**ENVIRONMENTAL PROTECTION AGENCY**

**40 CFR Parts 63 and 430**

**[FRL-4802-4]**

**RIN 2060-AD03 and 2040-AB53**

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

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Proposed rules.

**SUMMARY:** These proposed regulations would limit the discharge of pollutants into navigable waters of the United States and the introduction of pollutants into publicly owned treatment works by existing and new facilities that produce pulp, paper, and paperboard. These proposed regulations would also limit the emission of hazardous air pollutants by existing and new facilities in the pulp and paper production source category.

The purpose of this action is to reduce the discharge of water pollutants and emissions of hazardous air pollutants from the pulp, paper, and paperboard industry, not just with end-of-pipe and add-on controls, but also by eliminating or reducing the formation of these pollutants.

**DATES:** Comments on the proposed rules must be received by March 17, 1993 at the following address. For information on public hearings, see **SUPPLEMENTARY INFORMATION.**

**ADDRESSES:** Send comments in triplicate on this proposal to Ms. Marion Thompson, Engineering and Analysis Division (4303), U.S. EPA, 401 M Street SW., Washington, DC 20460. The public record supporting the proposed effluent limitations guidelines and standards is in the Water Docket located in the basement of the EPA Headquarters building, room L102, 401 M Street SW., Washington, DC 20460, telephone number (202) 260-3027. The public record supporting the proposed national emission standards is in the Air Docket located in room M1500 of the EPA Headquarters building at the address listed above, telephone number (202) 260-7548. The Docket staff requests that interested parties call for an appointment before visiting the dockets. The EPA regulations at 40 CFR part 2 provide that a reasonable fee may be charged for copying. For further information about the docket, see **SUPPLEMENTARY INFORMATION.**

**FOR FURTHER INFORMATION CONTACT:** Background documents supporting the proposed regulations are described in the "Background Documents" section later in this action. Contact Ms. Marion Thompson at the address listed above for any questions concerning availability of documents. Many of the documents are also available from the Office of Water Resource Center, RC-4100, at the U.S. EPA, Washington, DC address shown above; telephone (202) 260-7786 for the voice mail publication request line. For additional technical information on the water regulation, contact Mr. Donald Anderson, Engineering and Analysis Division (4303), U.S. EPA, 401 M Street, SW., Washington, DC 20460, or telephone (202) 260-7137. For additional technical information on the air regulation, contact Ms. Penny Lassiter or Mr. Stephen Shedd, Office of Air Quality Planning and Standards (MD-13), U.S. EPA, Research Triangle Park, North Carolina 27711; telephone Ms. Penny Lassiter at (919) 541-5396 or Mr. Stephen Shedd at (919) 541-5397. The contacts for economic information on the proposed regulations are Mr. Scott Mathias at the address in Research Triangle Park, NC listed above, telephone (919) 541-5310, and Ms. Debra Nicoll, at the Washington, DC address listed above, telephone (202) 260-5386.

**SUPPLEMENTARY INFORMATION:**

## Public Hearings

EPA will conduct a public hearing on the effluent pretreatment standards included in the proposed rule. In addition, if requested, a public hearing will be held concerning the proposed emission standards for hazardous air pollutants. One or more public meetings on these integrated regulations as a whole may also be held during the comment period. The date and location of any public hearings or meetings will be announced in the **Federal Register**.

## Docket

EPA notes that many documents in the record supporting these proposed rules have been claimed as confidential business information and, therefore, are not included in the record that is available to the public in the Air and Water Dockets. To support the rulemaking, EPA is presenting certain information in aggregated form or is masking mill identities to preserve confidentiality claims. Further, the Agency has withheld from disclosure some data not claimed as confidential business information because release of this information could indirectly reveal information claimed to be confidential.

Some mill-specific data, which have been claimed as confidential business information, are available to the company that submitted the information. To ensure that all CBI is protected in accordance with EPA regulations, any requests for company-specific data should be submitted on company letterhead and signed by a responsible official authorized to receive such data. The request must list the specific data requested and include the following statement, "I certify that EPA is authorized to transfer confidential business information submitted by my company, and that I am authorized to receive it."

## Overview

The preamble describes the definitions, acronyms, and abbreviations used in this notice; the background documents that support these proposed regulations; the legal authority of these rules; a summary of the proposal; background information; and the technical and economic methodologies used by the Agency to develop these regulations. This preamble also solicits comment and data on specific areas of interest.

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## I. Definitions, Acronyms, and Abbreviations

5-mill study—Cooperative U.S. EPA/paper industry study conducted during 1985 and 1986 at five bleached kraft pulp and paper mills for the purpose of determining the process sources of CDDs and CDFs. The study results were published in 1988 (U.S. Cooperative/Paper Industry Screening Study, EPA-440/1-88-025, March 1988).

104-mill study—Study of 104 chemical pulp mills with chlorine bleaching operations conducted during 1988 and 1989 for the purpose of determining levels of 2,3,7,8-TCDD and 2,3,7,8-TCDF in bleached pulps, treated wastewater effluents and wastewater treatment sludges. The study was conducted by the paper industry under direction by NCASI in accordance with EPA-approved protocols.

1990 Census—The 1990 National Census of Pulp, Paper and Paperboard Manufacturing Facilities. A questionnaire submitted by EPA to all facilities in the pulp, paper, and paperboard industry in October 1990 to gather technical and financial information.

Acid filtrate—Process wastewater from the acid bleach plant stages.

Administrator—The Administrator of the U.S. Environmental Protection Agency.

AFPA—American Forest and Paper Association (formerly the American Paper Institute).

Agency—The U.S. Environmental Protection Agency.

Air dried pulp—For purposes of the effluent guidelines, an unbleached pulp sample with a moisture content of approximately 10 percent by weight. For purposes of the NESHAP, a pulp sample with a moisture content of less than or equal to 10 percent by weight. For purposes of the NESHAP, pulp samples for the pulping component shall be unbleached pulp and for the bleaching component shall be bleached pulp.

Alkaline filtrate—Process wastewater from the pulp washing operations following alkaline bleach plant stages. See also caustic filtrate.

Annual average—The mean concentration, mass loading or production-normalized mass loading of a pollutant over a period of 365 consecutive days (or such other period of time determined by the permitting authority to be sufficiently long to encompass expected variability of the concentration, mass loading or production-normalized mass loading at the relevant point of measurement).

AOX—Adsorbable organic halides. A bulk parameter which measures the total chlorinated organic matter in wastewater.

API—American Paper Institute (now the American Forest and Paper Association).

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

BAT—The best available technology economically achievable, as described in sec. 304(b)(2) of the CWA.

BCT—The best conventional pollutant control technology, as described in sec. 304(b)(4) of the CWA.

BID—Background Information Document. Documentation of the technical background information and analyses supporting the proposed national emission standards for hazardous air pollutants.

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

Bleach plant—All process equipment beginning with the first application of bleaching agents (e.g., chlorine, chlorine dioxide, ozone, sodium or calcium hypochlorite, peroxide), each subsequent extraction stage, and each subsequent stage where bleaching agents are applied to the pulp. A limited number of mills produce specialty grades of pulp using hydrolysis or extraction stages prior to the first application of bleaching agents. The bleach plant includes those pulp pretreatment stages. Oxygen delignification prior to the application of bleaching agents is not part of the bleach plant.

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

Bleach sequence—Sequence of bleaching chemical additions in the bleach plant.

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

Bleaching component—For purposes of the NESHAP, all process equipment beginning with the first application to unbleached pulp of chlorine or chlorine-containing compounds up to and including the final bleaching stage. Treatment of pulp with ozone, oxygen, or peroxide may occur before or after the addition of chlorine. If treatment of pulp occurs after this chlorine addition, then these stages are included in the bleaching component.

BMP or BMPs—Best management practices, as described in section 304(e) of the CWA.

BOD—Biochemical oxygen demand. A measure of biochemical decomposition of organic matter in a water sample. It is determined by measuring the dissolved oxygen consumed by microorganisms to oxidize the organic contaminants in a water sample under standard laboratory conditions of five days and 70°C. BOD is not related to the oxygen requirements in chemical combustion.

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

BPT—The best practicable control technology currently available, as described in sec. 304(b)(1) of the CWA.

Brightness—As commonly used in the paper industry, the reflectivity of a sheet of pulp, paper, or paperboard for specified light measured under standardized conditions.

Broke—Partly or completely manufactured paper that does not leave the machine room as salable paper or paperboard; also, paper damaged in finishing operations such as rewinding rolls, cutting and trimming.

Brownstock—Pulp, usually kraft or groundwood, not yet bleached or treated other than in the pulping process.

CAA—Clean Air Act. The Air Pollution Prevention and Control Act (42 U.S.C. 7401 *et seq.*), as amended, *inter alia*, by the Clean Air Act Amendments of 1990 (Pub. L. 101–549, 104 Stat. 2399).

Caustic filtrate—Process wastewater from the caustic bleach plant stages. See also alkaline filtrates.

Chemical recovery—The recovery of chemicals from spent pulping liquor after it is used to cook wood in the digester.

Clarifier—A treatment unit designed to remove suspended materials from wastewater—typically by sedimentation.

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

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

Combustion device—An individual unit of equipment, including but not limited to, an incinerator, lime kiln, recovery furnace, or boiler, used for the thermal oxidation of organic hazardous air pollutant vapors.

Condensate—Any material that has condensed from a gaseous phase into a liquid phase.

Construction—When used in connection with CAA obligations, construction is the fabrication (on-site), erection, or installation of a stationary source, group of stationary sources, or portion of a stationary source that is or may be subject to a standard, limitation, prohibition, or other federally enforceable requirement established by the Administrator (or State with an approved permit program) pursuant to section 112 of the Clean Air Act.

Container—Any portable unit in which wastewater or HAPs removed from wastewater are stored, transported, treated, or otherwise handled. Examples of containers are drums, barrels, tank trucks, barges, dumpsters, tank cars, dump trucks, and ships.

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

Controlled-release discharge—A discharge that occurs at a rate that is intentionally varied to accommodate fluctuations in receiving stream assimilative capacity or for other reasons.

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

Converting mill—A facility that purchases paper for converting into marketplace products (e.g., boxes, paper plates, etc.).

CWA—Clean Water Act. The Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. 1251 *et seq.*), as amended, *inter alia*, by the Clean Water Act of 1977 (Pub. L. 95–217) and the Water Quality Act of 1987 (Pub. L. 100–4).

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

Decker—A piece of equipment used to thicken or reduce the water content of the pulp slurry after the pulp washer system.

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

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

Digester system—Each continuous digester or each set of batch digesters used for the chemical treatment of wood, including associated flash tank(s), blow tank(s), chip steamer(s), condenser(s), and pre-hydrolysis unit(s).

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

ECF—Elemental chlorine-free. Any process for bleaching pulps in the absence of elemental chlorine.

Effluent—Wastewater discharges.

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

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

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

EOP effluent—Final mill effluent discharged to waters of the United States or to a POTW.

EOP—(End-of-pipe) treatment—Treatment facilities or systems used to treat process wastewaters, non-process wastewaters and/or stormwaters after the wastewaters have left the process area of the facility and prior to discharge. End-of-pipe treatment generally does not include facilities or systems where products or by-products are separated from process wastewaters and returned to the process or directed to air emission control devices (e.g., pulping liquor spill prevention and control systems, foul condensate stripping systems, paper machine save-alls).

EPA—The U.S. Environmental Protection Agency.

Fines—Very small fibers and fiber fragments that readily pass through a filter wire cloth.

Flow indicator—A device that indicates whether gas flow is present in a closed vent system.

General Provisions—General Provisions for national emission standards for hazardous air pollutants and other regulatory requirements pursuant to section 112 of the Clean Air Act as amended November 15, 1990. The General Provisions, to be located in subpart A of part 63 of title 40 of the Code of Federal Regulations, will codify procedures and criteria to implement emission standards for stationary sources that emit (or have the potential to emit) one or more of the 189 chemicals listed as hazardous air pollutants in section 112(b) of the Clean Air Act as amended in 1990. EPA published the proposed NESHAP General Provisions for comment in the Federal Register on August 11, 1993 (58 FR 42760). Also, the General Provisions for the effluent limitations guidelines and standards proposed today, to be located at 40 CFR part 430.

Green Liquor—Liquor made by dissolving the sodium and sulfur-containing smelt from the kraft recovery process prior to causticizing.

Groundwood—Pulp and paper made up of mechanically separated fibers produced by the grinding of pulpwood.

HAP—Hazardous Air Pollutant. Any of the 189 chemicals listed under section 112(b) of the Clean Air Act.

Hardwood—Pulpwood from broad-leaved dicotyledonous deciduous trees.

Incinerator—An enclosed combustion device that is used for destroying organic compounds. Auxiliary fuel may be used to heat waste gas to combustion temperatures. Any energy recovery section present is not physically formed into one manufactured or assembled unit with the combustion section; rather, the energy recovery section is a separate section following the combustion section and the two are joined by ducts or connections carrying flue gas.

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

Individual drain system—The system used to convey process wastewater streams from the pulping or bleaching process equipment or tank, or process wastewater collection and treatment system unit, to a receiving process wastewater collection and treatment system unit. The term includes all process drains and junction boxes, together with their associated sewer lines and other junction boxes, manholes, sumps and lift stations, down to the receiving process wastewater treatment system. The individual drain system shall be designed to segregate the vapors within the system from other drain systems. A segregated stormwater sewer system, which is a drain and collection system designed and operated for the sole purpose of collecting rainfall-runoff at a facility, and which is segregated from all other individual drain systems, is excluded from this definition.

Industrial POTW—Any POTW receiving more than 50 percent of its influent flow or more than 50 percent $BOD_5$ or TSS wastewater load from a facility subject to these regulations.

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

Integrated regulatory alternative—A set of control options comprising the technology bases for effluent limitations guidelines and national emission standards.

ISO—Unit of brightness of the International Organization of Standardization.

IU—Industrial User. Synonym for "Indirect Discharger."

Junction box—A manhole access point to a wastewater sewer system or a lift station.

Knotter—A piece of equipment where knots or pieces of uncooked wood are removed after the digester system and prior to the pulp washer system. Equipment used to remove oversized particles from pulp following the pulp washer are considered screens.

Kraft process—See Sulfate process.

Lime kiln—An enclosed combustion device used to calcine lime mud, which consists primarily of calcium carbonate, into calcium oxide, which is known as quicklime and is used again with green liquor to form white liquor.

LTA—Long-term average: For purposes of the effluent guidelines, average pollutant levels achieved over a period of time by a mill, subcategory, or technology option. These LTAs were used in developing the limitations and standards in today's proposed regulation. The annual average limitations and standards were set equal to the LTAs.

MACT—Maximum Achievable Control Technology. Technology basis for the national emission standards for hazardous air pollutants.

Major source—As defined in section 112(a) of the Clean Air Act, major source is "any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit, considering controls, in the aggregate 10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air pollutants."

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

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

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

Mg—Megagram. One million ($10^6$) grams, or one metric ton.

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

Minimum level—The level at which an analytical system gives recognizable signals and an acceptable calibration point.

Modification—As defined in section 112(a) of the Clean Air Act, modification is "any physical change in, or change in the method of operation of, a major source which increases the actual emission of any hazardous air pollutant emitted by such source by more than a *de minimis* amount or which results in the emission of any hazardous air pollutant not previously emitted by more than a *de minimis* amount."

Multiple effect evaporator system—A series of evaporators, operated at different pressures such that the vapor from one evaporator body becomes the steam supply for the next evaporator, as well as the associated condenser(s) and hotwell(s) used to concentrate the spent cooking liquid that is separated from the pulp.

NCASI—National Council of the Paper Industry for Air and Stream Improvement.

NESHAP—National Emission Standard for Hazardous Air Pollutants. Emission standards to be proposed and promulgated under section 112(d) of the Clean Air Act for hazardous air pollutants listed in section 112(b) of the Clean Air Act.

New Source—When used in connection with CAA obligations, a "new source" is a stationary source the construction or reconstruction of which is commenced after the Administrator first proposes regulations under section 112 of the CAA establishing an emission standard applicable to such source. See CAA section 112(a). When used in connection with CWA obligations, a "new source" is any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commences after the promulgation of the standards being proposed today for the pulp, paper, and paperboard industry under sec. 306 of the CWA. See CWA section 306.

Non-continuous or intermittent discharge—Discharge of wastewaters stored for periods of at least 24 hours and released on a batch basis.

Nonconventional pollutants—Pollutants that are neither conventional pollutants nor toxic pollutants listed at 40 CFR 401.

Non-detect value—A concentration-based measurement reported below the minimum level that can reliably be measured by the analytical method for the pollutant.

Non-integrated mill—A mill that purchases or uses pulp produced at another site to produce paper or paperboard.

Non-water quality environmental impact—An environmental impact of a control or treatment technology, other than to surface waters.

NPDES—The National Pollutant Discharge Elimination System authorized under section 402 of the CWA. NPDES requires permits for discharge of pollutants from any point source into waters of the United States.

NRDC—Natural Resources Defense Council.

NSPS—New Source Performance Standards. This term refers to standards for new sources under both section 306 of the CWA and section 111 of the CAA. In today's regulation, EPA is proposing new and revised NSPS under the CWA. EPA is not proposing new or revised NSPS under the CAA, however EPA is proposing MACT standards for new sources under the authority of section 112 of the CAA.

