Options Considered. The Agency estimated the effluent reductions for the Bleached Papergrade Kraft and Soda subcategory that will result from the BAT options it analyzed. These estimated reductions are summarized in this section and are discussed in more detail in the Supplemental Technical Development Document, DCN 14487.

As discussed in the July 1996 Notice, EPA recalculated the effluent reduction benefits using a new baseline of mid-1995. See 61 FR at 36840. In addition, EPA revised and simplified the methodology used to estimate that baseline (using a model mill approach). Id. EPA also used a second approach to estimate the effluent loads of dioxin and furan using data for individual mills as compiled in the NCASI 1994 Dioxin Profile (see DCN 13764). The baseline calculation methodology revisions, along with details of the effluent reduction calculations, are described in record section 22.6.

As explained in DCN 14487, after July 1996, EPA again recalculated the effluent reductions. The baseline remains mid-1995. As before, EPA used one-half of the minimum level specified in 40 CFR 430.01(i) or one-half of the reported detection limits to estimate effluent discharge loadings when pollutant concentrations were below minimum levels. EPA considers this a reasonable approach for estimating mass loads because the actual concentration of the sample is too small to measure by current analytical methods, but is between zero and the detection limit. Furthermore, ECF processes use and generate chlorinated compounds, so EPA expects that chlorinated compounds were present (i.e., with a concentration value greater than zero) in the samples. Thus, EPA believes that it is appropriate to substitute a value at the midpoint between zero and the detection limit (i.e., the upper bound of the concentration in the sample) for ECF mills. The methodology was modified slightly for mills that use TCF bleaching sequences. Because chlorinated compounds are not used and are not generated by TCF processes, EPA assumed that TCF mills would discharge zero kilograms per year of AOX and the individual chlorinated pollutants rather than an amount equivalent to one-half the minimum level or detection limit multiplied by an appropriate production-normalized flow rate.

EPA's revised baselines, which were again found to be comparable to NCASI's industry-wide estimates for dioxin and furan, were used to calculate effluent reductions summarized in Table VI–3. The table shows the estimated baseline and the reduction from baseline expected if the option were implemented by all the existing direct discharging mills in the subcategory (i.e., those mills to which BAT will apply). The slightly greater removals of the bleach plant pollutants by Option B are a result of the reduced bleach plant flow found at mills employing Option B technology.

TABLE VI–3.—BASELINE DISCHARGES AND ESTIMATED REDUCTIONS OF POLLUTANTS FOR BLEACHED PAPERGRADE KRAFT AND SODA MILLS COMPLYING WITH BAT TECHNOLOGY OPTIONS CONSIDERED [a]

Pollutant parameter	Units	Mid-1995 baseline discharge	Estimated reductions: option A	Estimated reductions: option B	Estimated reductions: TCF
2,3,7,8–TCDD	g/yr	14.0	9.88	10.8	14.0
2,3,7,8–TCDF	g/yr	105	98.0	99.5	105
Chloroform	kkg/yr	43.6	35.5	35.5	43.6

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TABLE VI–3.—BASELINE DISCHARGES AND ESTIMATED REDUCTIONS OF POLLUTANTS FOR BLEACHED PAPERGRADE KRAFT AND SODA MILLS COMPLYING WITH BAT TECHNOLOGY OPTIONS CONSIDERED [a]—Continued

Pollutant parameter	Units	Mid-1995 baseline discharge	Estimated reductions: option A	Estimated reductions: option B	Estimated reductions: TCF
12 Chlorinated phenolic pollutants	kkg/yr	51.7	42.3	44.1	51.7
AOX	kkg/yr	33,300	22,100	27,900	33,300

[a] The TCF calculations assumed that chlorinated pollutants will not be present. For all other calculations, EPA assumed that pollutants reported as ''not detected'' were present in a concentration equivalent to one-half the minimum level specified in 40 CFR 430.01(i) or one-half of the reported detection limit.

The effluent reductions described and shown above are used in Section VII to estimate reduced human health and environmental risk attributable to today's rules. These estimates also form the basis for estimating monetized benefits in Section VIII.

(4) Development of Limitations. The proposed BAT regulations included limitations for dioxin, furan, 12 chlorinated phenolic pollutants, acetone, chloroform, methyl ethyl ketone (MEK), and methylene chloride (based on BAT process changes); and limitations for color, COD, and AOX (based on BAT process changes and biological wastewater treatment). In today's rule, EPA is promulgating limitations for dioxin, furan, 12 chlorinated phenolic pollutants, chloroform, and AOX. See 40 CFR 430.24(a)(1). As discussed in Section VI.B.3. above, EPA is not promulgating limitations for acetone, MEK, methylene chloride, or color. EPA intends to promulgate effluent limitations guidelines and standards for COD in a later rulemaking.

In addition to the new effluent limitations guidelines and standards for the Bleached Papergrade Kraft and Soda subcategory promulgated today and discussed immediately below, mills in this subcategory continue to be subject to existing limitations and standards for pentachlorophenol and trichlorophenol (now denominated as supplemental limitations and standards). These mills continue to have the opportunity to be exempt from these supplemental limitations and standards if they certify to the permitting or pretreatment authority that they are not using these chemicals as biocides. See 40 CFR 430.24(d).

Except where noted, the following discussion of BAT limitations also applies to EPA's procedures for setting NSPS, PSES, and PSNS for Subpart B.

(a) Performance Data. EPA revised the proposed limitations and standards based on data collected after proposal (see Pulp and Paper Mill Data Available for BAT Limitations Development, DCN 13951) and presented the revisions in the July 1996 Notice. See 61 FR at 36841–42. Today's TCDF, chloroform, and AOX limitations and standards have been further revised since the July 1996 Notice as a result of the selection of data sets used for the long-term averages, variability factors, and limitations. See DCN 14494, 14496, and Record Section 22.5. The rationale for changes in the data set selections is provided immediately below. See DCN 14487.

(i) Dioxin, Furan, and Chlorinated Phenolic Pollutants. For non-TCF mills, EPA had proposed mass-based limitations and standards for furan; in July 1996, EPA presented preliminary revised limitations and standards that were concentration-based. EPA has determined that a limitation on the concentration of furan is a more direct, and hence, a more reasonable measurement of the presence of furan than a mass-based limitation would be. When detected, furan typically is present in the effluent of Subpart B mills that use ECF bleaching at levels at or only slightly above the minimum level specified in the applicable analytical method. In this case, the value of mass-based limitations and standards are predominantly influenced by the variability in the bleach plant effluent flow rate and thus may not be a consistent and reliable measurement of the presence of furan. Since the July 1996 Notice, EPA has used one additional data set to calculate the furan limitation; this data set was from an Option B bleach line with a typical unbleached kappa number of 20. Because of this change and because of changes to assumptions used in the statistical analysis and changes to the computer programs, see Section VI.B.5.a(4)(b), the value of the furan limitations and standards has changed slightly from that presented in the July 1996 Notice.

EPA has made no changes to the limitations for dioxin and the 12 chlorinated phenolic pollutants presented in the July 1996 Notice. Upon further review after the July 1996 Notice, EPA discovered that some sample-specific minimum levels for some chlorinated phenolic pollutants were incorrectly entered into the databases. These values have been corrected. See DCN 14496, and Record Section 22.5.

EPA has determined that TCF bleaching processes do not result in the generation of dioxin, furan, chloroform or chlorinated phenolic pollutants. For this reason, EPA is not setting limitations for these pollutants as part of the voluntary alternative BAT limitations and standards promulgated today for mills that certify to the use of TCF bleaching processes. See 40 CFR 430.24(a)(2).

(ii) AOX. In the July 1996 Notice, EPA presented preliminary revised AOX BAT limitations and NSPS for non-TCF mills.

In the July 1996 Notice, EPA indicated that although it was presenting revised limitations and standards it would continue to analyze data from two mills representing the performance of BAT Option A. These data were submitted to EPA by the industry without sufficient time for the results to be reflected in the preliminary limitations and standards presented in the July 1996 Notice.

Commenters encouraged EPA to use the newly acquired data for the two Option A mills, but also questioned why certain other data in the record were not used to develop the preliminary revised AOX limitations and standards. EPA continued its analysis of the new data and obtained new information about mill operations associated with the other data addressed by comments. As a result, EPA added data from the two Option A mills to the data used to characterize the performance of Option A and added data from two other mills to the data used to characterize the performance of Option B. EPA ultimately used data from six mills to develop the AOX limitations for each option, including at least one mill for each option for which long-term monitoring data (for about one and a half years) were available. The mills used to represent each option pulp

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primarily softwood and most of them subsequently bleach the pulp to high brightness (i.e., greater than 88 ISO). Tables presented in DCN 14494 show several statistics for each mill (reflecting the mill characteristics during the sampling period), including furnish, kappa number, kappa factor, brightness, type of wastewater treatment system, and approximate AOX removal in the treatment system. For a discussion of EPA's development of pretreatment standards for AOX, see section VI.B.5.c(6).

Another factor that has contributed to revisions in today's AOX limitations and standards is the adjustment for autocorrelation in the data. See DCN 14496. EPA intended that this adjustment be made to the preliminary AOX limitations presented in the July 1996 Notice; however, comments on that notice stated correctly that this adjustment had been excluded from the calculations. This oversight has been corrected in the calculations of today's final AOX limitations and NSPS.

Since proposal, EPA has gathered additional data in order to establish a final limitation for AOX for TCF bleaching processes. See 40 CFR 430.24(a)(2). EPA sampled at two mills with TCF bleaching processes, one U.S. mill and one European mill. Analytical data from sampling these two mills during periods representative of TCF processes indicate that AOX concentrations were consistently below minimum levels in bleach plant wastewaters. See DCN 14494 and DCN 14488. Therefore, EPA has concluded that TCF bleaching processes are capable of achieving concentrations less than the minimum level for AOX in process wastewaters, whether measured at the bleach plant or after secondary biological treatment, and is setting AOX limitations and standards accordingly for TCF bleaching processes. See 40 CFR 430.24(a)(2).