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

PM—Particulate Matter.

Point of Generation—The location where the process wastewater stream exits the pulping or bleaching process equipment or tank prior to mixing with other process wastewater streams or prior to handling or treatment in a piece of equipment that is not an integral part of the pulping or bleaching process equipment. A piece of equipment is an integral part of the process if it is essential to the operation of the process (i.e., removal of the equipment would result in the process unit being shut down). For example, a stripping column is part of the process unit if it produces the principal product stream and a process wastewater that is discharged to the sewer. However, an identical stripper that treats a process wastewater stream and recovers residual product would not be considered an integral part of the process. When quantifying parameters descriptive of the point of generation (e.g., flow rate and concentration) by measurement or sampling, the end results should be representative of the conditions at the point where the process wastewater stream exits the pulping or bleaching process equipment before it is treated or mixed with other process wastewater streams, and prior to exposure to the atmosphere.

Point source category—A category of sources of water pollutants.

Pollutant (to water)—Dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, certain radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water.

POTW or POTWs—Publicly owned treatment works, as defined at 40 CFR 403.3(0).

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

Primary fuel—The fuel that provides the principal heat input to the device. To be considered primary, the fuel must be able to sustain operation of the combustion device without the addition of other fuels.

Priority pollutants—The toxic pollutants listed in 40 CFR part 423, Appendix A.

Process changes—Alterations in process operating conditions, equipment, or chemical use that reduce the formation of chemical compounds that are pollutants and/or pollutant precursors.

Process emission point—A gas stream that contains hazardous air pollutants discharged during operation of process equipment. Process emission points include gas streams that are discharged directly to the atmosphere, discharged to the atmosphere via vents or open process equipment, or after diversion through a product recovery device.

Process unit—A piece of equipment, such as a pulp washer, decker, or filtrate tank, associated with either the pulping process or the bleaching process.

Process wastewater—When used in connection with CWA obligations, any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. Process wastewater includes boiler blowdown; wastewaters from water treatment and other utility operations; blowdowns from high rate (e.g., greater than 98 percent) recycled non-contact cooling water systems to the extent they are mixed and co-treated with other process wastewaters; and, stormwaters from the immediate process areas to the extent they are mixed and co-treated with other process wastewaters. Contaminated groundwaters from on-site or off-site groundwater remediation projects are not process wastewaters. The discharge of such groundwaters are regulated separately, or in addition to, process wastewaters.

Process wastewater collection system—A piece of equipment, structure, or transport mechanism used in conveying or storing a process wastewater stream. Examples of process wastewater collection system equipment include individual drain systems, wastewater tanks, surface impoundments, or containers.

Process wastewater component—Air emissions from all process wastewater streams produced from the pulping and bleaching processes.

Process wastewater stream—When used in connection with CAA obligations, any HAP-containing liquid that results from either direct or indirect contact of water with organic compounds. Examples of a process wastewater stream include, but are not limited to digester condensates, evaporator condensates, and non-condensible gas system (NCG) condensates.

Process wastewater treatment system—When used in connection with CAA obligations, a process or specific technique that removes or destroys the organics or any HAP in a process wastewater stream. Examples include, but are not limited to a steam stripping unit, waste incinerator, or biological treatment unit.

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

Production Rate—For application to NPDES permits and pretreatment standards, defined as the daily process-specific production rate used to apply to the effluent limitations guidelines and standards in the proposed 40 CFR Part 430. Production shall be determined based upon the highest annual production in the five years divided by the number of operating days that year. See the General Provisions at 40 CFR 430.01 for production normalizing parameters applied to the limitations and standards (included in the definition of "product").

PSES—Pretreatment standards for existing sources of indirect discharges, under section 307(b) of the CWA.

PSNS—Pretreatment standards for new sources of indirect discharges, under section 307 (b) and (c) of the CWA.

Pulping component—All process equipment, beginning with the digester system, up to and including the last piece of pulp conditioning equipment prior to the bleaching component, including treatment with ozone, oxygen, or peroxide before the first application of chlorine or chlorine-containing compounds.

Purchased Pulp—Virgin pulp purchased from an off-site facility or obtained from an intra-company transfer from another site.

RCRA—Resource Conservation and Recovery Act (PL 94–580) of 1976, as amended.

Reconstruction—When used in connection with CAA obligations, reconstruction is the replacement of components of an affected source to such an extent that (1) the fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable new source, and (2) it is technologically and economically feasible for the reconstructed source to meet the promulgated emission standard(s) established by the Administrator pursuant to section 112 of the Clean Air Act.

Recovery Furnace—An enclosed combustion device where concentrated spent pulping liquor is burned to recover sodium and sulfur, produce steam, and dispose of unwanted dissolved wood components in the liquor.

Red liquor—Spent pulping liquor resulting from sulfite pulping.

Screen—A piece of process equipment where pieces of oversized particles are removed from the pulp slurry after the pulp washer system and prior to the papermaking equipment. Equipment used to remove uncooked wood prior to the pulp washer system are considered knotters.

Secondary fiber—Furnish consisting of recovered material. For the purposes of this preamble, secondary fiber does not include broke but does include recycled paper or paperboard known commonly as "post-consumer" recycled material.

Shives—Small bundles of fibers that have not been separated completely in the pulping operations.

SIC—Standard Industrial Classification (SIC). A numerical categorization system used by the U.S. Department of Commerce to denote segments of industry. An SIC code refers to the principal product, or group of products, produced or distributed, or to services rendered by an operating establishment. SIC codes are used to group establishments by the primary activity in which they are engaged.

Softwood—Pulpwood obtained from evergreen, cone-bearing species of trees, such as pines, spruces, hemlocks, etc., which are characterized by having needles.

Source Category—A category of major or area sources of hazardous air pollutants.

Source Reduction—The reduction or elimination of waste generation at the source, usually within a process. Any practice that (1) reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal; and (2) reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants.

Stationary source—Any building, structure, facility, or installation that emits or may emit any air pollutant. See CAA section 111.

Stripper system—A column, and associated feed tanks, decanters, reboilers, preheaters, condensers or heat exchangers, used to strip compounds from process wastewater, using air or steam.

Subpart S—National Emission Standards for Hazardous Air Pollutants from the Pulp and Paper Production Source Category under Title 40, chapter I, part 63 of the Code of Federal Regulations.

Sulfate process—An alkaline pulp manufacturing process in which the active chemicals of the liquor used in cooking (digesting) wood chips to their component parts in a pressurized vessel (digester) are primarily sodium sulfide ($NA_2S$) and sodium hydroxide (NaOH) with sodium sulfate ($NA_2SO_4$) and lime (CaO) being used to replenish these chemicals in recovery operations. Also referred to as the kraft process.

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

Support Document(s)—see section II for titles.

TCDD—2,3,7,8-tetrachlorodibenzo-p-dioxin.

TCDF—2,3,7,8-tetrachlorodibenzofuran.

TCF—Totally chlorine-free. Any process for bleaching pulps in the absence of both chlorine and chlorine-containing compounds.

TEQ—Toxic Equivalent.

TOX—Total Organic Halides.

TRS—Total Reduced Sulfur. An air pollutant.

TSCA—Toxic Substances Control Act, 15 U.S.C. sections 2601–2671.

TSS—Total Suspended Solids.

Toxic pollutants—the pollutants designated by EPA as toxic in 40 CFR 401.15.

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

VOC—Volatile Organic Compounds—Any organic compound which participates in atmospheric photochemical reactions; that is, any organic compound other than those which the Administrator designates as having negligible photochemical reactivity. The Administrator has designated the following organic compounds as negligibly reactive: methane, ethane, methyl chloroform (1,1,1-trichloroethane), CFC–113 (trichlorotrifluoroethane), methylene chloride, CFC–11 (trichlorofluromethane), CFC–12 (dichlorodifluoromethane), CFC–22 (chlorodifluoromethane), FC–23 (trifluoromethane), CFC–114 (dichlorotrifluoroethane), CFC–115 (chloropentafluoroethane), HCFC–123 (dichlorotrifluoroethane), HFC–134a (tetrafluoroethane), HCFC–141b (dichlorofluoroethane), HCFC–142b (chlorodifluoroethane).

Waters of the United States—the same meaning set forth in 40 CFR 122.2.

White liquor—Pulping liquor made by causticizing green liquor, produced in the kraft recovery cycle, with slaked lime.

White water—Waters formed when stock or other fiber-bearing suspensions are dewatered.

Zero discharge (ZD)—No discharge of wastewater to waters of the United States or to a POTW.

## II. Background Documents

The regulations proposed today are supported by several major documents. (1) The technical information supporting the air emissions regulations is detailed in "Pulp, Paper, and Paperboard Industry—Background Information for Proposed Air Emission Standards (October 1993)," hereafter referred to as the background information document (BID). The BID may be obtained from the EPA Library (MD-35), Research Triangle Park, NC, telephone number (919) 541-2777. Please refer to "Pulp, Paper, and Paperboard Industry—Background Information for Proposed Air Emission Standards," October 1993, EPA-453-R93-050a. (2) EPA's technical conclusions concerning the wastewater regulations are detailed in the "Development Document for Proposed Effluent Limitations Guidelines and Standards for the Pulp, Paper, and Paperboard Point Source Category," hereafter referred to as the technical water development document (EPA 821-R93-019). (3) The Agency's economic analysis is found in the "Economic Impact and Regulatory Flexibility Analysis of Proposed Effluent Guidelines and NESHAP for the Pulp, Paper, and Paperboard Industry," hereafter called the economic impact analysis (EPA 821-R93-021). (4) The regulatory impact analysis (including the Agency's assessment of environmental benefits) is detailed in the "Regulatory Impact Assessment of Proposed Effluent Guidelines and NESHAP for the Pulp, Paper, and Paperboard Industry," hereafter called the regulatory impact assessment (EPA 821-R93-020). (5) An analysis of the incremental costs and pollutant removals for the effluent regulations is presented in "Cost-effectiveness Analysis of Proposed Effluent Limitations Guidelines for the Pulp, Paper, and Paperboard Industry," (EPA 821-R93-018). (6) Analytical methods used in the development of proposed effluent guidelines are found in "Analytical Methods for the Determination of Pollutants in Pulp and Paper Industry Wastewater," a compendium of analytical methods (EPA 821-R93-017).

## III. Legal Authority

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

## IV. Summary and Scope of the Proposed Regulations

Today's proposed rules include effluent limitations guidelines and standards for the control of wastewater pollutants. Today's proposed rules also include national emission standards for hazardous air pollutants. Sections IX and X of this notice discuss the rationale for the proposed water and air regulations, respectively. This summary section highlights the technology bases and other key aspects of the proposed rules. The technology descriptions in this section are presented in abbreviated form; more detailed descriptions are included in the technical water development document and the background information document.

Today's proposal presents the Agency's recommended regulatory approach and several others that were considered. The Agency's recommendation is based on extensive comments received from interested parties during the development of these proposed rules, and on detailed evaluation of the available data. As indicated below in the discussion of the specifics of the proposal, the Agency welcomes comment on all options and issues and encourages commenters to submit additional data during the comment period. Also, the Agency will have additional discussions with interested parties during the comment period to ensure that the Agency has the views of all parties and the best possible data upon which to base a decision for the final regulation. EPA's final regulation may be based upon any technologies, rationale or approaches that are a logical outgrowth of this proposal, including any options considered but not selected for today's proposed regulation.

### *A. Effluent Limitations Guidelines and Standards*

1. Subcategorization

EPA is proposing to replace the subcategorization scheme under the existing effluent limitations guidelines for this industry (in parts 430 and 431) with a revised subcategorization scheme. The rationale for changing the existing subcategorization scheme and the development of the proposed subcategorization scheme are detailed in section IX.A. below. Table IV.A-1 is a summary of the new proposed subcategories and the corresponding subcategories under the existing regulations.

TABLE IV.A-1.—COMPARISON OF THE PROPOSED SUBCATEGORIZATION SCHEME WITH THE EXISTING SUBCATEGORIZATION SCHEME

| Proposed subpart | Proposed subcategorization scheme | Current subcategorization scheme (with existing 40 CFR part 430 subparts noted) |
|---|---|---|
| A | Dissolving Kraft | Dissolving Kraft (F). |
| B | Bleached Papergrade Kraft and Soda | Market Bleached Kraft (G), BCT Bleached Kraft (H), Fine Bleached Kraft (I), Soda (P). |
| C | Unbleached Kraft | Unbleached Kraft (A).<br>—Linerboard.<br>—Bag and Other Products.<br>Unbleached Kraft and Semi-Chemical (D, V). |
| D | Dissolving Sulfite | Dissolving Sulfite (K).<br>—Nitration.<br>—Viscose.<br>—Cellophane.<br>—Acetate. |
| E | Papergrade Sulfite | Papergrade Sulfite (J, U).<br>—Blow Pit Wash.<br>—Drum Wash. |
| F | Semi-Chemical | Semi-Chemical (B).<br>—Ammonia.<br>—Sodium. |

TABLE IV.A–1.—COMPARISON OF THE PROPOSED SUBCATEGORIZATION SCHEME WITH THE EXISTING SUBCATEGORIZATION SCHEME—Continued

| Proposed subpart | Proposed subcategorization scheme | Current subcategorization scheme (with existing 40 CFR part 430 subparts noted) |
| --- | --- | --- |
| G | Mechanical Pulp | GW-Thermo-Mechanical (M), GW-Coarse, Molded, News (N), GW-Fine Papers (O), GW-Chemi-Mechanical (L). |
| H | Non-Wood Chemical Pulp | Miscellaneous mills not covered by a specific subpart. |
| I | Secondary Fiber Deink | Deink Secondary Fiber (Q).<br>—Fine Papers.<br>—Tissue Papers.<br>—Newsprint. |
| J | Secondary Fiber Non-Deink | Tissue from Wastepaper (T).<br>Paperboard from Wastepaper (E).<br>—Corrugating medium.<br>—Non-Corrugating Medium.<br>Wastepaper-Molded Products (W).<br>Builders' Paper and Roofing Felt (40 CFR part 431 subpart A). |
| K | Fine and Lightweight Papers from Purchased Pulp | Non-Integrated Fine Papers (R).<br>—Wood Fiber Furnish.<br>—Cotton Fiber Furnish.<br>Lightweight Papers (X).<br>—Lightweight Papers.<br>—Lightweight Electrical Papers. |
| L | Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp | Non-Integrated.<br>—Tissue Papers (S).<br>—Filter and Non-Woven (Y).<br>—Paperboard (Z). |

2. Best Practicable Control Technology Currently Available (BPT)

EPA is proposing to revise the BPT effluent limitations guidelines for biochemical oxygen demand ($BOD_5$) and total suspended solids (TSS) for all subcategories of the pulp, paper, and paperboard industry. These proposed revisions are based on the application of secondary wastewater treatment with appropriate water use and reuse. In most cases, the proposed effluent limitations are defined by the performance of the average of the best 50 percent of mills in that subcategory. The development of proposed BPT effluent limitations is discussed in section IX.E.1 of this notice and in chapter 9.2 of the technical water development document.

3. Best Conventional Pollutant Control Technology (BCT)

EPA is proposing to revise the BCT effluent limitations guidelines for $BOD_5$ and TSS for all subcategories of the pulp, paper, and paperboard industry. In most cases, the proposed BCT effluent limitations are equal to the proposed BPT effluent limitations. The development of proposed BCT effluent limitations is further explained in section IX.E.2.

4. Best Available Technology Economically Achievable (BAT)

The Agency is proposing to revise the BAT effluent limitations guidelines for six subcategories of the pulp, paper, and paperboard industry to control pollutants in the bleach plant effluent and in the end-of-pipe effluent. Table IV.A–2 is a summary of the technology basis for the proposed effluent limitations for each subcategory.

TABLE IV.A–2.—TECHNOLOGY BASIS FOR BAT EFFLUENT LIMITATIONS

| Proposed subpart | Name of subcategory | Technology basis |
| --- | --- | --- |
| A | Dissolving Kraft. | Oxygen delignification with 70% chlorine dioxide substitution for chlorine; COD controls. |
| B | Bleached Papergrade Kraft and Soda. | Oxygen delignification or extended delignification with 100% chlorine dioxide substitution for chlorine; COD controls; color controls. |
| C | Unbleached Kraft. | COD controls |
| D | Dissolving Sulfite. | Oxygen delignification with 100% chlorine dioxide substitution for chlorine. |
| E | Papergrade Sulfite. | Totally chlorine-free bleaching; COD controls. |
| F | Semi-chemical | COD controls. |

In addition to the effluent limitations based on the technologies in Table IV.A–2 for subcategories A, B, and D, EPA is proposing alternative effluent limitations applicable to mills that utilize totally chlorine-free processes in these subcategories.

EPA is proposing to control toxic and nonconventional pollutants in the bleach plant effluent and in the end-of-pipe effluent. The pollutants controlled and the points of application vary for each subcategory and are described in sections IX.C and IX.E.3.