(iii) Chloroform. EPA proposed a monthly average chloroform limitation of 2.01 g/kkg based on sampling results from one mill that used extended delignification and complete substitution of chlorine dioxide for elemental chlorine, and that did not use hypochlorite during bleaching. Data collected by EPA after proposal indicated that bleach plant loads of chloroform did not differ between mills that used conventional pulping (Option A) and extended delignification (Option B), as long as bleaching was carried out without elemental chlorine or hypochlorite. However, these data indicate that the type of pulp washers used in a mill's bleach plant influence the partitioning of chloroform between the air and effluent. Use of low air flow washers results in less emission of chloroform to the air and greater loads of chloroform in bleach plant effluent than use of high air flow washers. See DCN 14494. In general, modern low air flow washers (such as pressure diffusion) also use less water to accomplish equivalent washing, i.e., they are more efficient than conventional vacuum drum washers (high air flow washers). See DCN 14494, and DCN 14497, Vol. I. Because of their efficient use of water and their potential to reduce non-water quality environmental impacts, EPA encourages industry to use modern low air flow washers. For this reason, EPA developed revised chloroform limitations and standards using only data from mills that use low air flow washers. In the July 1996 Notice, EPA presented a revised bleach plant monthly average chloroform limitation of 2.80 g/kkg. This limitation was developed using data from four mills that did not use elemental chlorine or hypochlorite during bleaching, and that used low air flow bleach plant washers.

EPA received comments that the revised chloroform limitations and standards were not consistently achievable by mills with the process technologies serving as the basis for Options A and B. As a result of these comments, EPA re-evaluated the chloroform limitations and standards presented in the July 1996 Notice.

EPA has revised the long-term average and variability factors used to calculate the chloroform limitations and standards after considering data from five mills that did not use elemental chlorine or hypochlorite during bleaching and that used low air flow bleach plant washers (data from four of these mills were used in the July 1996 Notice). In developing the long-term average, EPA used data from two mills that bleach pulp to a high brightness (88 to 90 ISO). In developing the variability factors, EPA also considered data from the other three mills with low air flow washers to obtain a more realistic estimate of variability associated with operating low air flow washers. Two of these mills bleach pulp to a lower brightness (80 to 85 ISO). EPA believes that the resulting limitations and standards can be met by all well-operated and maintained ECF mills regardless of the type of bleach plant washers used. (EPA's revised bleach plant monthly average chloroform limitation is now 4.14 g/kkg.) The data in the record indicate that it is highly unlikely that a mill employing elemental chlorine or hypochlorite in its bleach plant could comply with the chloroform limitations promulgated in this rule. See DCN 14494.

(iv) COD. As discussed in VI.B.3.d., EPA is reserving limitations for COD at this time.

(b) Changes to Statistical Methodology. After the July 1996 Notice, EPA performed a detailed review of the results of the statistical analyses, the documentation of the statistical methodology, the computer programs, and the data for all of the limitations and standards. As a result of this review, EPA revised the assumptions regarding statistical analysis of data to ensure that long-term averages for TCDF and chloroform were greater than or equal to the minimum level of the analytical methods. EPA made other revisions to the statistical assumptions and the computer programs that resulted in minor changes to the values of the limitations and standards. All of these revisions are identified and described in the Statistical Support Document for the Pulp and Paper Industry: Subpart B, DCN 14496. In the record, EPA has also provided detailed responses to comments about the statistical methodology. See DCN 14497, Vol. VI.

(c) Definition of Limitations and Standards Expressed at Less Than the Minimum Level. In today's rulemaking, EPA is establishing limitations and standards for Subparts B and E for 12 chlorinated phenolic pollutants and dioxin that are expressed as less than the minimum level (''<ML''). (EPA is also expressing today's AOX limitations and standards for TCF processes as ''<ML.'') The limitations and standards hereafter are referred to as ''ML limitations.'' The ''ML'' is an abbreviation for the minimum level identified in § 430.01(i) of today's rule for the analytical methods that EPA used to determine the level of pollution reduction achievable through the use of BAT, NSPS, PSES and PSNS model technologies for the 12 chlorinated phenolic pollutants, dioxin, and, for alternative TCF technologies, AOX. (For Subpart E, limitations and standards for furan and AOX are also expressed as ''<ML''.) EPA intends for mills subject to ML limitations to have pollutant discharges with concentrations less than the minimum levels of the analytical methods specified today in 40 CFR 430.01(i).

In general terms, the ML is the level at which the analytical system gives recognizable signals and an acceptable calibration point. Method 1613 (used for dioxin and furan), Method 1650 (used for AOX), and Method 1653 (used for the chlorinated phenolic pollutants) provide precise definitions of the ML

relative to those analytes. See 40 CFR 430.01(i). In the proposal and the July 1996 Notice, EPA referred to the ML limitations as ''ND limitations.'' EPA has changed the terminology, but not the concept, in response to comments that the terminology was potentially misleading. This section provides a discussion of ML limitations. Compliance with the ML limitations is discussed in Section VI.B.8.c(2).

EPA expects that future analytical methods will be more sensitive than today's methods, and their minimum levels will have values that are less than those for the analytical methods identified today in § 430.01(i). However, the analytical methods (and their minimum levels) specified in § 430.01(i) were used to chemically analyze the wastewaters from mills with the BAT, NSPS, PSES, and PSNS model technologies selected today for Subparts B and E. EPA used the data from these chemical analyses to determine that today's ML limitations were technically and economically achievable. EPA is unable to determine, based on the data from these chemical analyses, whether more stringent limitations (that is, limitations with values or associated with minimum levels less than the minimum levels published today in § 430.01) would be technically and economically achievable. To determine whether the technologies are capable of achieving more stringent limitations, EPA would need to evaluate data from chemical analyses using these future more sensitive methods. Those data obviously are not available today. Until any further revision of today's limitations and standards for subparts B and E, the limitations for these analytes will continue to be associated with the minimum levels specified today in Section 430.01(i).

Table VI–4 identifies the analytical methods used to generate the data for today's rule. The minimum levels in this Table are established by the analytical methods and have been validated by use.

TABLE VI–4.—ANALYTICAL METHODS AND MINIMUM LEVELS FOR REGULATED POLLUTANTS

Pollutant	Method	Minimum level
2,3,7,8-TCDD	1613	10 pg/L
2,3,7,8-TCDF	1613	10 pg/L
Trichlorosyringol	1653	2.5 µg/L
3,4,5-trichlorocatechol	1653	5.0 µg/L
3,4,6-trichlorocatechol	1653	5.0 µg/L
3,4,5-trichloroguaiacol	1653	2.5 µg/L
3,4,6-trichloroguaiacol	1653	2.5 µg/L
4,5,6-trichloroguaiacol	1653	2.5 µg/L
2,4,5-trichlorophenol	1653	2.5 µg/L
2,4,6-trichlorophenol	1653	2.5 µg/L
Tetrachlorocatechol	1653	5.0 µg/L
Tetrachloroguaiacol	1653	5.0 µg/L
2,3,4,6-tetrachlorophenol	1653	2.5 µg/L
Pentachlorophenol	1653	5.0 µg/L
AOX	1650	20 µg/L

(d) Limitations. Table VI–5 presents the final effluent limitations for Options A and B for the Bleached Papergrade Kraft and Soda subcategory that are based on in-plant process changes. These limitations are based on data obtained from bleach plant effluent prior to mixing with other mill wastestreams.

TABLE VI–5.—BLEACHED PAPERGRADE KRAFT AND SODA LIMITATIONS COMPARISON OF OPTIONS A AND B

	Daily maximum limitation		Monthly average limitation	
	Option A	Option B	Option A	Option B
TCDD (pg/L)	<ML	<ML	N/A	N/A
TCDF (pg/L)	31.9	31.9	N/A	N/A
Chlorinated Phenolic Pollutants* (µg/L)	<ML	<ML	N/A	N/A
Chloroform (g/kkg)	6.92	6.92	4.14	4.14

*Trichlorosyringol, 2,4,5-trichlorophenol, 2,4,6-trichlorophenol, 3,4,5-trichlorocatechol, 3,4,5-trichloroguaiacol, 3,4,6-trichlorocatechol, 3,4,6-trichloroguaiacol, 4,5,6-trichloroguaiacol, tetrachlorocatechol, tetrachloroguaiacol, 2,3,4,6-tetrachlorophenol, and pentachlorophenol.

ML or Minimum level—the level at which the analytical system gives recognizable signals and an acceptable calibration point. See 40 CFR 430.01(i).

N/A Not applicable.

EPA did not establish monthly average limitations and standards for dioxin and the 12 chlorinated phenolic pollutants because the daily maximum limitations and standards for these pollutants are expressed as less than the Minimum Level (<ML). (The same is true for AOX limitations for TCF processes.) The purpose of a monthly average limitation is to require continuous dischargers to provide better control, on a monthly basis, than required by the daily maximum limitation. However, for these pollutants, today's analytical methods cannot measure below the minimum levels associated with the daily maximum limitations. Thus, even if a permitting or pretreatment authority requires more frequent monitoring for these pollutants than the monthly monitoring frequencies specified in today's rule, see 40 CFR 430.02, monthly average limitations would still be expressed as <ML.

EPA did not establish a monthly average limitation for furan because a

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monthly average limitation would be based on the assumption that a mill would be required to monitor more frequently than once a month. For the reasons set forth in Section VI.B.8.c(4)(b), EPA believes that one monthly monitoring event is sufficient; however, if permitting or pretreatment authorities choose to require more frequent monitoring for furan, they may set monthly average limitations and standards based on their best professional judgment. See, e.g., 40 CFR 430.24(a)(1), footnote b. Today's rule requires mills to monitor for chloroform four times per month (i.e., weekly); therefore, both daily maximum and monthly average limitations are presented.

EPA has also calculated both daily maximum and monthly average limitations for AOX based on Option A, Option B, and TCF bleaching processes. These limitations are presented in Table VI–6. Today's rules require AOX to be monitored every day during the month. See 40 CFR 430.02(a). Annual average limitations for AOX apply only to non-continuous discharges. The alternative TCF effluent limitations apply only to AOX and are expressed as ''<ML.''

TABLE VI–6.—BLEACHED PAPERGRADE KRAFT AND SODA AOX LIMITATIONS

[Comparison of Options A and B, and Alternative TCF Limitations]

	Option A (kg/kkg)	Option B (kg/kkg)	Alternative TCF limitations (kg/kkg)
Annual Average	0.512	0.208	N/A
Monthly Average Limitation	0.623	0.272	N/A
Daily Maximum Limitation	0.951	0.476	<ML

In order for a fiber line to qualify for the voluntary alternative TCF limitations, the discharger must certify to the permitting authority, as part of its NPDES permit application, that the fiber line bleaches pulp exclusively with TCF bleaching processes. See 40 CFR 430.24(a)(2). (A fiber line that swings between ECF and TCF bleaching processes, for example, would not be eligible for these alternative effluent limitations because dioxin and other chlorinated organic pollutants will be generated at least some of the time and therefore need to be controlled.) EPA decided not to promulgate an additional requirement, as it had proposed, that would have required dischargers to provide monitoring results for three composite bleach plant wastewater samples for dioxin, furan, and the 12 chlorinated phenolic pollutants and three grab samples for chloroform in order to qualify for those limitations. See 58 FR at 66195. EPA believes that the additional proposed requirement is unnecessary because EPA has no reason to believe that a discharger would falsify its TCF certification and because a discharger certifying to TCF processes at a particular fiber line is required in any case to notify the permitting authority if it converts the fiber line in whole or in part to bleaching processes employing chlorine or chlorine-containing compounds. As a result of this notification, the discharger's TCF-based permit limits would need to be modified to reflect the new processes. See, e.g., 40 CFR 122.21(g)(3), 122.21(g)(7), and 122.41(l).