5. New Source Performance Standards (NSPS).

*a. Toxic and Nonconventional Pollutants.* EPA is proposing revised NSPS for seven subcategories of the pulp, paper, and paperboard industry. In five of these subcategories, EPA is proposing NSPS equivalent to the proposed BAT effluent limitations. In one subcategory (Bleached Papergrade Kraft), EPA is proposing NSPS based on prebleaching controls in addition to those that form the technology basis for proposed BAT. In one subcategory where EPA is not today proposing BAT limits (secondary fiber non-deink), EPA is proposing NSPS based on zero discharge of wastewater. A summary of the pollutants and subcategories controlled is presented in section IX.C, and the development of proposed NSPS for toxic and nonconventional pollutants is discussed in section IX.E.4.

b. *Conventional Pollutants.* EPA is proposing to revise the NSPS controlling discharges of $BOD_5$ and TSS for all subcategories at a level equal to the discharge characteristics of the best performing mill. A summary of the pollutants and subcategories controlled is presented in section IX.C, and the development of proposed NSPS for conventional pollutants is discussed in section IX.E.4.

6. Pretreatment Standards for Existing Sources (PSES)

EPA is proposing to revise PSES for the same toxic and nonconventional pollutants to be controlled by the proposed BAT limitations based on the same technologies, as summarized in Table IV.A–2. PSES are further discussed in section IX.E.5.

7. Pretreatment Standards for New Sources (PSNS)

EPA is proposing to revise PSNS for the same toxic and nonconventional pollutants controlled by the proposed NSPS based on the same technologies. PSNS are further discussed in section IX.E.6.

8. Best Management Practices (BMPs)

EPA is proposing BMPs today for the following subparts: A (Dissolving Kraft), B (Bleached Papergrade Kraft and Soda), C (Unbleached Kraft), D (Dissolving Sulfite), E (Papergrade Sulfite), F (Semi-Chemical), and H (Non-Wood Chemical Pulp). EPA is proposing to require that each mill in the subparts listed above develop a BMPs plan within 120 days of promulgation of this rule. This plan must be submitted to EPA for approval and implemented within 24 months of promulgation. The BMPs requirements are discussed further in section IX.E.7.

*B. National Emission Standards for Hazardous Air Pollutants*

Today's proposed standards would amend title 40, chapter I, part 63 of the Code of Federal Regulations by adding a subpart S—National Emission Standards for Hazardous Air Pollutants from the Pulp and Paper Production Source Category. The following is a summary of the proposed standards.

1. Source Category Covered by Standards

Hazardous air pollutant emissions from the pulp and paper production source category are being regulated under section 112(d) of the CAA. The standards proposed today would regulate HAP emissions from mills that chemically pulp wood fiber using kraft, sulfite, soda, or semi-chemical methods. Today's standards are limited to the emission points in the pulping and bleaching processes and in the associated process wastewater collection and treatment systems. Data were not available to evaluate potential controls for other emission points within the source category. Standards for the remaining portion of the pulp and paper production source category will be proposed separately.

For today's regulations, EPA is not proposing to subcategorize the pulp and paper production source category.

2. Pollutants Regulated

Today's proposed standards would regulate emissions of any and all of the 189 HAPs listed under section 112(b) of the CAA. The regulations would require control of aggregated HAP emissions.

3. Source

For today's regulations, EPA is proposing to define a single source to include the pulping processes, the bleaching processes, and the associated process wastewater streams.

4. Applicability

The requirements of the proposed standards would apply to the owners or operators of an existing or new major source, as defined under the CAA at section 112(a), comprising all pulping process components, bleaching process components, and process wastewater components associated with the production of chemical pulp from wood, including kraft, soda, sulfite, or semi-chemical processes.

5. Format of the Standards

As authorized under section 112(h) of the CAA, the proposed standards consist of a combination of emission standards and equipment, design, and work practice standards. Emission standards are used whenever feasible; however, such standards are not feasible in all circumstances. In some circumstances, alternative emission standards are also proposed. Separate standards for the pulping, bleaching, and process wastewater components, as well as for enclosures and closed vent systems, are proposed.

6. Standards for Pulping

An emission standard to reduce HAP emissions by at least 98 percent by weight based upon the use of combustion is proposed for the pulping component of this source category. Three equivalent ways to meet this standard are proposed. Sources subject to the proposed standard would comply with the regulation by enclosing open process equipment and routing all emissions through a closed vent system and either demonstrating 98 percent reduction of HAP emissions through a control device, or demonstrating compliance in one of the three following ways:

- Concentration limitation—Meet an incinerator outlet concentration of 20 ppmv of total HAP;
- Equipment and design standard—Route emissions to an incinerator designed and operated at a minimum temperature of 1600°F and a minimum residence time of 0.75 seconds;
- Equipment and design standard—Route emissions to a boiler, lime kiln, or recovery furnace which introduces all emission point gas streams with the primary fuel or into the flame zone.

All emission points within the pulping component, except those from equipment that follow primary washing, such as deckers and screens, are required to be controlled by the proposed standards, unless the mill can show one of the following conditions exists:

- The emission point from an enclosed process has a flow rate less than 0.0050 scmm;
- The emission point from an enclosed process has an emission rate less than 0.230 kg total HAP/hr;
- The emission point from an enclosed process has emissions less than 0.0010 kg total HAP/Mg air dry pulp (ADP) produced; or
- Process equipment has a total liquid phase concentration from all entering streams combined of less than 0.050 kg of total HAP/Mg of ADP produced.

7. Standards for Bleaching

Sources subject to the proposed standards would comply with the regulations by enclosing open process equipment and routing all emissions through a closed vent system and reducing total HAP mass in the vent stream entering the treatment device by 99 percent, based upon use of a scrubber.

All emission points within the bleaching component are required to be controlled by the proposed standards, unless the mill can show one of the following conditions exists:

(1) The emission point from an enclosed process has a flow rate less than 0.0050 scmm;

(2) The emission point from an enclosed process has an emission rate less than 0.230 kg total HAP/hr; or

(3) The emission point from an enclosed process has emissions less than 0.0010 kg total HAP/Mg ADP produced.

8. Standards for Process Wastewater

Under the proposed standards, bleaching process wastewater streams are not required to be controlled. Pulping process wastewater streams with total HAP concentrations greater than or equal to 500 ppmw and flow rates greater than or equal to 1.0 ℓpm are required to be controlled. The proposed wastewater treatment standard is 90 percent reduction of total HAP, based upon steam stripping. Other techniques such as biological treatment that achieve a 90 percent reduction may also be used. The requirements include the following three equivalent ways to meet the standard:

(1) Recycle applicable wastewater streams to a process unit that is controlled as per the standards for pulping;

(2) Reduce the concentration of HAP in the wastewater outlet to less than 500 ppmw; or

(3) Use a design steam stripper.

Emissions of HAP from wastewater treatment devices (except biological treatment units) must be routed to a control device meeting the pulping component control requirements.

Wastewater collection and treatment systems must be designed and operated without leaks. All tanks, containers, and surface impoundments storing applicable wastewater streams must be enclosed, and all vented vapors must be routed to a control device by means of a closed vent system. A submerged fill pipe must be used to fill containers with a wastewater stream or any stream containing HAP removed from a wastewater stream. All drain systems that receive or manage applicable wastewater streams must be enclosed and any HAP emissions must be routed to a control device.

9. Enclosures and Closed Vent System Standards

Under the proposed standards, all pulping and bleaching component emissions requiring control must be captured and contained by enclosing open process equipment and must be transported in a closed vent system. In addition, the closed vent system must be designed and operated with no detectable leaks. Open process equipment, such as washers, must be enclosed and emissions captured by demonstrating and maintaining a negative pressure at all openings.

10. Test Methods

Test methods and procedures are required to ensure compliance with the standards proposed for the pulping, bleaching, and wastewater components. The proposed standards include requirements for demonstrating that an emission point or wastewater stream is in compliance with control requirements or not required to be controlled. Also included are provisions to test for no detectable leaks from closed vent systems and process wastewater collection and treatment systems. Because the majority of all HAP emissions from the pulping and process wastewater components are methanol, the owner or operator has the option of measuring methanol concentration or methanol emissions as surrogates for total HAP emissions from these areas. For the mass limit requirements or percent reduction requirements, the total HAP concentration in the bleaching component may be measured by methanol and chlorine as surrogates for total HAP.

11. Continuous Monitoring Requirements

Some operating parameters associated with control devices must be continuously monitored. All closed vent systems and process wastewater collection and treatment equipment must be inspected monthly to ensure there are no detectable leaks in the system. Enclosures over previously open process equipment must be visually inspected every 30 days to ensure that all openings in the enclosure that were closed during the performance test remain closed.

12. Recordkeeping and Reporting Requirements

Sources subject to the proposed standards are required to submit the following five types of reports: (1) Initial Notification, (2) Notification of Performance Tests, (3) Exceedance Reports, and (4) Quarterly Summary Reports. Exceedance and Summary Reports are not required for emission points that are not required to be controlled. The proposed rule also requires sources to keep readily accessible records of monitored parameters. For those control devices that must be monitored continuously, records that include at least one monitored value for every 15 minutes of operation are considered sufficient. These monitoring records must be maintained for five years.

*C. Scope of Today's Proposed Rules*

These proposed rules apply to mills within the U.S. Department of Commerce, Bureau of the Census Standard Industrial Classifications (SIC) 2611 (pulp mills), 2621 (paper mills except building paper mills), 2631 (paperboard mills), and 2661 (building paper and building board mills). Some components of these proposed rules apply to only some of the foregoing mills. The mills covered by each component of these proposed rules are shown on Table IV.C–1.

TABLE IV.C–1.—APPLICATION OF PROPOSED RULES TO SUBPARTS

| Effluent guidelines subcategory | Effluent guidelines subpart | Clean Air Act NESHAP | Clean Water Act | | |
|---|---|---|---|---|---|
| | | | Toxics & nonconv: BAT, NSPS, PSES, and PSNS | Conv: BPT, BCT, NSPS | BMPs |
| Dissolving Kraft | A | X | X | X | X |
| Bleached Papergrade Kraft and Soda | B | X | X | X | X |
| Unbleached Kraft | C | X | X | X | X |
| Dissolving Sulfite | D | X | X | X | X |
| Papergrade Sulfite | E | X | X | X | X |

TABLE IV.C–1.—APPLICATION OF PROPOSED RULES TO SUBPARTS—Continued

| Effluent guidelines subcategory | Effluent guidelines subpart | Clean Air Act NESHAP | Clean Water Act: Toxics & nonconv: BAT, NSPS, PSES, and PSNS | Clean Water Act: Conv: BPT, BCT, NSPS | Clean Water Act: BMPs |
|---|---|---|---|---|---|
| Semi-Chemical | F | X | X | X | X |
| Mechanical Pulp | G | | | X | |
| Non-wood Chemical | H | | | X | X |
| Secondary Fiber Deink | I | | | X | |
| Secondary Fiber Non-Deink | J | | X* | X | |
| Fine and Lightweight Papers from Purchased Pulp | K | | | X | |
| Tissue, Filter, Nonwoven, and Paperboard from Purchased Pulp | L | | | X | |

*NSPS only.

## V. Background

### A. Clean Water Act

1. Statutory Requirements of Regulations

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 § 101(a). To assist in achieving this objective, EPA issues effluent limitations guidelines, pretreatment standards, and new source performance standards for industrial dischargers. These guidelines and standards are summarized below:

a. *Best Practicable Control Technology Currently Available (BPT)—sec. 304(b)(1) of the CWA.* BPT effluent limitations guidelines apply to discharges of conventional pollutants from existing sources. BPT guidelines are based on the average of the best existing performance by plants in a category or subcategory. In establishing BPT, EPA considers the cost of achieving effluent reductions in relation to the effluent reduction benefits, the age of equipment and facilities, the processes employed, process changes required, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements), and other factors as EPA Administrator deems appropriate. CWA 304(b)(1)(B). Where existing performance is uniformly inadequate, BPT may be transferred from a different subcategory or category.

Section 304(a)(4) designates the following as conventional pollutants: biochemical oxygen demanding pollutants (measured as $BOD_5$), total suspended solids (TSS), fecal coliform, pH, and any additional pollutants defined by the Administrator as conventional. The Administrator designated oil and grease as an additional conventional pollutant on July 30, 1979 (44 FR 44501).

b. *Best Conventional Pollutant Control Technology (BCT)—sec. 304(b)(4) of the CWA.* The 1977 amendments to the CWA established BCT as an additional level of control for discharges of conventional pollutants from existing industrial point sources. In addition to other factors specified in section 304(b)(4)(B), the CWA requires that BCT limitations be established in light of a two part "cost-reasonableness" test. EPA issued a methodology for the development of BCT limitations in July 1986 (51 FR 24974).

c. *Best Available Technology Economically Achievable (BAT)—sec. 304(b)(2) of the CWA.* In general, BAT effluent limitations guidelines represent the best existing economically achievable performance of plants in the industrial subcategory or category. The CWA establishes BAT as a principal means of controlling the direct discharge of toxic and nonconventional pollutants to waters of the United States. The factors considered in assessing BAT include the age of equipment and facilities involved, the process employed, potential process changes, and non-water quality environmental impacts, including energy requirements. The Agency retains considerable discretion in assigning the weight to be accorded these factors. As with BPT, where existing performance is uniformly inadequate, BAT may be transferred from a different subcategory or category. BAT may be based upon process changes or internal controls, even when these technologies are not common industry practice.

d. *New Source Performance Standards (NSPS)—section 306 of the CWA.* NSPS are based on the best available demonstrated treatment technology. New plants have the opportunity to install the best and most efficient production processes and wastewater treatment technologies. As a result, NSPS should represent the most stringent controls attainable through the application of the best available control technology for all pollutants (i.e., conventional, nonconventional, and toxic pollutants). In establishing NSPS, EPA is directed to take into consideration the cost of achieving the effluent reduction and any non-water quality environmental impacts and energy requirements.

e. *Pretreatment Standards for Existing Sources (PSES)—sec. 307(b) of the CWA.* PSES are designed to prevent the discharge of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of publicly owned treatment works (POTW). The CWA authorizes EPA to establish pretreatment standards for pollutants that pass through POTWs or interfere with treatment processes or sludge disposal methods at POTWs. Pretreatment standards are technology-based and analogous to BAT effluent limitations guidelines.

The General Pretreatment Regulations, which set forth the framework for the implementation of categorical pretreatment standards, are found at 40 CFR part 403. Those regulations contain a definition of pass-through that addresses localized rather than national instances of pass-through and establish pretreatment standards that apply to all nondomestic dischargers. See 52 FR 1586, January 14, 1987.

f. *Pretreatment Standards for New Sources (PSNS)—sec. 307(b) of the CWA.* Like PSES, PSNS are designed to prevent the discharges of pollutants that pass through, interfere with, or are otherwise incompatible with the operation of POTW. PSNS are to be issued at the same time as NSPS. New indirect dischargers have the opportunity to incorporate into their plants the best available demonstrated technologies. The Agency considers the same factors in promulgating PSNS as it considers in promulgating NSPS.

g. *Best Management Practices (BMPs).* Section 304(e) of the CWA gives the Administrator the authority to publish regulations, in addition to the effluent limitations guidelines and standards listed above, to control plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage which the Administrator determines may contribute significant amounts of pollutants.

2. Prior Regulations

EPA promulgated BPT, BAT, NSPS, and PSNS for the builders' paper and roofing felt subcategory of the builders' paper and board mills point source category on May 9, 1974 (39 FR 16578; 40 CFR part 431). EPA promulgated BPT, BAT, NSPS, and PSNS for the unbleached kraft, sodium-based neutral sulfite semi-chemical, ammonia-based neutral sulfite semi-chemical, unbleached kraft neutral-sulfite semi-chemical (cross recovery), and paperboard from wastepaper subcategories of the pulp, paper, and paperboard point source category on May 29, 1974 (39 FR 18742; 40 CFR part 430).

EPA promulgated BPT for the dissolving kraft, market bleached kraft, BCT (board, coarse, and tissue) bleached kraft, fine bleached kraft, papergrade sulfite (blow pit wash), dissolving sulfite pulp, groundwood-thermo-mechanical, groundwood-CMN papers, groundwood-fine papers, soda, deink, nonintegrated-fine papers, nonintegrated-tissue papers, tissue from wastepaper, and papergrade sulfite (drum wash) subcategories of the pulp, paper, and paperboard point source category on January 6, 1977 (42 FR 1398; 40 CFR part 430).

Several industry members challenged the regulations promulgated in May 1974 and January 1977. These challenges were heard in the District of Columbia Circuit Court of Appeals. The promulgated regulations were upheld in their entirety with one exception. The Agency was ordered to reconsider the BPT $BOD_5$ limitation for acetate grade pulp production in the dissolving sulfite pulp subcategory. *Weyerhaeuser Company, et al.* v. *Costle,* 590 F. 2nd 1011 (D.C. Circuit 1978). In response to this remand, the Agency proposed BPT regulations for acetate grade pulp production in the dissolving sulfite pulp subcategory on March 12, 1980 (45 FR 15952). These proposed regulations were not promulgated.

EPA published proposed effluent limitations guidelines and standards for BAT, BCT, NSPS, PSES, and PSNS for 24 of the 25 subcategories of the pulp, paper, and paperboard industry on January 6, 1981 (46 FR 1430). These regulations were promulgated on November 18, 1982 (47 FR 52006) with the exception of BCT, which was reserved. On December 17, 1986, EPA promulgated BCT effluent limitations for 24 of the 25 subcategories of the pulp, paper, and paperboard industry (51 FR 45232). These regulations are currently in effect.

3. Litigation History (Since the 1982 Promulgation)

On March 25, 1985, the Environmental Defense Fund and the National Wildlife Federation filed suit against the Agency concerning the regulation of dioxins and furans (*Environmental Defense Fund and National Wildlife Federation* v. *Thomas,* Civ. No. 85–0973 (D.D.C.)). In settlement of this lawsuit, EPA entered into a consent decree (the "Consent Decree") on July 27, 1988. The Consent Decree imposed a number of obligations on EPA. Among these was the obligation to adopt a schedule to address discharges of dioxins and furans from 104 bleaching pulp mills. As amended by order dated April 2, 1992, the Consent Decree requires the Agency to propose regulations addressing discharges of dioxins and furans from these mills on or before October 31, 1993. Today's proposed rulemaking satisfies this obligation. The Consent Decree requires EPA to use its best efforts to promulgate regulations addressing discharges of dioxins and furans from these mills within 18 months of this proposal.

The Consent Decree also requires EPA to conduct a multiple pathway risk assessment considering sludges, water effluent, and products made from pulp produced at the mills studied in the U.S. EPA/Industry Cooperative Dioxin Study (hereafter referred to as the 104-Mill Study and described in section V.E. below). The risk assessment considering sludges and products is discussed in section V.C. below.

4. Section 304(m) Requirements

Section 304(m) of the Clean Water Act (33 U.S.C. 1314(m)), added by the Water Quality Act of 1987, requires EPA to establish schedules for (i) reviewing and revising existing effluent limitations guidelines and standards and (ii) promulgating new effluent guidelines. On January 2, 1990, EPA published an Effluent Guidelines Plan (55 FR 80), in which schedules were established for developing new and revised effluent guidelines for several industry categories. One of the industries for which the Agency established a schedule was the pulp, paper, and paperboard and the builders' paper and board mills point source category.

Natural Resources Defense Council, Inc. (NRDC) and Public Citizen, Inc. challenged the Effluent Guidelines Plan in a suit filed in U.S. District Court for the District of Columbia (*NRDC et al.* v. *Reilly,* Civ. No. 89–2980 (D.D.C.)). The plaintiffs charged that EPA's plan did not meet the requirements of sec. 304(m). On January 31, 1992, EPA entered into a consent decree (the "304(m) Decree"), which establishes schedules for, among other things, EPA's proposal and promulgation of approximately 20 effluent guidelines. Paragraph 2(b) of the 304(m) Decree provides that:

"Revision of the effluent guidelines for the pulp, paper, and paperboard point source category is the subject of litigation in *EDF* v. *Thomas,* Civ. No. 85–0973 (D.D.C.) . . . The schedules for proposal and final action for those guidelines are the subject of those proceedings, and are not the subject of this decree."

*B. Clean Air Act*

1. Statutory Requirements

Title III of the 1990 Clean Air Act Amendments was enacted to reduce the amount of nationwide air toxic emissions. It comprehensively amended section 112 of the Clean Air Act (CAA).

Section 112(b) lists the 189 chemicals, compounds, or groups of chemicals deemed by Congress to be hazardous air pollutants (HAPs). These toxic air pollutants are to be regulated by national emission standards for hazardous air pollutants (NESHAP). Section 112(c) requires the Administrator to use this list of HAPs to develop and publish a list of source categories for which NESHAP will be developed. EPA must list all known categories and subcategories of "major sources."

The term "major source" is defined in paragraph 112(a)(1) to mean "any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit, considering controls, in the aggregate 10 tons per year (tons/yr) or more of any HAP or 25 tons/yr or more of any combination of HAPs." The term "stationary source," from section 111 of the CAA, means any building, structure, facility, or installation that emits or may emit any air pollutant. The term "area source," as defined in section 112(a)(2), means any stationary source of HAPs that is not a major source.

Notice of the initial list of categories of major and area sources of HAPs was published on July 16, 1992 (57 FR 31576), under authority of section 112(c). This notice listed pulp and paper production as a category of major sources of HAPs. Notice of the draft schedule for the promulgation of emission standards for the listed categories, under authority of section 112(e), was given on September 24, 1992 (57 FR 44147). Under this notice, emission standards for the pulp and paper production industry would be promulgated no later than November 15, 1997.

Section 112(d) of the CAA directs the Administrator to promulgate emission standards for each category of HAP sources listed under section 112(c). Such standards are applicable to both new and existing sources and must require that

> the maximum degree of reduction in emissions of the hazardous air pollutants subject to this section (including a prohibition on such emissions, where achievable) that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable for new and existing sources in the category or subcategory to which such emission standard applies. . . .
> (42 U.S.C. 7412 (d)(2)).

Section 112(d)(3) provides that "the maximum degree of reduction in emissions that is deemed achievable" for new sources shall not be any less stringent than "the emission control that is achieved in practice by the best controlled similar source." For existing sources, the standards may not be less stringent than "the average emission limitation achieved by the best performing 12 percent of existing sources" in each category of 30 or more sources.

Once this minimum control level (referred to as the floor) has been determined for new or existing sources for a category, the Administrator must set a standard based on maximum achievable control technology (MACT) that is no less stringent than the floor. The Administrator may set MACT standards that are more stringent than the floor if such standards are achievable considering the cost, environmental, and other impacts listed in section 112(d)(2). Such standards must then be met by all sources within the category.

2. Prior Regulations

On February 23, 1978 (43 FR 7568), EPA promulgated new source performance standards (NSPS) to limit emissions of particulate matter (PM) and total reduced sulfur (TRS) from new, modified, and reconstructed kraft pulp mills under the authority of section 111 of the CAA. These standards also applied in some circumstances to existing sources, under authority of CAA section 111(d). The standards limited TRS and PM emissions from recovery furnaces, smelt dissolving tanks, lime kilns, digester systems, multiple effect evaporator systems, black liquor oxidation systems, brownstock washer systems, and condensate stripper systems that were constructed, modified, or reconstructed after September 24, 1976. These standards reflected the application of the best technological system of continuous emission reduction that (taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impact and energy requirements) the Administrator determined had been adequately demonstrated.

Minor revisions and corrections to these standards were promulgated on May 20, 1986 (51 FR 18538). The revisions exempted black liquor oxidation systems from the standards; revised the existing TRS standard and its units for smelt dissolving tanks; deleted the requirement to monitor the combustion temperature in lime kilns, power boilers, or recovery furnaces; changed the frequency of excess emission reports from quarterly to semiannual; and exempted diffusion washers from the TRS standard for brownstock washer systems. The revisions also required that monitored emissions be recorded, and corrected the reference for reporting excess emissions. Today's action does not revise or change the requirements of this NSPS.

*C. Sludge Regulatory Development*

1. Sludge Activities in Response to the Consent Decrees

a. *Consent Decree Obligations.* As introduced in section V.A. above, the Consent Decree requires EPA to perform a number of activities under its various statutes. The activity that led to various regulatory programs addressing pulp and paper sludge management was a multi-media, multi-pathway risk assessment for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and 2,3,7,8-tetrachlorodibenzofuran (TCDF) emissions from chlorine-bleaching pulp and paper mills. EPA, the Food and Drug Administration (FDA), and the Consumer Product Safety Commission (CPSC) performed the risk assessment. The multi-media risk assessment consists of ten separate assessments examining approximately 120 exposure pathways, including sludge use and disposal. The sludge assessment is entitled "Assessment of Risks from Exposure of Humans, Terrestrial, Avian, and Aquatic Life to Dioxins and Furans from Disposal and Use of Sludge from Bleached Kraft and Sulfite Pulp and Paper Mills" (EPA 560/5–90–013, July 1990) and hereafter referred to as the integrated risk assessment.

By April 30, 1990, the consent decree required EPA to take at least one of four possible actions with respect to the matters considered in the integrated risk assessment. The four options were:

(1) Commit to propose regulations in the **Federal Register** by April 30, 1991;

(2) Commit to refer under TSCA section 9 some or all matters under consideration to another Federal agency or agencies by October 30, 1990;

(3) Determine that the regulations or referrals are unnecessary;

(4) Determine that EPA does not have sufficient information to make one of the above determinations, establish a schedule to obtain the required information by April 30, 1991, and then within 180 days take at least one of the options.

The findings of the integrated risk assessment compelled EPA to make determinations of the risks associated with the management of sludge through the practice of land application, landfills, and surface impoundments.

On June 19, 1991, EPA entered into another consent decree, *EDF* v. *Reilly* (to date this decree has not been signed by the court). This decree sets out an extensive series of deadlines for promulgating Resource Conservation and Recovery Act (RCRA) rules and for completing certain studies and reports. One component of the decree is a contingency listing determination for pulp and paper mill sludge. The decree requires a listing determination to be proposed 12 months and promulgated 24 months after the effluent limitations guidelines and standards are promulgated. EPA is not required to make a listing determination "if the final rule for the pending effluent limitations guidelines and standards rulemaking . . . 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."

b. *Regulation of Sludge Land Application.* On May 10, 1991, electing to exercise option (i), EPA published proposed 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). The proposed regulations sought to establish a final maximum TCDD and TCDF soil concentration of 10 ppt toxic equivalents (TEQ) and site management practices for the land application of bleached kraft and sulfite mill sludge. EPA was to make a good faith effort to promulgate the rule by November 1992.

On December 11, 1992, EPA informed the plaintiffs of the Consent Decree (*EDF* v. *Thomas*) that the decision on the promulgation of the proposed sludge land application rule was deferred pending promulgation in 1995 of the integrated rulemaking for effluent guidelines and national emission standards. The effluent limitations and emission standards have the potential to result in bleach plant process changes, which should result in reduced dioxin and furan contamination levels in sludge.

In light of the anticipated impact of the effluent limitations guidelines and air emissions 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 the effluent guidelines 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. The Agency expects this determination to be made in 1995–1997.

Prior to that determination, however, EPA is taking action to achieve risk reduction. In the interim period before the effluent limitations and emission standards are promulgated and the sludge listing determinations are made, EPA will promote the establishment of an industry environmental stewardship program for the practice of sludge land application. The centerpiece of this program would be a voluntary agreement establishing standards and management practices for those facilities currently practicing land application. EPA and industry representatives have begun negotiations for such a voluntary agreement.

c. *Regulation of Landfills and Surface Impoundments.* On November 8, 1991, EPA, exercising option (iii), informed the plaintiffs of the Consent Decree of EPA's decision not to promulgate additional regulations under Subtitle D of the Resource Conservation and Recovery Act (RCRA) for landfills and surface impoundments receiving sludge from bleached kraft and sulfite mills. EPA concluded that, under current conditions, dioxin contained in pulp and paper mill sludges does not impose an unreasonable risk to human health and the environment when disposed in landfills and surface impoundments.

2. Land Disposal Restrictions Activities

a. *Background.* In addition to the land disposal restrictions imposed by the Consent Decree, as described in section V.C.1. above, pulp and paper sludges are subject to the provisions of the Resource Conservation and Recovery Act (RCRA). The Hazardous and Solid Waste Amendments (HSWA) to RCRA, enacted on November 8, 1984, allow hazardous wastes to be land disposed only if they are treated, or otherwise satisfy the requirement of substantially diminishing the toxicity of the waste or substantially reducing the likelihood of migration of hazardous constituents from the waste so that short-term and long-term threats to human health and the environment are minimized (section 3004(m) of RCRA). Congress required EPA to promulgate land disposal prohibitions and treatment standards by May 8, 1990 for all wastes that were either listed or identified as hazardous at the time of HSWA, to avoid a ban on land disposal of those hazardous wastes.

On May 8, 1990, EPA promulgated regulations addressing the last of the five prohibitions, the third one-third of the schedule of restricted hazardous wastes (hereafter referred to as the Third Third). Among other things in the Third Third final rule, the Agency promulgated treatment standards and prohibitions for hazardous wastes that exhibited one or more of the following characteristics: ignitability, corrosivity, reactivity, or EP toxicity. The Agency stated in that rule the important principle that merely removing the characteristic of a hazardous waste did not mean that treatment of that waste must cease. So long as the waste exhibits a characteristic at the point it is generated, it can continue to be treated until the short and long-term threats to human health and the environment are minimized.

The D.C. Circuit agreed with EPA on this point, but extended EPA's reasoning, stating that EPA's discretion to apply this point of generation principle for wastes was limited, and that for wastes that exhibit a characteristic at the point of generation, all hazardous constituents must be destroyed or removed before the waste is land disposed. This potentially disallows the common practice of aggregating wastewater for centralized wastewater treatment in land disposal units like surface impoundments, because the aggregation step typically does not destroy or remove hazardous constituents; it merely dilutes them. Because of the nexus with the CWA, the court crafted a limited exception that allows such aggregated wastewater to be placed in surface impoundments without first being fully treated, provided that the treatment the waste receives in the surface impoundment is equivalent to the treatment it would have received in a surface treatment unit. 976 F.2d at 23, 24.

b. *Applicability to the Pulp and Paper Industry.* RCRA land disposal restrictions (LDRs) are applicable to the pulp and paper industry, because the industry has wastes that are ignitable or corrosive at the point of generation, and at some facilities the waste is subsequently land disposed (discharged to a surface impoundment). These ignitable or corrosive wastes typically contain hazardous constituents, such as chloroform, which under the court's ruling must be destroyed or removed in some manner.

c. *Current Situation.* On January 19, 1993, EPA published a Notice of Data Availability to solicit as many comments as possible on all issues in the court opinion (58 FR 4972). The Federal Register notice and Supplemental Information Report (reference number F93–TTCA–FFFFF) can be found in Section 2.5 of the public record supporting this rule or may be obtained by visiting the RCRA Docket, located in room M2427 at EPA Headquarters, or calling (202) 260–9327.

On May 24, 1993, EPA published an Interim Final Emergency Rule to address those issues that required immediate attention (58 FR 29860). As explained in the emergency rule, CWA systems are not immediately affected by the court ruling—the applicable treatment standards were remanded to the Agency, and will remain in effect until the Agency modifies the RCRA regulations. Current practices by the industry of diluting ignitable or corrosive waste streams prior to discharge into a surface impoundment that treats the waste are acceptable for now. Modifications to the RCRA deactivation standard for CWA systems will be addressed in rulemakings scheduled to be finalized in 1995 and 1996. As stated in the Notice of Data Availability, the Agency will be considering applying end-of-pipe wastewater limitations and controls on emissions and leaks from surface impoundments. In addition, the Agency will determine if controls established under the CWA and CAA adequately address the requirements of RCRA.

*D. Pollution Prevention Act*

In the Pollution Prevention Act of 1990 (42 U.S.C. 13101 *et seq.*, Pub. L. 101–508, November 5, 1990), Congress declared pollution prevention the national policy of the United States. The Pollution Prevention Act declares that pollution should be prevented or reduced whenever feasible; pollution that cannot be prevented or reduced should be recycled or reused in an environmentally safe manner wherever feasible; pollution that cannot be recycled should be treated; and disposal or release into the environment should be chosen only as a last resort.

Today's proposed rules are consistent with this policy. As described in sections IX and X, development of today's rules focused on the pollution-preventing technologies that some segments of the industry have already adopted. Thus, a critical component of the technology basis for certain effluent limitations is a process change that eliminates the formation of certain toxic chemicals. Process changes were also considered as the technology basis for the emission standards.

*E. Summary of Environmental Studies*

After the 1982 promulgation of effluent guidelines and standards, research and studies in the United States and other countries showed that pulp and paper mills were discharging toxic pollutants that had not been addressed in the earlier rulemaking. Presented below is a summary of some of the major studies.

1. Swedish Studies

In the mid-1980's, the Swedish Environmental Protection Board's Environment Cellulose project documented biological effects of pulp and paper mill wastes on several species of aquatic life in the Baltic Sea (Sodergren, A., B. E. Bengtsson, et al., "Summary of Results from the Swedish Project Environment Cellulose," Water Science Tech., Vol. 20, No. 1, 1988).

2. National Dioxin Study

In 1983, EPA issued a Dioxin Strategy to establish a framework for addressing dioxin contamination. As part of the Dioxin Strategy, the Agency conducted a broad National Dioxin Study of dioxin contamination in the environment and its associated risks (U.S. EPA, "The National Dioxin Study, Tiers 3, 5, 6, and 7," EPA 440/4–87–003, Office of Water Regulations and Standards, Washington, D.C., February 1987). An unexpected finding of the National Dioxin Study was that the dioxin isomer 2,3,7,8-tetrachlorodibenzo-p-dioxin (or TCDD) was present in fish downstream from 57 percent of the pulp and paper mill sites sampled. To further investigate these results, EPA sampled wastewater treatment sludge at pulp and paper mills in late 1985, and dioxin was also detected in the sludges. The data revealed that, within the paper industry, bleached kraft pulp mills contained the highest levels of dioxin. This suggested that dioxin was probably being formed as a by-product during the bleaching of wood pulp with chlorine or chlorine derivatives.