(5) Selection of BAT/PSES Technology Basis. After considering all of the technology options described in the December 1993 proposal and the July 1996 Notice in light of the factors specified in section 304(b)(2)(B) of the Clean Water Act, EPA has selected Option A as its technology basis for the BAT limitations promulgated today for Subpart B. For the reasons set forth below, EPA has also selected Option A as its technology basis for the PSES promulgated today for Subpart B. (For a discussion of PSES options, parameters, and EPA's pass-through analysis, see Section VI.B.5.c.) The record establishes that Option A is technically available. See the Supplemental Technical Development Document, DCN 14487. As discussed in more detail below, EPA has also concluded that it is economically achievable. Further, EPA has determined, for the reasons set forth in Section VII, that Option A has no unacceptable adverse non-water quality environmental impacts. Finally, EPA determined that Option A achieves greater environmental benefits than any other economically achievable technology considered by EPA and, for that reason, also represents the best technology among those considered.

EPA considered the age, size, processes, other engineering factors, and non-water quality environmental impacts pertinent to mills in this subcategory for the purpose of evaluating the BAT and PSES technology options. None of these factors provides a basis for selecting different technologies than EPA has chosen as the basis for today's BAT limitations and PSES.

In order to evaluate economic achievability, EPA concluded that it was appropriate to examine BAT/PSES in view of the MACT requirements also being promulgated today for mills subject to subpart B. As a general matter, when evaluating the economic impact of the candidate BAT/PSES technologies, EPA generally looks at the industry as it exists at the time the decision is made. In this industry, subpart B mills will be subject to significant additional costs as a result of today's MACT I rule. See Section VIII. Therefore, although EPA has not ascribed MACT I costs to the BAT/PSES costs of today's rule, EPA is taking those costs into account when considering the total impact of the various BAT/PSES options on subpart B mills. This is particularly appropriate here because EPA undertook this Cluster rulemaking in order to consider at one time a range of air and water controls and their total economic consequences, among other things. Thus, EPA believes that its BAT/PSES analysis more accurately reflects the actual costs and economic impacts that mills in the Bleached Papergrade Kraft and Soda subcategory will experience. EPA also performed its economic achievability analysis based on the impact of BAT/PSES costs without considering the impact of the MACT I rule on subpart B mills. This analysis did not change EPA's final conclusions. Additionally, in response to comments, and because more information is now available regarding estimated costs, EPA also considered the economic impacts of the MACT II requirements being proposed at this time. The additional consideration of projected MACT II costs also does not alter EPA's determination of economic achievability in this instance.

EPA has determined that the selected BAT/PSES model technology (Option A)

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is economically achievable for the Bleached Papergrade Kraft and Soda subcategory as a whole for several reasons. When EPA considered the effect of BAT/PSES compliance in light of the MACT I rule on subpart B mills, EPA estimated that the selected BAT/PSES Option would cause two mill closures, with related direct loss of 900 jobs and a $275 million decrease in shipments, and no firm failures that are likely to result in additional job loss. (See Section VIII.F and Table VIII–4 for other economic impacts associated with the selected BAT/PSES option, with and without MACT I compliance costs.) The number of closures (two) is less than 3 percent of the affected mills (86) in the subcategory. The loss of jobs associated with these closures is about one percent of subcategory employment. EPA believes that, even with these projected impacts, the selected BAT/PSES is economically achievable for this subcategory as a whole. When the cost of the MACT I rule on subpart B mills is not considered, the selected BAT/PSES would cause one mill closure and no firm failures they are likely to result in additional job loss. See Section VIII.E. For confidentiality reasons, related losses of jobs and shipments cannot be disclosed in this **Federal Register** notice, but are described in the CBI portion of the record.

EPA concluded that Option B is not economically achievable for the Bleached Papergrade Kraft and Soda subcategory as a whole. When EPA considered the effect of BAT/PSES compliance in light of the MACT I rule on subpart B mills, EPA estimated that Option B would cause four mill closures, with a related direct loss of up to 4,800 jobs, and a $1.3 billion decrease in shipments, and one or more firm failures that are likely to result in additional job loss. (See Section VIII.F and Table VIII–4 for other economic impacts associated with Option B with and without MACT I compliance costs.) EPA estimates that when the cost of the MACT I rule is not considered, Option B would cause two mill closures, with a related direct loss of 900 jobs and a $275 million decrease in shipments, and one or more firm failures. See Section VIII.F.1.

While the increased number of closures and related job losses associated with Option B are strong indicators of economic unachievability, the potential firm failures (i.e., bankruptcies) associated with this Option are particularly problematic. For each option, EPA's bankruptcy analysis focuses on whether each affected company can afford to make the collective investment required to install the technology upon which the option is based for all of its facilities. The substantially higher capital cost associated with Option B results in the potential failure of one or more firms that Option A does not cause. In most cases, requirements to raise capital to upgrade each mill to meet Option B limitations and standards may seriously jeopardize some companies' ability to cover interest on the new investments as well as other costs. In other words, some companies with insufficient cash or equity resources to cover the costs of these upgrades may be in jeopardy of bankruptcy. It takes an event of considerable magnitude to induce bankruptcy in a firm. The fact that Option B, even when considered without regard for the impact of the MACT I rule on this subpart, is projected to drive one or more firms into bankruptcy indicates to EPA the significant magnitude of Option B's capital requirements. In EPA's view, the overall effect of Option B on those firms would be substantial. See Section VIII.F. For a more detailed discussion of EPA's firm failure analysis, see the Economic Analysis, Chapter 6 (DCN 14649).

The magnitude of the effects that may arise from large firm bankruptcies is a substantial indicator of the economic unachievability of Option B. The negative effects are indefinite and unquantifiable, but EPA has reason to believe, based on the recent history of the domestic pulp and paper industry, that they are likely to be significant. The effects include, as examples, stock price turmoil, reduced workforces, and foreign ownership of formerly American-owned assets. Which impacts occur would depend on the responses of the potentially affected firm(s) to the increased costs. Companies that enter bankruptcy or near-bankruptcy are more likely to see their stock prices fall, causing substantial loss of investor value and possibly becoming the target of a hostile takeover by a domestic or foreign company. Recent history of hostile or friendly takeovers shows that the acquiring companies subsequently divested themselves of unproductive assets, closed a number of mills and eliminated over 15,000 jobs, affecting both smaller and larger communities, with the most devastating consequences on the smaller communities. Some companies may downsize some operations without closing any mills, thus potentially causing job losses in communities that depend on the mills directly or indirectly for their economic well-being. The potential job losses associated with the likely firm failure(s) represent an unacceptably large portion of the employment losses associated with this option for the Bleached Papergrade Kraft and Soda subcategory. See DCN 14379, 14382, and 14388 (contained in CBI record). In addition, weaker companies might be forced to sell off blocks of assets, or their corporate existence might be endangered. Companies may choose to close marginal plants to avoid the cost of upgrade or to sell off mills both to avoid the costs of upgrade and to raise capital to upgrade the remaining mills. Closed mills' equipment could be sold to overseas companies, who could initiate low cost pulp or paper production and gain market share from U.S. firms as a result. Foreign companies acquiring U.S. mills might close or alter those mills to gain market share (although such behavior is not necessarily economically efficient). Substituting foreign for domestic production means an additional loss of jobs and income for Americans. See Economic Analysis, Chapter 6 (DCN 14649).

EPA also considered the effects of delaying the implementation of Option B for five years. EPA acknowledges that the uncertainties of the pulp and paper market and the financial circumstances of individual firms make questionable the validity of any assumptions regarding the relative effects of a five-year delay. EPA's evaluation of delaying the implementation of Option B for five years involves consideration of discounting Option B costs for five years, the expected industry price and revenue cycle, and resulting aggregate costs, closures, and firm failures. EPA has determined, due to expected effects of the industry cycle, that deferring the costs of this technology for five years would not appreciably reduce the economic impacts for this subcategory as a whole compared to immediate compliance. See Economic Analysis, Chapter 6 (DCN 14649). For example, EPA found that under the most likely scenario (in which the costs of complying with MACT I are taken into account), the same number of mills (four) would be predicted to close even if implementation of Option B were delayed for five years. Firm failure predictions could not be made for five years hence because the analysis is based on several financial components, each of which may change dramatically and unpredictably in the interim.

Based on the above discussion, EPA concludes that only the selected BAT/PSES technology option—Option A—is economically achievable today for the Bleached Papergrade Kraft and Soda subcategory as a whole. EPA acknowledges that the number of

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predicted closures attributable to Option B, when considered without regard for the impact of the MACT I rule on subpart B mills, is the same as the number of predicted closures under Option A when MACT I impacts are considered. (This is also true for job losses and effects on shipments.) However, EPA does not believe that these impacts alone are a compelling decision basis for this rulemaking. Not only would such an analysis fail to account for the real-world economic impacts of the concurrent MACT I rulemaking, but the closures and related impacts by themselves fail to express the total economic impacts EPA predicts for Option B. For the reasons described above, EPA concludes that it is appropriate to take into account the potential firm failures attributable to Option B in this rulemaking. Further, EPA concludes that it is appropriate in this rulemaking to base the economic achievability determination on the total economic impacts (the closures and the projected firm failures, coupled with predicted regional and market impacts) of its BAT/PSES options on the industry. Those total economic impacts constitute the principal and deciding difference between the selected BAT/PSES technology basis and Option B. Based on that conclusion, EPA has determined that only Option A is economically achievable for subpart B as a whole, both when the impacts of compliance with the MACT I rule are considered and when they are not.

EPA is also rejecting Option B because its capital costs are simply too high when compared to Option A. Implementation of Option B would result in capital costs that are more than $1 billion greater than those associated with Option A. EPA believes that this consideration is particularly relevant in this rulemaking for several reasons. First, these Cluster Rules represent the fourth set of effluent limitations guidelines and standards promulgated for subpart B mills. Since 1977, the industry has incurred substantial capital costs to achieve its current level of pollutant control and has achieved significant pollutant loading reductions. This is also the first pulp and paper regulation to employ process changes, rather than treatment technologies, as the core of its model BAT/PSES technology. EPA is authorized, in the exercise of its discretion, to consider these factors as the Administrator deems appropriate in selecting BAT. See CWA section 304(b)(2)(B). For all of these additional reasons, EPA has concluded that Option B is not the best available technology economically achievable for subpart B at this time.