3. Five-Mill Study

In early 1986, EPA made plans to obtain detailed sampling data from one bleached kraft pulp and paper mill to determine the source of the dioxin. Before sampling took place, industry representatives urged EPA to expand the study from one to five mills. The industry agreed to fund a portion of the project and to supply detailed process information for each mill selected for study. In June 1986, EPA and industry representatives entered into an agreement for a cooperative screening study, often referred to as the Five-Mill Study. Full-scale sampling started in June 1986 and ended in January 1987. Two compounds, TCDD and 2,3,7,8-tetrachlorodibenzofuran (TCDF), were detected in the effluents of four of the five mills, the pulps of all five mills, and the wastewater treatment plant sludges of all five mills (U.S. EPA, "U.S. EPA/Paper Industry Cooperative Dioxin Screening Study," Office of Water Regulations and Standards, Washington, DC 20460, EPA 440/1–88–025, March 1988).

4. 104-Mill Study

After reviewing the results from the Five-Mill Study, EPA determined that information was needed from all chlorine-bleaching facilities to assess if dioxin was being formed at all mills using chlorine-containing compounds and to determine how dioxin was being generated. Again, industry representatives expressed interest in cooperating voluntarily to gather additional data. An agreement was drafted in late 1987. After the Office of Management and Budget approved the cooperative data collection activities, the agreement was signed on April 25, 1988, and 104 mills agreed to participate. This study provided EPA with dioxin and furan analytical results in effluents, sludges, and pulps along with detailed bleach plant process information and data on wastewater treatment system operation and sludge disposal practices. These types of information had not been collected for this industry since 1976 so the 104-Mill Study provided EPA with valuable data representative of pulp and paper mill operations operating in 1988 (U.S. EPA, "U.S. EPA/Paper Industry Cooperative Dioxin Study—the 104-Mill Study—Summary Report," Office of Water Regulations and Standards, Washington, D.C. 20460, July 1990).

5. National Study of Chemical Residues in Fish

After the Five-Mill Study, EPA initiated a study to determine whether fish tissue was contaminated by pollutants of concern, including dioxins and furans. Pulp and paper mills using chlorine to bleach pulp appeared to be the dominant source of TCDD and TCDF. Statistical comparisons show that fish near pulp and paper mills using chlorine have significantly higher concentrations of TCDD than all other source categories (U.S. EPA, "National Study of Chemical Residues in Fish," Office of Science and Technology, Washington, DC 20460, EPA 823–R–92–008a, September 1992).

6. Air Emission Findings

EPA has long known that pulp and paper mills emit chlorine and chloroform to the air. In the 1980's, the Agency attempted to get chloroform listed as a hazardous air pollutant (HAP), due to its carcinogenicity, under sec. 112 of the 1977 Amendments to the CAA. After the 1990 Amendments to the CAA, the pulp and paper industry was listed as a category of major sources of hazardous air pollutants because of the known presence of chlorine, chloroform, and other metallic HAPs in pulp mill emissions. In addition, pulp mills are known to be a source of odor due to total reduced sulfur (TRS). TRS would be controlled as a result of a NESHAP. National baseline emissions of HAP from the pulp and paper industry are estimated to be 172,000 Mg per year.

7. Dioxin Reassessment

In the Spring of 1991, EPA undertook a reassessment of the risk of dioxin. As part of this reassessment, EPA is examining the mechanisms by which dioxin apparently causes a variety of adverse effects in animals and humans, including cancer, reproductive effects, developmental effects, and effects on the immune system. EPA's regulatory programs are proceeding uninterrupted during the preparation of the reassessment. Findings of the reassessment are scheduled to be published in mid-to-late 1994.

### *F. Summary of Public Participation*

During the data gathering activities that preceded development of the proposed rules, EPA met regularly with representatives from the industry and environmental groups, and these contacts are discussed in section VIII. During the development of the proposed regulations, EPA continued to meet with interested parties on a regular basis. Between September 1992 and June 1993, EPA sponsored five public meetings, where the Agency shared information about the content and the status of the regulations. The public meetings also gave interested parties an opportunity to provide information, data, and ideas on key issues. EPA's intent in conducting these public meetings was to elicit input that would improve the quality of the proposed regulations.

The meetings were announced in the **Federal Register**, and agendas and meeting materials were mailed to interested parties before the meetings or distributed at the meetings. An extensive mailing list was developed from meeting attendee lists and telephone calls to the Agency. The information presented at each meeting corresponded to the stage of regulatory development and the status of the data analysis at the time of the meeting.

At the first public meeting, the Agency clarified that the public meetings would not replace the notice-and-comment process, nor would the meetings become a mechanism for a negotiated rulemaking. While EPA accepted information and data at the meetings and made good faith efforts to review all information and address all issues discussed at the meetings, EPA could not commit to fully assessing and incorporating all comments into the proposal. EPA will assess all comments and data received at the public meetings prior to promulgation.

In addition to the five public meetings, EPA met with interested parties and conducted telephone conference call meetings to discuss specific issues on many occasions during regulatory development. As a result of these public participation activities, the Agency learned of several technical issues that were not completely resolved or documented prior to this proposed rulemaking. Hence, the Agency is requesting data and comment on several issues that were introduced during the public participation activities (see section XIII). Many materials concerning the public meetings are included in section 15.0 of the water docket.

## VI. Integrated Regulatory Development Under the Clean Water Act and the Clean Air Act

This section describes the Agency's approach for developing regulations applicable to the pulp and paper industry jointly under the CWA and CAA. (As stated previously, the CWA regulations proposed today are known as effluent limitations guidelines and standards; the CAA regulations are known as national emissions standards for hazardous air pollutants). The Administrator developed these proposed regulations jointly to provide greater protection of human health and the environment, reduce the cost of complying with both sets of rules, promote and facilitate coordinated compliance planning by industry, promote and facilitate pollution prevention, and emphasize the multimedia nature of pollution control.

In developing these regulations, EPA first collected information about the industry, next developed control technology bases for the effluent limitations and air emission standards to meet the separate statutory requirements of the CWA and the CAA, and then analyzed the impacts of various combinations of control technologies as the bases for effluent limitations and air emissions control. The total environmental and economic impacts of basing limitations and standards on these control technologies were estimated.

### *A. Background*

The pulp and paper industry releases significant amounts of pollutants to ambient air, surface waters, POTWs, and wastewater treatment sludges. Section V of this notice discusses in greater detail the separate components of EPA's regulatory efforts to address these pollutant releases, including revised effluent limitations guidelines and standards under the CWA, NESHAP under the CAA, and regulations on the land application of pulp and paper mill sludge under the TSCA and the RCRA.

In 1990, EPA established the Pulp and Paper Regulatory Cluster, which is composed of representatives from most EPA offices. One role of the Pulp and Paper Regulatory Cluster is to identify optimal approaches to solving environmental problems associated with the pulp and paper industry through regulatory coordination. Pursuant to the Cluster initiative, today's notice is a joint proposal of CWA effluent limitations guidelines and CAA NESHAP for the pulp and paper industry. A third effort under the Cluster initiative—regulation of land application of pulp and paper mill sludge—was also included in the Agency's coordinated regulatory strategy, as explained in section V.C.1.

The air emission standards proposed today would not regulate all HAP emission points within the source category. The air emission standards, however, do address the emission points that are affected by the use of process changes—that is, noncombustion points at mills that chemically pulp wood fiber. Proposing these standards jointly with the effluent standards thus allows consideration of process changes as a control strategy for reducing discharges of both water and air pollutants. CAA standards for the remaining portion of the pulp and paper source category will be proposed separately. EPA plans to propose standards for the combustion emission points at chemical pulping processes approximately one year after today's proposal and promulgate them together with the standards for the noncombustion emission points and the effluent guidelines limitations.

### *B. Goals*

EPA has several technical and policy goals for coordinating the development of the effluent limitations guidelines and the NESHAP. These goals include: (1) Protecting the public health and the environment by attaining significant reductions in pulp and paper industry pollutant releases to all media; (2) reducing the cost of complying with both sets of rules; (3) promoting and facilitating coordinated compliance planning by the industry; (4) promoting and facilitating pollution prevention; and (5) emphasizing the multimedia nature of pollution control. The Agency believes these goals were served by the coordinated development of these rules.

### *C. Technical Approach*

#### 1. Coordinated Information Collection

The first step in developing the joint regulations was to develop a mill-specific database of all facilities subject to both sets of standards. As described in Section VIII of this notice, EPA utilized information from a number of sources, including its wastewater sampling program, air emissions testing program, 1990 census questionnaire, and API/NCASI 1992 voluntary questionnaire, to develop the integrated regulations. The information collected includes the processes and control technologies in use, current control levels, and pollutant releases. The Agency recognizes that the industry is dynamic, and that processes and equipment change over time. Therefore, survey data were updated through telephone calls and letters to ascertain that the database reasonably reflects the current status of the industry. EPA will consider information and data submitted in a timely manner by interested parties in response to this proposal for the purpose of updating the database prior to promulgation. The Administrator is aware that the industry is currently conducting a sampling program, and will consider the results of this program in developing the final regulations to the extent that they are available in a timely manner.

Information collected about the industry was placed into a mill-specific database. EPA then developed an integrated database system to analyze the impacts of implementing the combined effluent limitations guidelines and NESHAP. The integrated database system, which is described in the BID, uses the mill-specific database and other components to calculate national baseline air emissions and wastewater discharges, and national pollutant reductions and costs of the effluent limitations and air emission control options. It contains information on all mills in the industry and was developed using information from EPA's wastewater sampling program, emissions testing program, 1990 census questionnaire, API/NCASI survey, and other sources. This comprehensive information provides a strong basis for ensuring that the proposed regulations meet the statutory requirements, and allows consideration of other factors such as coordinated compliance planning and multimedia pollutant reduction.

2. Development of Effluent Limitations and Air Emissions Control Technology Options

After evaluation of control technologies and their use in the industry, EPA selected potential BAT, PSES, BPT, BCT, NSPS, PSNS, and MACT control technology options, as well as BMP; this process is described in Sections IX and X of this notice. Process change options were selected as the basis for proposed BAT and PSES limitations in all cases because they are the most effective and economically achievable controls for toxic and nonconventional pollutants. Combustion, wet scrubbing, and steam stripping were selected for the basis of the proposed MACT standards because they are the best system of emission limitation considering the costs, non-air quality health and environmental impacts, and energy requirements. Proposed BPT limitations to reduce conventional pollutant effluent loadings are based on wastewater flow controls and improvements to wastewater treatment systems. The proposed BMP are based on pulping and black liquor spill prevention and control.

3. Analyses of Multiple Integrated Air and Water Regulatory Alternatives

A series of analyses were conducted to assess the impacts of various combinations of BAT, PSES, BPT, BCT, NSPS, PSNS, and MACT control options, as well as BMP. EPA developed regulatory alternatives based on pollution-preventing process changes alone, air emissions control alone, and combinations of process changes and air emission controls. Each regulatory alternative also included a flow control and wastewater treatment component comprising the BPT technology basis, and a BMP component based on pulping and black liquor spill prevention and control. The projected effluent loadings and air emissions resulting from these integrated regulatory alternatives were compared to baseline pollutant releases. Control costs and other environmental and economic impacts for each alternative above the baseline level of control were also estimated. These analyses were used to determine the combined effect of the process changes, air controls, improvements to wastewater treatment, and best management practices. The alternatives were designed to evaluate the most efficient application of control technologies and to minimize the cross-media transfer of pollutants between water and air.

EPA evaluated whether pollution-preventing process changes, such as those selected as the control basis for BAT and PSES, reduce HAP emissions sufficiently to satisfy the CAA requirements. Based on available data, the analyses showed that use of process change technologies reduces emissions of some HAPs, but increases others. Specifically, process change technologies decrease emissions of chlorinated HAPs, including chloroform, chlorine, and hydrochloric acid. This decrease in air emissions of chlorinated HAPs is believed to be attributable to the elimination of hypochlorite as a bleaching agent and to increasing levels of chlorine dioxide substitution in the process changes considered. However, air emissions of some nonchlorinated HAPs, including methanol, methyl ethyl ketone (MEK), and formaldehyde, show modest increases as a result of those process changes. These patterns in air emissions were observed for the range of process change control options evaluated as possible technology bases for BAT and PSES. EPA concluded that process change technologies alone do not adequately control HAP emissions to the air, and that air control technologies in addition to the process changes are needed to achieve HAP emission limitations required by the CAA. EPA requests comments and data on air emission trends associated with elimination of hypochlorite, chlorine dioxide substitution, and oxygen delignification.

EPA also considered the effect of steam stripping process wastewater streams on water and air pollutant releases, as it is recognized as a control device that reduces both conventional effluent pollutant loadings and HAP emissions. The analyses showed that flow reduction and wastewater treatment system improvements would be needed for some mills to reduce BOD and TSS discharges to comply with proposed BPT limitations based on the best performing 50 percent of mills with advanced biological treatment. However, steam stripping also contributes to BOD removal.

A third consideration was the effect of the air controls on effluent loadings of toxic and nonconventional pollutants. The analyses showed that air controls did not significantly affect effluent loadings of toxic and priority pollutants. Combustion destroys most compounds emitted from process vents, thus reducing the amount of pollutants that could enter surface waters due to deposition. Chlorinated HAPs remaining after the process changes react with the caustic in the scrubber, neutralizing the caustic effluent. Non-chlorinated HAPs that absorb into the caustic are biodegradable, and are not estimated to significantly increase the pollutant load to the wastewater treatment system. Steam stripping systems remove compounds from wastewater streams, and the removed compounds are destroyed in a combustion device.

*D. Results*

The analyses of multiple integrated regulatory alternatives showed that there is no single control technology currently available that reduces pollutant discharges to the water and air to the levels required by the respective statutes. The demonstrated control technologies that can serve as the bases for BAT, PSES, NSPS, PSNS, and BPT limitations pose no significant adverse impacts to and have some benefits for air quality. Similarly, the air control technologies that can serve as the basis for the NESHAP standards pose no significant adverse impacts on and have some benefits for water quality. Therefore, combining the best control technology options for effluent limitations with the best control technology options for the air emission standards represents a reasonable method for constructing the integrated regulatory alternative.

EPA selected control options for the BAT, PSES, and BPT limitations and the NESHAP are based on evaluation of pollutant reductions, costs, cost effectiveness, and economic, environmental, and energy impacts. Prior to selection of the proposed rules, an integrated regulatory alternative comprising the sum of the proposed control options for the four standards was constructed. Impacts of the combined standards, including pollutant reductions, costs, cost effectiveness, and economic, environmental, and energy impacts, were then assessed. This coordinated evaluation ensures that today's proposed regulations fully satisfy all the relevant statutory requirements while minimizing cross-media pollutant transfer, encouraging the use of pollution-preventing process changes, and ensuring the greatest environmental benefit for the pollution control costs. Specific results of the Agency's evaluation and the selected integrated regulatory alternative are presented in Section XI of this notice.

## VII. Description of the Industry

### *A. Pulp and Paper Manufacturing Facilities*

Presented below is a brief summary description of the pulp, paper, and paperboard industry. Other descriptive characteristics of the industry are detailed in sections IX.B., IX.C., IX.D., and IX.E. of this notice; chapter 4.0 of the technical water development document; and in the NESHAP Background Information Document (BID). Based upon responses to EPA's 1990 National Census of Pulp, Paper, and Paperboard Manufacturing Facilities, the Agency estimates that there are approximately 565 manufacturing facilities located in 42 States. The major pulp production areas in the U.S. are the Southeast, Northwest, Northeast, and Northern Central regions, due to availability of fiber furnish and processing facilities.

The 565 manufacturing facilities that EPA has considered for regulation comprise either integrated pulp and paper mills, where pulp is manufactured on-site from virgin wood fiber, secondary fiber, or non-wood fiber; or, non-integrated paper mills where only paper or paperboard products are manufactured from purchased pulp or pulp produced elsewhere. There are approximately 290 integrated pulp and paper mills and 275 non-integrated paper mills.

### *B. Manufacturing Processes*

#### 1. Raw Materials

There are four major types of fiber furnish used for papermaking: (a) Hardwood; (b) softwood; (c) secondary fibers (recycled fiber); and (d) non-wood fibers. Pulps produced from hardwood trees (oak, maple, birch, beech, and others) contain relatively short fibers, which produce pulps of higher density. Pulps produced from softwood trees (pine, spruce, hemlock, and others) contain longer fibers, which produce pulps of greater strength. Many papers are made from blends of hardwood and softwood pulps to take advantage of softwood pulp strength and hardwood pulp density. About twice as much softwood pulp is produced in the U.S. compared to hardwood pulp.

Wood pulp is manufactured from trees brought to the pulp mill in the form of logs ("round wood"), or in the form of wood chips. Sawdust from saw mills is also used as a fiber furnish. At most mills, the tree bark is removed from round wood using mechanical debarkers. The debarked logs are then mechanically chipped, sized and stored in piles prior to pulping.

"Secondary fibers" is the term used to apply to furnish obtained from the recycle of waste papers and paperboard. Depending upon waste paper segregation and processing, secondary fibers can be converted into most grades of finished paper. Examples of non-wood fibers include cotton, sugar cane waste called bagasse, flax, and hemp. Non-wood fibers are most often used to produce low volume, specialty grades of paper. Certain plastics and latexes are also used for specialty papermaking.

#### 2. Pulping Processes

In 1992, as reported by the American Forest and Paper Association, U.S. pulp and paper industry produced 90.7 million tons of pulp by the following processes: (a) Chemical Pulp (60.3 percent); (b) Secondary Fiber Pulp (28.0 percent); (c) Mechanical Pulp (7.2 percent); and (d) Semi-Chemical Pulp (4.5 percent). The principal distinguishing characteristics and the major products associated with each pulping process are briefly described below and are reviewed in detail in the technical water development document.

Chemical pulping processes are carried out using concentrated chemical solutions at high temperature and under pressure. The processes are characterized by chemical pulps with relatively low yield and pure fibers that impart particular properties that are important to high grade products. Examples of chemical pulping processes are kraft, soda, and sulfite. Extensive chemical recovery cycles or byproducts production are necessary for economical operation of chemical pulp mills. Modifications of the kraft and sulfite pulping and bleaching processes are used to produce "dissolving" grades of pulp for manufacture of selected products where a high purity of alpha cellulose and the virtual absence of lignin is desired.

Secondary fiber pulping is carried out mechanically where waste paper and board products are solubilized in water. Impurities (e.g., staples, clips, plastics, adhesives) are removed by various cleaning steps, depending upon the grade of wastepaper processed and the product's end use. If secondary fiber pulps will be used for the manufacture of printing grades of paper, the pulp must also be deinked by chemical and mechanical methods. The grades of paper and paperboard produced from recycled papers or wastepapers are highly dependent upon the quality of the wastepaper.

Often, pulps are produced at integrated pulp and paper mills by more than one method. Pulps are blended to take advantage of the various properties of specific pulps. Because of the increasing trend for use of recycled paper products, secondary fiber is used to augment the virgin wood fiber supply at many chemical pulp mills. Market pulp mills are those where pulp is produced to customer specifications for sale in this country or exported. Usually, only one type of pulping process is used at each market pulp mill. Market bleached kraft pulp is the predominant grade of market pulp produced in the United States.

Mechanical pulping is conducted by mechanical energy, with little or no use of chemicals and moderate or no use of heat. The process has high yield and results in short, impure fibers that exhibit good print quality. It is generally not feasible to produce highly bleached mechanical pulp. Examples of mechanical pulps are stone groundwood, refiner mechanical, and chemi-thermo-mechanical pulps.

Semi-Chemical pulping is conducted with combinations of chemical and mechanical treatments. The processes have intermediate yields and result in pulps with a wide range of properties depending upon the degree of mechanical and chemical methods used. A common semi-chemical pulping process is the Neutral Sulfite Semi-Chemical process used to produce corrugating medium. Some mills use only chemical pulping.

3. Pulp Bleaching

Pulps may either be used to produce unbleached final products from the pulping process, or pulps may be chemically bleached to desired levels of brightness for the production of other products. Bleached pulps are used for products where high purity is required and yellowing (or color reversion) is not desired (e.g., printing and writing papers, food contact papers, sanitary paper products). Unbleached pulp is typically used for production of boxboard, linerboard, and grocery bags.

Bleaching is used to whiten pulp by chemically altering the coloring matter and to impart a higher brightness. The selection of wood type for pulping, the pulping process used, and the desired qualities and end use of the paper product greatly affect the type and degree of pulp bleaching required. There are two basic methods to increase the brightness of pulps. The first is to use selective bleaching agents that destroy some of the colored compounds, without significantly reacting with lignin, which binds wood fibers together. This method is used to brighten pulps with high lignin content such as groundwood and semi-chemical pulps. High brightness values are difficult to achieve without delignification, and significant delignification of these pulps is not desirable due to the negative impact on yield. The second method of bleaching includes complete or near-complete removal of the lignin remaining after chemical pulping, followed by further bleaching of the pulp to a desired degree of brightness. The latter method is used to bleach kraft, soda and sulfite pulps to higher brightness levels.

In recent years there has been a major trend in the industry toward reducing both the types and amount of chlorine and chlorine-containing chemicals used for pulp bleaching. Most of these changes have occurred as a result of product quality considerations and environmental concerns about the presence of dioxins and other chlorinated compounds in pulp and paper products resulting from the bleaching of pulps with chlorine and chlorine-containing compounds. At many mills, chlorine dioxide is being used in first stage of bleaching in place of some or all of the chlorine; use of hypochlorite has diminished in response to concerns about chloroform emissions; and significant efforts have been made by many mill operators to improve delignification prior to bleaching to minimize bleach chemical usage and the attendant formation of unwanted chlorinated by-products. At this writing, commercial production of market grades of high brightness bleached softwood kraft pulp has not been achieved without the use of any chlorine or chlorine derivatives. Totally chlorine free bleaching of selected market grades of sulfite pulps has been demonstrated in Europe.

4. Paper Making

Depending upon end use, unbleached or bleached pulp is processed by beating and refining prior to papermaking. Chemicals are also added to impart specific properties to the finished product.

## VIII. Summary of Data Gathering Efforts

*A. Wastewater Sampling Program*

This section presents a brief overview of EPA's wastewater sampling program. Details of this data gathering effort are presented in Chapter 3.2 of the technical water development document. Also, findings from EPA's sampling program are discussed in section IX.B. of this notice. Detailed support documentation can be found in section 7.5 of the public record for the effluent limitations. During the development of the proposed rules, the Agency conducted two wastewater sampling programs consisting of 13 short-term studies and a long-term study.

1. Short-Term Studies

The Agency conducted 13 short-term sampling episodes from 1988 through mid-1993. The first three sampling episodes, performed in 1988, served as screening episodes and allowed the Agency to narrow the list of pollutants to be examined during future episodes. During these first three episodes, samples were analyzed for the following groups of analytes: Chlorinated dioxins and furans, chlorinated phenolics, volatile organics, semi-volatile organics, pesticides/herbicides, metals, conventional pollutants ($BOD_5$ and TSS), and nonconventional pollutants (COD and TOX). Subsequently, EPA conducted ten short-term sampling episodes between 1989 and 1993. During these episodes, samples were analyzed for a limited set of analytes: Chlorinated dioxins and furans, chlorinated phenolics, volatile organics, $BOD_5$, COD, TSS, TOX, and AOX. Mills were selected for participation in the short-term sampling program because they utilized particular pulping or bleaching technologies, wastewater treatment, or fiber furnishes.

At each mill sampled in the period 1988 through 1990, sampling points were selected to characterize wastewater discharges from various process areas (brownstock wash water, bleach plant filtrates, and paper machine white water), mill exports (final effluent, pulp, and sludge), the performance of the wastewater treatment system (one or more influents and effluents), and mill process water and brownstock pulp. For the sampling episodes that occurred in 1992 and 1993, the sampling points were limited to bleach plant filtrates, bleached pulp, and wastewater treatment system samples.

Data obtained from the short-term sampling program provided EPA with valuable information about mill operations and pollutant discharges during the period from 1988 to 1993. One important finding was that, since 1988, many mills made process technology and/or operating changes in the bleach plant intended to reduce the formation of dioxins, furans, and other chlorinated pollutants. Some data from the short-term study were used to develop the effluent limitations and standards proposed today.

2. Long-Term Study

The Agency's long-term study was undertaken to generate the data necessary for developing effluent limitations and standards. The study was a cooperative effort between EPA and the industry. Representing the paper industry, the American Paper Institute (now the American Forest and Paper Association, or AFPA) and the National Council of the Paper Industry for Air and Stream Improvement, Inc. (NCASI) cooperated with EPA in substantially expanding the scope of the Agency's study. In particular, AFPA and NCASI coordinated and conducted the expanded collection and analysis of data from four mills selected by the Agency to an additional four mills selected by the industry, for a total of eight pulp and paper mills. In addition, the scope of the study was expanded to cover two nine-week periods (summer 1991 and winter 1991–1992).

These eight mills were selected to participate in the long-term study sampling program because they utilized particular pulping or bleaching technologies, wastewater treatment, or fiber furnishes. At each mill, sampling points were selected to characterize the bleach plant effluent, plant exports (final effluent, pulp, and sludge), and the performance of the wastewater treatment system. Bleach plant effluents were characterized by collecting samples that represent the total discharge from a bleach line, typically an acid filtrate (or acid sewer) and an alkaline filtrate (or alkaline sewer) and other filtrates that may be discharged separately. Mill process water, the influent and effluent from wastewater treatment, bleached pulp, and wastewater treatment sludge were also sampled. EPA analyzed for the following pollutants: Volatiles, dioxins and furans, chlorinated phenolics, AOX, $BOD_5$, TSS, and color. AOX, $BOD_5$, TSS, and color were analyzed only in influent to and effluent from wastewater treatment.

Samples were collected during one 24-hour period each week for nine weeks in the summer of 1991 and each week for nine weeks in the winter of 1991–1992. Each week, mill personnel were responsible for collecting the samples, and accurately reporting wastewater flow, bleached pulp production, and mill operating conditions. Detailed sampling plans were prepared by the Agency and reviewed with mill personnel prior to the first week of sampling. NCASI and EPA-contractor staff were on-site during the first week of sampling at each mill during the summer program. The Agency audited sampling performance in the eighth or ninth week of the summer program, and again during the winter program to assess whether mill personnel were following the site-specific sampling plans. Summer and winter program audit reports were prepared for each mill. These reports generally contain confidential business information (CBI) pertaining to mill operations during the study. At the conclusion of the study, a non-confidential audit report was prepared to summarize audit results from both the summer and winter programs for all eight mills. These reports are contained in section 7.5.2 of the public record supporting the proposed effluent limitations. The audits uncovered relatively few significant deviations from established sampling and sample handling protocols.

The Agency and NCASI jointly reviewed the quality of the long-term study analytical data. Analytical data that did not meet appropriate criteria were further studied or excluded from EPA's database. An engineering review of the data was also conducted, and based upon that review, certain additional data were excluded. For example, all data for trichlorofluoromethane and some data for methylene chloride were excluded from the database because it appeared that the presence of these compounds in some samples was due to contamination during sampling, preservation, shipping, or analysis. Overall, a small portion—approximately 6 percent—of the analytical determinations were excluded from the database because the data failed to meet analytical method QA/QC requirements. The long-term study provided the Agency with the analytical data and mill information necessary for the development of the effluent limitations and standards proposed today. Detailed information concerning the long-term study, including the engineering review of the data, can be found in section 7.5.2 of the public record in the water docket.

*B. 1990 National Census of Pulp, Paper, and Paperboard Manufacturing Facilities*

In early 1989, EPA began to develop a questionnaire to gather the technical and financial information necessary for rulemaking. EPA met with industry representatives and environmental groups during the questionnaire development process in an effort to keep these parties informed of the Agency's plans and to solicit informed comments on questionnaire design. In July 1989, EPA shared a preliminary draft of the questionnaire with representatives of the pulp and paper industry to obtain a technical review of terminology. Between late August 1989 and November 1989, EPA met several times with industry representatives to discuss the draft questionnaire. The Agency benefitted from industry's comments by making improvements to the clarity and organization of the questions.

EPA sent a pre-test version of the questionnaire to nine mills on December 6, 1989 and subsequently reviewed each mill's experience in completing the questionnaire. All responses from the pre-test were received by mid-February 1990, and the questionnaire was again revised after further discussions with industry representatives and pre-test participants. A copy of the pre-test questionnaire was supplied to environmental groups, and comments received were incorporated as appropriate.

On May 2, 1990, EPA submitted the questionnaire and a supporting statement to the Office of Management and Budget (OMB) for review and approval, as required by the Paperwork Reduction Act, and the questionnaire was distributed in October 1990.

The questionnaire was administered as a census to all pulp and paper manufacturing facilities. The census requested the following information: process and production data; data on water use, waste characteristics, and current wastewater treatment operations; wastewater treatment sludge disposal practices data; air emissions data; information on the potential for worker exposure to dioxin; and financial and economic information.

In October and November, 1990, EPA sent letters to each respondent containing clarifying instructions to the questionnaire. EPA also participated in two workshops sponsored by the industry in late October and early November, 1990, to assist pulp and paper mill staff in responding to the questionnaire.

Materials supporting the development of the questionnaire can be found in Section 3.1 of the public record in the Office of Water Docket. These materials include correspondence with industry representatives, environmental groups, and OMB; meeting reports; preliminary drafts of the questionnaire; and the information collection request package submitted to OMB.

*C. Data Gathering Activities for Air Emission Standards*

EPA used three types of technical information for development of the NESHAP: (1) A voluntary survey of mills that chemically pulp wood fiber conducted by an industry trade association, (2) review of existing information pertaining to the pulp and paper industry, including existing State and local regulations; and (3) results of an EPA sampling program. These information sources are described further below.

1. API/NCASI Voluntary Mill Survey

In 1992, API (now the American Forest and Paper Association)/NCASI conducted a voluntary survey of mills that chemically pulp wood fiber. Information from this survey was used to determine baseline controls and components of the MACT regulatory floor. There were 124 responses to the survey, which included information on wood pulping, bleaching, papermaking, and combustion processes.

The survey was designed to obtain information on pulping and bleaching processes, control technologies, and emissions at the mills. The survey requested information related to atmospheric emissions from (1) chemical pulping and recovery vent gases; (2) incineration devices for non-condensible gases (NCGs); (3) steam and air strippers; (4) tall oil acidulation; and

(5) bleach plants. In addition, information was requested related to process waters and wastewaters generated in the pulping area and bleach plant. A discussion of specific information obtained by this survey is included in the BID.

2. State and Local Regulations

Information was gathered on existing State and local regulations, permits, and permitting requirements for pulp and paper mills. This information was used to supplement the voluntary survey information for baseline control levels for air emissions from kraft, soda, sulfite, and semi-chemical mills. All ten EPA regions were contacted to identify the States with the most active pulp and paper facilities. Seventeen States were found to have regulations specific to the pulp and paper industry.

Information obtained included data on the pollutants and emission sources covered, emissions limits and/or control methods specified, and type of compliance monitoring required.

3. Sampling and Analytical Program

The sampling and analytical program included detailed testing of air and liquid samples from pulp and paper mills that chemically pulp wood fiber. The program was conducted to gather data to characterize HAP emission points within the pulp and paper industry and to develop emission factors for these points. In addition, the sampling program was conducted to evaluate the effectiveness of various controls under consideration for MACT.

Air emission samples were collected from pulping and bleaching unit process vents and liquid samples were collected from process streams from five mills. The five mills included three kraft mills, one kraft and semi-chemical mill, and one sulfite mill. The sampling and analysis program and its results are described in the BID.

EPA is aware that the NCASI is presently conducting an industry sampling program that they initiated in the Fall of 1992. Vent gas samples, process liquid samples, and process wastewater samples are being collected from a variety of pulping and bleaching process units. Corresponding process information to determine what relationship might exist between process parameters and air emissions is also being gathered. The NCASI sampling program consists of 13 kraft, two sulfite, and at least one stand-alone semi-chemical mill. As of August 1993, NCASI had completed testing at approximately nine of the selected mills. NCASI has indicated that they plan to provide the test data reports to the Agency as they become available. They anticipate that all of the test data reports should be completed and made available to the Agency by mid to late 1994. The Agency plans to consider this data for the promulgation of the NESHAP.

## IX. Development of Effluent Limitations Guidelines and Standards

### *A. Industry Subcategorization*

1. Introduction

In developing today's proposed regulations, EPA considered whether different effluent limitations and standards were appropriate for different groups of mills or subcategories within the industry. Factors considered included: processes employed, effluent characteristics, costs, age of equipment and facilities, size, location, engineering aspects of the application of various types of control techniques, process changes, and non-water quality environmental impacts. In determining which subcategories were appropriate for these proposed regulations, EPA first assessed subcategorization under the effluent guidelines currently applicable to this industry using recently available data.

2. Current Subcategorization

The current subcategorization of this industry dates to 1974, and was developed using data from the early- and mid-1970's. The current subcategories are as follows:

40 CFR Part 430

Subpart A Unbleached kraft
Subpart B Semi-chemical
Subpart D Unbleached kraft-neutral sulfite semi-chemical (cross recovery)
Subpart E Paperboard from wastepaper
Subpart F Dissolving kraft
Subpart G Market bleached kraft
Subpart H Board, coarse, and tissue (BCT) bleached kraft
Subpart I Fine bleached kraft
Subpart J Papergrade sulfite (blow pit wash)
Subpart K Dissolving sulfite pulp
Subpart L Groundwood-chemi-mechanical
Subpart M Groundwood-thermo-mechanical
Subpart N Groundwood-coarse, molded, and news (CMN) papers
Subpart O Groundwood-fine papers
Subpart P Soda
Subpart Q Deink
Subpart R Nonintegrated-fine products
Subpart S Nonintegrated-tissue papers
Subpart T Tissue from wastepapers
Subpart U Papergrade sulfite (drum wash)
Subpart V Unbleached kraft and semi-chemical
Subpart W Wastepaper-molded products
Subpart X Nonintegrated-lightweight papers
Subpart Y Nonintegrated-filter and nonwoven papers
Subpart Z Nonintegrated-paperboard

40 CFR Part 431

Subpart A Builders' paper and roofing felt

3. Rationale for Changing the Current Subcategorization and Development of the Proposed Subcategorization

During the 20 year period since the current subcategorization was developed, there have been numerous process and wastewater treatment changes in the pulp, paper, and paperboard industry. In addition, EPA and state permit writers have gained much experience implementing the current effluent limitations guidelines and standards for the pulp and paper industry since the regulations were first promulgated. Frequently, those permit writers have found that a single mill will contain processes that fall within two, three or more subcategories. This situation greatly complicates the task of permit writing, requiring considerable additional information gathering, time, and resources. As a result of the foregoing, the Agency analyzed the most recent data from the pulp and paper industry to determine if the revised regulations might appropriately contain fewer subcategories. The first step in the subcategorization analysis was to determine long-term average (LTA) effluent characteristics for the current subcategories. For this analysis, EPA used effluent $BOD_5$ and TSS loadings supplied in the questionnaire for 1989 by every direct-discharging mill.