EPA also evaluated the economic achievability of TCF process technologies for subpart B mills. EPA concluded that the annualized cost of retrofitting existing sources for TCF is substantially greater than the annualized cost of Option B (regardless which bleaching chemicals are used), with additional impacts ranging from seven estimated closures and 7,100 job losses to the potential that a greater number of firms would be placed in jeopardy of bankruptcy. See Section VIII.F. (When this option is considered in light of MACT I compliance costs, the economic impacts would be even greater. See id.) EPA, therefore, concluded that TCF bleaching processes are not economically achievable for the subcategory as a whole at this time. Nevertheless, EPA is promulgating voluntary alternative BAT limitations and PSES based on TCF bleaching processes in order to encourage mills to use this technology whenever possible. See 40 CFR 430.24(a)(2), 430.26(a)(2).

EPA determined that Option A is the best technology because no other option that was both available and economically achievable resulted in greater reductions in effluent loadings for dioxin, furan and other significant pollutants of concern. (See 58 FR at 66110 for other options considered at proposal.) For a discussion of the effluent reduction benefits associated with Option A, see Section VIII.G.

(6) Point of Compliance Monitoring. EPA is requiring mills in subpart B to demonstrate compliance with BAT limitations for dioxin, furan, chloroform, and 12 chlorinated phenolic pollutants inside the discharger's facility at the point where the wastewater containing those pollutants leaves the bleach plant. EPA is authorized by the Clean Water Act and EPA's regulations at 40 CFR 122.44(i), 122.45(h), and 125.3(e) to specify an in-plant point of compliance monitoring for technology-based limitations. Hereafter, EPA refers to the BAT limitations for which compliance must be demonstrated in-plant as ''in-plant limitations.'' As set forth in more detail below, EPA is establishing in-plant limitations on bleach plant effluent because limitations imposed on those pollutants at the point of discharge are impractical and infeasible as measures of the performance of process technologies representing the technology-based levels of control. Moreover, in-plant effluent limitations are consistent with the MACT standards for chloroform, which independently require achievement of BAT limitations on dioxin, furan, chloroform and the 12 chlorinated phenolic compounds at the bleach plant (in addition to compliance with AOX limitations) in order to ensure that the removals represented by the MACT technology floor—complete substitution of chlorine dioxide for elemental chlorine and elimination of hypochlorite—are attained.

Mills using the model BAT technology, described in section VI.B.5.a(1), are able to achieve at the bleach plant concentrations of dioxin and the 12 chlorinated phenolic pollutants at levels below the minimum levels of currently available analytical methods. Furan concentrations, in turn, are very near the analytical minimum levels. (At the end of the pipe, furan in many mills' effluent cannot be detected by available analytical methods.)

Because only 10 to 40 percent of the wastewater discharged by mills in subpart B originates in the bleach plant, (see the Supplemental Technical Development Document, DCN 14487) the concentrations of pollutants in the final effluent would be one-tenth to two-fifths of their concentrations at the bleach plant. In the biological wastewater treatment system, the pollutants may be present but in concentrations below the applicable analytical minimum levels. When they are discharged to receiving streams, however, dioxin and furan bioaccumulate in aquatic organisms. Were EPA to allow compliance monitoring of the final effluent, there would be no way to determine whether the bleach plant effluent has been adequately controlled or whether the effluent has simply been diluted below the analytical minimum level by the other flows. Diluting pollutants in this manner rather than preventing their discharge is inconsistent with achieving the removals represented by the technology-based levels of control, and hence with the purpose of the BAT limitations. It is also inconsistent with the goals of the Clean Water Act in general. See sections 101(a) and 301(b)(2)(A). While no mill is required to install EPA's model BAT technology, establishing limitations at the bleach plant is the only way EPA can ensure that none of these pollutants will be discharged at concentrations greater than the levels achievable through implementation of the best available technology. See *E.I. du Pont de Nemours & Co.* v. *Train*, 430 U.S. 112, 129 (1977).

With respect to the 12 chlorinated phenolic pollutants, EPA acknowledges that these pollutants could be degraded by biological treatment of the facility's combined wastewater. However, the

same process technologies necessary to address dioxin and furan also reduce the levels of chlorinated phenolic pollutants to concentrations below minimum levels at the bleach plant. Commenters have supplied no data showing that the chlorinated phenolic pollutants should or indeed, as a practical matter, could be segregated from the dioxin- or furan-bearing wastestreams in order to utilize a mill's secondary treatment system fully. Nor is there any assurance that BAT limitations for these pollutants, if monitored at the end of the pipe, would be achieved by treatment rather than simply by the effects of dilution. See 40 CFR 122.45(h). Thus, EPA believes that it is appropriate to require compliance monitoring for the BAT limitations on the 12 chlorinated phenolic pollutants at the point they most easily can be achieved and measured—at the bleach plant.