During the development of the proposed regulations, EPA received comments concerning the use of effluent characteristics in its subcategorization analysis. Some of these comments urged EPA to use raw waste load, instead of effluent, data for this purpose. In the early-to-mid 1970's, the Agency generally used raw waste load data in its subcategorization analysis because many mills had not installed well-operated wastewater treatment systems and the overall level of wastewater treatment provided by the industry was not consistent among mills with similar manufacturing processes. The raw waste load data were used because end-of-pipe data were not uniformly available. At that time, EPA found that untreated wastewater loadings were highly variable for different processes. As a result, the Agency concluded that untreated loadings provided a reasonable basis to subcategorize the industry because the costs for mills with similar untreated wastewater loadings to achieve uniform effluent levels would be similar.

Since the early-to-mid 1970's, most mills have installed secondary wastewater treatment systems, and end-of-pipe discharge data supplied in the

1990 Census for most mills show that the degree of end-of-pipe wastewater treatment provided by the industry is much more uniform than it was during the 1970's. EPA determined that the subcategorization analysis and its consideration of the factors in CWA section 304(b), especially those specifying processes employed and engineering aspects of the application of various types of control techniques, are more appropriately conducted for the pulp, paper, and paperboard industry using end-of-pipe data than raw waste data because these data accurately represent a mill's ability to comply with effluent limitations and standards and achieve pollutant reductions.

The mills were arranged according to the current subcategorization scheme shown above. In order to assess the effluent characteristics for a specific subcategory, the ideal approach would be to use only those mills with 100 percent of their production in that subcategory. However, the 1990 Census revealed that some subcategories did not have an adequate number of mills with 100 percent production in the subcategory to characterize the effluent characteristics in that subcategory. As a result, EPA determined that, for most subcategories, for the purpose of determining subcategory-specific LTAs, subcategory effluent characteristics were based on mills with 85 to 100 percent production in that subcategory.

In performing its subcategorization analysis, EPA created a database comprised of all mills with wastewater treatment technologies representative of secondary treatment. Examples of mills not included in the database include indirect dischargers, intermittent dischargers, mills with no treatment, zero dischargers, mills with poor performance due to the lack of primary or secondary treatment, and mills that did not operate during significant portions of 1989.

The LTA for $BOD_5$ and TSS loadings, normalized by production, were then determined for each mill. When EPA reviewed the data for the mills arranged in the current subcategories, there were a number of subcategories with similar production processes, such as market bleached kraft and fine bleached kraft, where the effluent quality was also similar. EPA combined these similar subcategories and evaluated the impact of the other factors specified in CWA section 304(b). None of these factors provided led EPA to conclude that further or different subcategorization would be appropriate. Combinations were not made where effluent quality values were similar but production processes were *not* similar.

EPA also considered removal of toxic pollutants in its subcategorization analysis. In general, the toxic pollutants of concern are discharged by mills that bleach pulp with chlorine-containing compounds. In the proposed subcategorization scheme, EPA separates mills that bleach pulp from mills that do not bleach pulp. The result is that not all mills using similar pulping processes are in the same subcategory, because some bleach pulp and some do not.

EPA recognizes that the current subcategorization scheme for the pulp and paper effluent guidelines and standards has been in effect for many years and is familiar to many industry representatives and others. During the process of developing these proposed regulations, EPA received several specific comments concerning the impacts of consolidating subcategories in the manner proposed today. EPA invites additional comment concerning today's proposed subcategorization scheme. In particular, EPA invites comments on (1) whether any specific subcategories proposed today should be divided into smaller subcategories, and (2) whether any specific subcategories proposed today should be combined to form larger subcategories. Without limiting the foregoing, EPA specifically invites comment on whether the bleached papergrade kraft and soda subcategory should be divided to distinguish between bleached papergrade kraft and soda mills, and whether the dissolving sulfite pulp subcategory should be further subdivided to distinguish between different grades of pulp produced.

4. Proposed Subcategorization and Applicability of Regulations

EPA determined that, based upon recent available data from the mills, the current subcategories could appropriately be combined and reorganized into 12 proposed subcategories. Each of the new proposed subcategories is comprised of mills using similar processes and attaining similar effluent quality. The proposed subcategorization scheme and a comparison of this scheme to the current subcategorization scheme is presented in Table IV.A.1–1 (in the summary discussion of today's rules).

EPA is also proposing to merge the current 40 CFR part 431 subpart A (builders' paper and roofing felt) into the proposed 40 CFR part 430 subpart J, the secondary fiber non-deink subcategory. Detailed information about the subcategorization analysis is presented in section five of the technical water development document. Facilities with production covered by more than one subcategory are subject to the effluent limitations in more than one subcategory as well.

The subcategories of the pulp, paper, and paperboard industry for which regulations are proposed in this rulemaking are defined as follows:

a. *Dissolving Kraft Subcategory (Subpart A).* This subcategory includes production of a highly bleached and purified kraft wood pulp using an alkaline sodium hydroxide and sodium sulfide cooking liquor with acid prehydrolysis. The principal product is a highly bleached and purified dissolving kraft wood pulp used primarily for the manufacture of rayon, viscose, acetate, and other products requiring a high percentage of alpha cellulose and a low percentage of hemicellulose. This subcategory includes production at facilities that manufacture dissolving grade kraft pulps and papergrade kraft pulps at the same site.

b. *Bleached Papergrade Kraft and Soda Subcategory (Subpart B).* This subcategory includes production of a bleached kraft wood pulp using an alkaline sodium hydroxide and sodium sulfide cooking liquor. Principal products include papergrade kraft market pulp, paperboard, coarse papers, tissue papers, uncoated free sheet, and fine papers, which include business, writing, and printing papers.

This subcategory also includes production of bleached soda wood pulp using an alkaline sodium hydroxide cooking liquor. Principal products are fine papers, which include printing, writing, and business papers, and market pulp.

c. *Unbleached Kraft Subcategory (Subpart C).* This subcategory includes production of kraft wood pulp without bleaching using an alkaline sodium hydroxide and sodium sulfide cooking liquor. Principal products include unbleached kraft market pulp, bag papers, and liner board (the smooth facing in corrugated boxes).

This subcategory also includes production of both unbleached kraft and semi-chemical wood pulps at mills with cross-recovery processes. Principal products are similar to those produced at stand-alone unbleached kraft mills and stand-alone semi-chemical mills.

d. *Dissolving Sulfite Subcategory (Subpart D).* This subcategory includes production of a highly bleached and purified sulfite wood pulp using acidic cooking liquors of calcium, magnesium, ammonium, or sodium sulfites. Pulps produced by this process, are used primarily for the manufacture of rayon, cellophane, methyl cellulose, ethyl cellulose, nitra-cellulose, cellulose acetate, and other products that require a high percentage of alpha cellulose and a low percentage of hemicellulose. This subcategory includes production at facilities that manufacture dissolving grade sulfite pulps and papergrade sulfite pulps at the same site.

e. *Papergrade Sulfite Subcategory (Subpart E).* This subcategory includes production of sulfite wood pulp, with or without brightening or bleaching, using an acidic cooking liquor of calcium, magnesium, ammonium, or sodium sulfites. Principal products include tissue papers, fine papers, newsprint, and market pulp.

f. *Semi-Chemical Subcategory (Subpart F).* This subcategory includes production of pulp from wood chips under pressure using a variety of cooking liquors, including but not limited to neutral sulfite semi-chemical (NSSC), sulfur free (sodium carbonate), green liquor, and Permachem®. The cooked chips are usually mechanically refined. Pulp is produced with or without bleaching. Principal products include corrugating medium, paper, and paperboard. Production of both semi-chemical wood pulp and unbleached kraft wood pulp at the same site using a cross-recovery system is included in the unbleached kraft subcategory.

g. *Mechanical Pulp Subcategory (Subpart G).* During the development of the proposed regulations, EPA frequently referred to Subpart G as the "Groundwood, Chemi-Mechanical, and Chemi-Thermo-Mechanical" Subcategory. EPA then changed the name of subpart G to "Mechanical Pulp" because it characterizes the subcategory more correctly. The same mills that were included in the Groundwood, Chemi-Mechanical, and Chemi-Thermo-Mechanical Subcategory are included in the Mechanical Pulp Subcategory.

This subcategory includes production of stone groundwood, refiner mechanical, thermo-mechanical, chemi-mechanical, and chemi-thermo-mechanical pulps. Mechanical pulps are produced using mechanical defibration by either stone grinders or steel refiners. Thermo-mechanical pulp (TMP) is produced using steam followed by mechanical defibration in refiners. Chemi-mechanical pulp (CMP) is produced using a chemical cooking liquor to partially cook the wood. The softened wood fibers are further processed by mechanical defibration using refiners. Chemi-thermo-mechanical pulp (CTMP) is produced using steam followed by chemical cooking and mechanical defibration in refiners. Principal products include market pulp, newsprint, coarse papers, tissue, molded fiber products and fine papers, which include business, writing, and printing papers.

h. *Non-Wood Chemical Pulp Subcategory (Subpart H).* This subcategory includes production of non-wood pulps from chemical pulping processes such as kraft, sulfite, or soda. Fiber furnishes include textiles (rags), cotton linters, flax, hemp, bagasse, tobacco, and abaca. Principal products include market pulp, cigarette plug wrap paper, and other specialty paper products.

i. *Secondary Fiber Deink Subcategory (Subpart I).* This subcategory includes production of deinked pulps from wastepapers using a chemical or solvent process to remove contaminants such as inks, coatings, and pigments. Deinked pulp is usually brightened or bleached. Principal products include printing, writing, and business papers, tissue papers, newsprint, and deinked market pulp.

j. *Secondary Fiber Non-Deink Subcategory (Subpart J).* This subcategory includes production of pulps from wastepaper without deinking. Pulp is produced with or without brightening. Principal products include tissue, paperboard, molded products, and construction papers. Construction papers may be produced from cellulosic fibers derived from wastepaper, wood flour and sawdust, wood chips, and rags.

k. *Fine and Lightweight Papers from Purchased Pulp Subcategory (Subpart K).* This subcategory includes production of fine and lightweight papers produced from purchased virgin pulps or secondary fiber. Principal products include clay coated printing and converted paper, uncoated free sheet, cotton fiber writing paper and thin paper, and lightweight electrical papers.

l. *Tissue, Filter, Non-Woven, and Paperboard From Purchased Pulp Subcategory (Subpart L).* This subcategory includes production of paperboard, tissue papers, filter papers, and non-woven items from purchased virgin pulps or secondary fiber.

*B. Characterization of Wastewaters*

This section describes current water use and wastewater recycle practices, and the general characteristics of wastewater, at the 565 mills that manufacture pulp, paper, and paperboard in the U.S. A more detailed presentation can be found in chapter 6.0 of the technical water development document. All pulp and papermaking processes require the use of water; however, specifics for any mill will depend on the mill's combination of raw material, process and product.

1. Water Use

Approximately 1,551 billion gallons of wastewater are generated annually by pulp, paper, and paperboard manufacturers. The pulp and paper industry is the largest industrial process water user in the U.S. Water use in the industry has decreased approximately 30 percent since 1975, reflecting significant effort by the industry to reduce consumption and increase wastewater reuse and recycle. Sources of wastewater generation from each major process area in the industry are summarized in Table IX.B.1–1 and are discussed below.

a. *Wood Preparation.* Pulp mills that use logs as raw material may use water for one or more of the following purposes to prepare wood for pulping: log conveyance, log washing, and wet debarking. Approximately 31 billion gallons of water per year are used in wood preparation.

b. *Mechanical Pulping.* Mechanical pulping processes use water as a coolant, as a carrier to sluice pulp from the body of the grinder, as a diluent for subsequent pulp screening and cleaning steps, and to wash or pretreat chips. Approximately 16 billion gallons of water per year are discharged from pulping operations at mechanical pulping mills (this does not include wastewater discharged from mechanical pulping operations at mills that also have chemical pulping operations).

c. *Chemical Pulping.* In all types of chemical pulping, wood chips are cooked in a digester in an aqueous chemical solution, at elevated temperature and pressure. Water is used as a solvent for cooking chemicals, as the pulp cooking medium, as pulp wash water, and as a diluent for screening, cleaning, and subsequent pulp processing. Wastewater sources from chemical pulping typically include digester relief and blow condensates, and discharges from open screen rooms, cleaners, deckers, and spills from the digester area in mills with inadequate spill prevention and control systems. Approximately 185 billion gallons of water per year are discharged from pulping operations at chemical pulping mills.

d. *Chemical Recovery.* The recovery of pulping chemicals and heat is an essential component of an economical kraft pulping process. Water enters the recovery cycle with weak black liquor (pulp wash water) from the pulp mill. Most of this water is removed from the black liquor in multi-stage evaporators and then recondensed. The evaporator condensate is either discharged as wastewater or it may be recycled to the pulp mill, typically to the pulp washers.

During the recovery of kraft pulping chemicals, water is also used to wash the solid precipitates formed in the recovery cycle. Washing recovers sodium- and sulfur-containing compounds from green liquor dregs and lime mud. This weak wash is reused in the recovery cycle to dissolve recovery furnace smelt. Excess weak wash is discharged as wastewater. Approximately 121 billion gallons of water per year are discharged from chemical recovery processes at kraft mills.

Although recovery of pulping chemicals is not as extensively practiced at mills that use sulfite pulping, sulfite pulp wash water (weak red liquor) is evaporated, generating an evaporator condensate wastewater. Approximately 7.5 billion gallons of water per year are discharged from chemical recovery processes at sulfite mills.

e. *Wastepaper Processing.* In processing wastepaper, the paper is mixed with water to form a dilute slush. In this slush, pulp particles can be separated from undesirable contaminants by physical-chemical means. When deinking is not necessary, the contaminants are removed by physical means (e.g., sedimentation, flotation, and filtration). The wastewater that contains contaminants is further treated to remove or concentrate the contaminants and the recovered process water is reused. Deinking requires the addition of surfactant chemicals such as detergents, dispersants, and foaming agents to facilitate the physical separation of ink particles from fiber. Approximately 31 billion gallons of water per year are discharged from non-deinking wastepaper processing; 33 billion gallons of water per year are discharged from deinking wastepaper processing.

f. *Bleaching.* Pulp bleaching is a staged process that uses different chemicals and conditions in each stage, with washing performed between stages. Washing removes bleaching chemicals and any wood components extracted during bleaching. Chlorine-containing compounds are the most widely used bleaching chemicals. Water is used as pulp wash water and in the preparation of bleaching chemicals. The high chloride content of bleaching wastewaters makes them incompatible with pulping chemical recovery processes so they are discharged as wastewater. Approximately 326 billion gallons of water per year are discharged from bleaching operations.

g. *Pulp handling and papermaking.* In preparation for papermaking, pulp is suspended in water, mechanically conditioned in beaters or continuous refiners, and chemicals are added. Water is added to further dilute the pulp and transport it to the paper machine. Water that drains from the wet end of the paper machine is known as white water, and it is normally captured and reused in stock preparation or on the machine, after some removal of entrained solids. Excess white water is reused in other parts of the paper mill. Mills that make paper from purchased pulp have fewer operations in which to reuse wastewater than mills that pulp wood on-site. Approximately 62 billion gallons of wastewater per year are discharged from pulp handling operations; 574 billion gallons per year are discharged from papermaking operations.

2. Wastewater Discharge

The majority of wastewater discharge (37 percent) is from paper/paperboard making. Bleaching and pulping also contribute major portions of the wastewater flow discharged by the industry (21 and 16 percent, respectively). Information obtained from the 1990 Census showed that, of the 1,551 billion gallons of wastewater generated in 1989 by the pulp and paper industry, 91 percent was discharged directly, 9 percent was discharged indirectly, and approximately 1.1 billion gallons of wastewater was disposed of by on-site land application. Of the 565 mills operating in December 1992 in the U.S., 319 are direct dischargers, 203 are indirect dischargers, six discharge both directly and indirectly, and 37 discharge no wastewater.

Of the 37 mills that discharge no wastewater, nine dispose of wastewater by land application, while 28 achieve zero discharge through 100 percent recycle. Of the mills that achieve zero discharge through 100 percent recycle, one produces paperboard from purchased virgin semi-chemical pulp. The other mills that achieve 100% recycle produce a variety of products from non-deinked secondary fiber: 21 produce paperboard, builders paper or roofing felt, and six produce other products. However, the Agency was unable to confirm its data concerning the discharge status of the six mills, making these other products. The mills that achieve 100 percent recycle do so by segregated cleaning, screening, and reuse of wastewater within the process area where the wastewater is generated. In addition, the mills recycle recovered wastewater between process areas.

Pulp and paper mill wastewaters dominate the flow into certain POTWs in the U.S. At these "industrial" POTWs, either flow or $BOD_5$ load or TSS load from a pulp, paper, and paperboard category source is equal to or greater than 50 percent of the total POTW flow. The Agency has identified 32 industrial POTWs that treat pulp and paper industry wastewaters to this extent. Typically, the facility co-treats municipal sewage. The mills discharging wastewater to these POTWs have manufacturing processes in nine subcategories.