In the case of chloroform, in-plant limits are authorized by 40 CFR 122.45(h) because they offset the effects of dilution, in this case, the occurrence of uncontrolled volatilization. In other regulatory contexts, EPA recognizes that dilution includes not only mixing a pollutant of concern with other wastestreams, but also mixing it with excess air in the form of uncontrolled volatilization. See 52 FR 25760, 25778–79 (July 8, 1987). Volatilization, like dilution, does nothing to remove, destroy, or immobilize pollutants, and for this reason is not in itself a form of treatment. id. at 25779. The policy reasons supporting that principle in the hazardous waste context similarly apply here.

Finally, EPA is setting effluent limitations at the bleach plant in order to avert the non-water quality environmental impacts caused by the volatilization of chloroform to the air and in order to be consistent with its Clean Air Act determination that the MACT floor for chloroform consists of bleach plant process modifications, i.e., complete chlorine dioxide substitution and elimination of hypochlorite as bleaching agents. Specifically, EPA is requiring under the Clean Air Act that chloroform emissions be controlled by complying with the BAT requirements for all regulated pollutants. See 40 CFR 63.445(d). Therefore, EPA has determined under its Clean Air Act authority that bleach plant technologies—and bleach plant limitations on dioxin, furan, chloroform and the 12 chlorinated phenolics—are necessary to regulate air emissions of chloroform. The situation presented here is very different from the situation EPA faced when promulgating effluent limitations guidelines and standards for the organic chemicals, plastics and synthetic fibers industrial category in 1987. See 52 FR 42522, 42658–62 (Nov. 5, 1987). In that rulemaking, the issue before EPA was whether to use in-plant limitations and standards to regulate air emissions of certain volatile and semi-volatile pollutants; EPA chose not to set in-plant requirements for that purpose because it determined that the regulation of such emissions was best accomplished in a Clean Air Act proceeding, which EPA was commencing at that time. See 52 FR at 42560–62. In contrast, EPA in this rulemaking integrated its decision-making under the Clean Water Act and the Clean Air Act expressly to address these cross-media issues. Taking into account both the air and water objectives of these Cluster Rules, EPA therefore concludes that it is highly appropriate for EPA to set effluent limitations under the Clean Water Act to correspond to and support its concurrent regulation of air emissions under the Clean Air Act.

b. New Source Performance Standards. (1) Background. The Agency proposed to revise NSPS for the Bleached Papergrade Kraft and Soda subcategory. New mills have the opportunity to incorporate the best available demonstrated technologies, including process changes, in-plant controls, and end-of-pipe treatment technologies.

(a) Definition of ''New Source''. EPA had proposed supplemental definitions of the term ''new source,'' as provided in National Pollutant Discharge Elimination System (NPDES) permit program regulations found at 40 CFR 122.2 and 122.29, for the pulp and paper industry only. See 58 FR at 66116–17. EPA is codifying a definition of ''new source'' in Part 430 for subparts B and E. See 40 CFR 430.01(j). The new definition provides that new source performance standards are triggered by new ''greenfield'' mills, complete replacements of entire fiber lines (e.g., pulping and bleaching), or the construction of a new source whose processes are substantially independent of an existing source, such as a new fiber line built to supplement an existing fiber line. Specifically excluded from the definition of new source are existing mills that modify existing fiber lines for purposes of complying with either BAT limitations or PSES, and existing mills that replace entire fiber lines in order to comply with Advanced Technology BAT limitations. For more details, see Section VI.B.8.a(2).

(b) Proposed NSPS. EPA proposed NSPS for toxic and nonconventional pollutants for the Bleached Papergrade Kraft and Soda subcategory based on the combination of both oxygen delignification and extended cooking followed by 100 percent substitution of chlorine dioxide for elemental chlorine and elimination of hypochlorite (identified at proposal as Option 5). The proposed technology bases for NSPS also included the other elements described as part of BAT in VI.B.5.a(1). EPA also proposed NSPS for BOD_5 and TSS based on the single best demonstrated end-of-pipe secondary wastewater treatment system. See 58 FR at 66116–18, 66197. To encourage continuing innovation in the development of processes to reduce or eliminate the discharge of pollutants from the Bleached Papergrade Kraft and Soda subcategory, EPA also proposed alternative NSPS limits for mills adopting TCF processes. See 58 FR at 66111.

(2) Options Considered. In addition to the option proposed for NSPS, EPA considered three other options for the technology basis of NSPS for toxic and nonconventional pollutants. These options are summarized below. For further discussion of these options, see the Supplemental Technical Development Document, DCN 14487. The first alternative option is identical to BAT Option B, described above. This revised NSPS option includes extended delignification (i.e., oxygen delignification and/or extended cooking) to produce softwood pulps with a kappa number of approximately equal to or less than 20 (approximately 13 for hardwoods), followed by complete (100 percent) substitution of chlorine dioxide for elemental chlorine and elimination of hypochlorite for bleaching. EPA concluded that there are no performance differences between the proposed NSPS option and this revised option. See the Supplemental Technical Development Document, DCN 14487.

EPA also considered an ECF technology used at two U.S. mills consisting of oxygen delignification followed by ozone bleaching, enhanced extraction, and final chlorine dioxide brightening. This technology is used to produce pulps of somewhat lower brightness than market pulps. Finally, the Agency considered a TCF process technology that one U.S. mill is currently using to produce pulps with brightness up to 83 ISO.

For conventional pollutants, EPA considered the proposed NSPS option based on the single best available demonstrated end-of-pipe secondary wastewater treatment and a second option based on the best available demonstrated performance of a

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