3. Wastewater Characterization

Mills in the pulp, paper, and paperboard category discharge conventional, nonconventional, and toxic pollutants. As reported in the 1990 Census, approximately 182,000 metric tons per year of $BOD_5$ and 266,000 metric tons per year of TSS are discharged directly by the pulp and paper industry.

When the Agency conducted its sampling program (as described in section VIII.A), the early screening studies confirmed that most priority pollutants are not present in bleached kraft mill wastewaters. The priority pollutants that were present in bleached kraft mill wastewaters included TCDD, chloroform, methylene chloride, 2,4,6-trichlorophenol, and pentachlorophenol. Further sampling work, conducted between 1989 and 1992, focused on volatile organic compounds and on two different classes of toxic compounds that are generated during bleaching of chemically pulped wood with chlorine and chlorine-containing compounds: chlorinated dioxins and furans and chlorinated phenolic compounds. The Agency estimated the current discharge of priority and nonconventional pollutants from pulp and paper mills using data collected by the Agency's short- and long-term sampling programs and data supplied by the industry. Data believed to be representative of industry operations as of January 1, 1993 were used.

The Agency estimates that 410 g/yr of TCDD and TCDF were discharged to the environment by the pulp and paper industry in 1992. Approximately 1,530 kkg/yr of four volatile compounds and 1,550 kkg/yr of 20 chlorinated phenolic compounds were discharged in 1992. The Agency estimates that additional chlorinated phenolic compounds and other dioxin and furan compounds were discharged to the environment although they are not specifically incorporated into the discharge estimates shown above.

In addition to specific toxic compounds, the Agency collected data on the generation of three nonconventional aggregate pollutant parameters: adsorbable organic halides (AOX), chemical oxygen demand (COD), and color. Each of these pollutant parameters is defined by the analytical test method used to measure it (see section IX–I.6 of this preamble). Approximately 51,000 kkg/yr of AOX were discharged directly in 1992. For chemical wood pulping mills (Subparts A, B, C, D, E, and F), approximately 3,180,000 kkg/yr of COD were discharged in 1992. Standardized data on industry-wide discharges of color were not available, so the Agency has not estimated the mass of color discharged by paper mills nationwide.

Section 6 of the technical water development document for today's proposed rule provides additional data on mass loadings and concentrations of priority and nonconventional pollutants found during the Agency's sampling of pulp and paper wastewater and also provides industry-supplied data on pollutants found in wastewater. The methodology used to estimate baseline pollutant loadings is also described in detail.

*C. Selection of Pollutant Parameters*

1. Pollutants Regulated

a. *Introduction.* This section summarizes the effluent pollutants controlled by today's proposed regulation, which are presented in Table IX.C–1.

b. *Dioxin and Furan.* The pulp, paper, and paperboard mills that chemically pulp and bleach wood with chlorine and chlorine-containing compounds generate significant discharges of toxic pollutants from the pulping and bleaching processes. Such toxic pollutants include chlorinated dioxins and furans, particularly TCDD and TCDF. None of the bleaching chemical pulp mills in the 104-Mill Study were found to be free of TCDD/TCDF. Data gathered by the Agency indicate that approximately 410 grams of TCDD and TCDF combined are discharged annually (as of 1992) to surface waters from the mills using those bleaching operations. Thus, effluent limitations for TCDD and TCDF are included in the proposed regulations in the dissolving kraft subcategory (Subpart A), bleached papergrade kraft and soda subcategory (Subpart B), dissolving sulfite subcategory (Subpart D), and papergrade sulfite subcategory (Subpart E).

TABLE IX.C–1.—POLLUTANTS CONTROLLED IN PROPOSED EFFLUENT GUIDELINES

| Pollutants regulated | Effluent regulation | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | BPT | BCT | BAT | | NSPS | | PSES | | PSNS | |
| | | | BP[1] | EOP[2] | BP[1] | EOP[2] | BP[1] | EOP[3] | BP[1] | EOP[3] |
| $BOD_5$ | X | X | | | | X | | | | |
| TSS | X | X | | | | X | | | | |
| TCDD | | | X | | X | | X | | X | |
| TCDF | | | X | | X | | X | | X | |
| Chloroform | | | X | | X | | X | | X | |
| Acetone | | | X | | X | | X | | X | |
| MEK[4] | | | X | | X | | X | | X | |
| Methylene Chloride | | | X | | X | | X | | X | |
| Chlorinated Phenolics[5] | | | X | | X | | X | | X | |
| AOX | | | | X | | X | | X | | X |
| COD | | | | X | | X | | X | | X |
| Color[6] | | | | X | | | | X | | |

[1] BP=bleach plant effluent;
[2] EOP=end-of-pipe effluent;
[3] For indirect discharging mills, the end-of-pipe effluent is the discharge to a POTW;
[4] MEK=methyl ethyl ketone;
[5] Chlorinated phenolics=trichlorosyringol; 3,4,5-trichlorocatechol; 3,4,6-trichlorocatechol; 3,4,5-trichloroguaiacol; 3,4,6-trichloroguaiacol; 4,5,6-trichloroguaiacol; 2,4,5-trichlorophenol; 2,4,6-trichlorophenol; tetrachlorocatechol; tetrachloroguaiacol; 2,3,4,6-tetrachlorophenol; pentachlorophenol;
[6] Color limits are proposed only for the bleached papergrade kraft subcategory.

c. *Volatile Compounds.* Among the volatile organic compounds for which wastewater samples were analyzed (see Appendix A), the four detected most often were acetone, chloroform, methylene chloride, and methyl ethyl ketone (MEK). Under the CWA, chloroform and methylene chloride are priority pollutants, and MEK and acetone are nonconventional pollutants. Chloroform, methylene chloride, and MEK also are listed as hazardous air pollutants (HAPs). Data gathered by the Agency indicates that a total of approximately 1,530 kkg/yr of these four volatile organic compounds were discharged in wastewaters in 1992. These compounds are also emitted to the atmosphere. The proposed regulations will reduce both wastewater discharges and atmospheric emissions of these compounds. For these reasons, these four compounds are proposed for regulation in the dissolving kraft subcategory (Subpart A), bleached papergrade kraft and soda subcategory (Subpart B), dissolving sulfite subcategory (Subpart D), and papergrade sulfite subcategory (Subpart E).

d. *Chlorinated Phenolic Compounds.* Among the chlorinated phenolic compounds for which samples were analyzed (see Appendix A), 12 of the higher substituted tri-, tetra- and penta-chlorinated compounds are associated with the formation and presence of TCDD and TCDF, and also have human health or aquatic effects. Data gathered by the Agency indicates that 282 metric tons per year of higher substituted chlorinated phenolic compounds are discharged in final effluent by bleaching chemical pulp mills. The 12 compounds proposed for regulation are as follows: Trichlorosyringol; 3,4,5-trichlorocatechol; 3,4,6-trichlorocatechol; 3,4,5-trichloroguaiacol; 3,4,6-trichloroguaiacol; 4,5,6-trichloroguaiacol; 2,4,5-trichlorophenol; 2,4,6-trichlorophenol; tetrachlorocatechol; tetrachloroguaiacol; 2,3,4,6-tetrachlorophenol; and pentachlorophenol. Two of these pollutants are priority pollutants (2,4,6-trichlorophenol and pentachlorophenol); the remainder are nonconventional pollutants. In addition to the importance of controlling these 12 higher substituted compounds, the Agency also believes that further progress in reducing TCDD and TCDF below currently measurable levels also will be achieved. These 12 compounds are proposed for regulation in the dissolving kraft subcategory (Subpart A), bleached papergrade kraft and soda subcategory (Subpart B), dissolving sulfite subcategory (Subpart D), and papergrade sulfite subcategory (Subpart E).

e. *AOX.* Adsorbable organic halides (AOX) is a measure of the total amount of halogens (chlorine, bromine and iodine) that are bound to dissolved or suspended organic matter and are quantified under specific analytical conditions. In pulp, paper, and paperboard effluents, essentially all of the halogenated organic substances, which are measured as AOX, are chlorinated forms which result from the bleaching of pulps with elemental chlorine and chlorinated compounds such as chlorine dioxide and hypochlorites.

Implementation of process changes by mills in the industry in many cases results in concentrations of TCDD and TCDF below the present limits of detection. Complete elimination of dioxin, furan, chlorinated phenolics, and other chlorinated organics would not be achieved unless all forms of chlorine-based bleaching are eliminated. Similarly, not all chlorinated organic compounds are eliminated when TCDD and TCDF are not detected. AOX is reduced as a result of these process changes, however, the total concentration and mass of chlorinated organic compounds, measured as AOX, remaining after these process changes is significant and measurable.

While statistically valid relationships among AOX and specific chlorinated organic compounds have not been established, only a small portion of the numerous chlorinated organic compounds in bleached chemical pulps have been individually identified. Establishing effluent limitations for AOX also has an advantage over establishing effluent limitations for the majority of individual chlorinated compounds, because the AOX analytical method is relatively inexpensive, quick, and reliable. For these reasons, AOX has been adopted by numerous jurisdictions around the world for the measurement and control of bleached chemical pulp wastewater discharges.

Therefore, the nonconventional pollutant AOX is being proposed for control in the dissolving kraft subcategory (subpart A), bleached papergrade kraft and soda subcategory (subpart B), dissolving sulfite subcategory (Subpart D), and papergrade sulfite subcategory (Subpart E).

f. *COD.* The Agency is proposing to regulate Chemical Oxygen Demand (COD) in discharges from the chemical pulping subcategories. COD is a measure of chemical oxidation using an analytical method that estimates the total oxygen demand of wastewater, including the refractory organic and inorganic substances in wastewater that are oxidized by potassium dichromate. COD is an important nonconventional pollutant parameter to control because it is indicative of the overall load of organic and wood extractive constituents in wastewater, and in particular, indicates the mass of organic pollutants in biologically treated effluents that are not readily biodegraded. In addition, COD effluent limitations based on the appropriate technology, including improved brownstock washing, closed screen rooms, best management practices and end-of-pipe biological treatment, will control losses and discharges to streams of pulping liquors and associated wood extractives. These sources recently have been postulated as the source of toxicity to aquatic systems. EPA believes that COD is an appropriate pollutant parameter for controlling these sources of pollutants and aquatic toxicity. Effluent limitations for COD are being proposed today for the chemical pulping subcategories, both bleached and unbleached, including the dissolving kraft subcategory (Subpart A), bleached papergrade kraft and soda subcategory (Subpart B), unbleached kraft subcategory (Subpart C), papergrade sulfite subcategory (Subpart E), and semi-chemical subcategory (Subpart F). The Agency will continue to consider proposing COD effluent limitations for the dissolving sulfite subcategory (Subpart D), however, there are insufficient data available for such a proposal at this time. See section XIII of this preamble.

g. *Color.* Color in treated effluents of both bleached and unbleached chemical pulp mills is an easily recognized characteristic of these wastewaters. In this effluent guideline, EPA is proposing to regulate color, which is a nonconventional pollutant as well as a useful measure of the performance of process technologies. However, as discussed in sections IX.E and XIII, limited color data are available for most subcategories. Only in the bleached papergrade kraft and soda subcategory (subpart B) are sufficient data available to propose effluent limitations for color. Further discussion of color is included in the technical water development document.

h. *$BOD_5$ and TSS.* Biochemical oxygen demand ($BOD_5$) and total suspended solids (TSS) are conventional pollutants that have been regulated in this industry by BPT and BCT effluent limitations as important measures of the biodegradable organic matter and suspended solids generated by all mills in all subcategories of the pulp and paper industry. EPA estimates that 182,000 metric tons of $BOD_5$ and 266,000 metric tons of TSS are discharged from 325 direct dischargers in the industry. Most mills have secondary biological treatment, except for certain non-integrated mills in the fine and lightweight papers from purchased pulp subcategory (Subpart K), and the tissue, filter, non-woven, and purchased pulp subcategory (Subpart L) for which primary treatment was the basis for the existing effluent limitations. See section IX.E.1. EPA is proposing to revise the BPT and BCT effluent limitations for these pollutants in all subcategories.

2. Pollutants and Subcategories Not Regulated

a. *Toxic pollutants not regulated.* EPA is not proposing effluent limitations or standards for all priority and toxic pollutants in this proposed regulation. Among the reasons EPA may have decided not to propose effluent limitations for a pollutant are the following:

(1) The pollutant is deemed not present in pulp, paper, and paperboard wastewaters, because it was not detected in the effluent with the use of analytical methods promulgated pursuant to section 304(h) of the Clean Water Act or with other state-of-the-art methods.

(2) The pollutant is present only in trace amounts and is neither causing nor likely to cause toxic effects.

(3) The pollutant was detected in the effluent from only one or a small number of samples and the pollutant's presence could not be confirmed.

(4) The pollutant was effectively controlled by the technologies used as a basis for limitations on other pollutants, including those limitations proposed today, or

(5) Insufficient data are available to establish effluent limitations.

b. *Nonconventional Pollutants Not Regulated.* In addition to TCDD and TCDF, there are other dioxin and furan congeners which were found in pulp and paper wastewaters but which EPA is not proposing to regulate directly in today's regulations. The primary congeners found were the hepta- and octa-substituted dioxins and furans. EPA believes that today's proposed regulations would provide substantial incidental control of these pollutants. This is in part because, with a few exceptions, when TCDD and TCDF were not detected, the hepta-, and octa-substituted congeners were either near or below their detection limits. While the detection limits of these compounds are higher than for TCDD and TCDF, they contribute less than 10 percent of the total TEQ for all congeners found in this industry.

In addition, EPA is not proposing regulations for eight chlorinated phenolics found in pulp and paper wastewaters. These compounds, while not chosen for regulation, appear to be amenable to biological treatment and have been noted to have relatively low human health and aquatic toxicities.

c. *Subcategories Not Regulated.* EPA is today proposing BAT limits in six subcategories. As described in section IX.E., revised BAT effluent limitations guidelines and standards for the remaining subcategories (Subparts G, H, I, J, K, and L) are not being proposed today pending further study to determine the quantities of priority and nonconventional pollutants discharged, and the availability, costs, and economic impact of appropriate control technologies.

The Agency is concerned about the discharge of chlorinated compounds from subcategories that utilize chlorine bleaching but are not covered by today's proposed BAT effluent guidelines. In EPA's 1990 Census, a total of 41 mills in these subcategories reported bleaching with hypochlorite and/or chlorine. (These 41 mills were found in the secondary fiber deink, secondary fiber non-deink, and non-wood pulp subcategories). Many of these mills monitored their effluent for toxic chlorinated compounds between 1985 and 1990, and supplied results of this monitoring with their questionnaires. TCDD was detected at two secondary fiber deink mills and TCDF was found at four secondary fiber mills, two deink and two non-deink. Chloroform was detected by seven secondary fiber deink mills, and one mill that uses kraft pulping on non-wood furnish.

*D. Available Technologies*

1. Process Controls and Changes Considered

Many approaches have been taken by the pulp, paper, and paperboard industry in implementing process control and process changes to reduce or eliminate pollutant discharges. Technical development documents for previous rulemakings have identified production process control technologies that are commonly employed within the industry for the woodyard and woodroom, pulp mill, pulp washer and screen room, bleaching system, evaporation and recovery, liquor preparation area, papermill, and steam plant and utility areas. Since the previous rulemakings, there have been numerous process innovations and changes at pulp, paper, and paperboard mills, the majority of which have occurred in the pulping and bleaching areas.

The process changes that were considered in the development of these proposed effluent limitations guidelines include: (1) Chip quality control—Such control through the use of chip thickness screens or better control of the chipping process has a significant impact on the delignification process. Chip uniformity is extremely important for proper circulation and penetration of the pulping chemicals. Cooking chips of uniform thickness results in a maximization of yield and a minimization of the use of bleaching chemicals; (2) elimination of dioxin precursor defoamers—This elimination is accomplished through the substitution of precursor free defoamers thus eliminating the possible creation of dioxins from this source; (3) extended cooking—Over the last decade, methods have been developed that allow the pulp cooking time to be extended, enabling further delignification to occur before the pulp moves on to the bleaching stages. At the same time, these techniques protect the pulp from the detrimental effects (reduction in quality and yield) that would normally accompany increased cooking time. Extended delignification reduces the residual lignin by up to 38 percent compared to conventional cooking, thereby reducing the bleach plant effluent constituents by a similar amount; (4) closed screening and deknotting—Through employment of closed screening and deknotting systems, all wastewater associated with the pulping process up to the bleach plant is reused and ultimately routed to the recovery system thus eliminating the wastewater discharges associated with open screening and deknotting systems; (5) improved pulp washing—Improved washing involves the replacement of, or the addition to, existing pulp washing systems resulting in the increased removal of dissolved lignin solids and spent cooking liquor from the pulp. Such reductions result in a concurrent reduction in the use of bleaching chemicals. Current state-of-the-art washers include pressure washers, belt washers, diffusion washers and pulp presses; (6) oxygen delignification—This process provides an additional way to extend the pulp delignification process, thereby lowering the bleaching chemical demands and the amount of pollution associated with subsequent bleaching stages. Between 40 and 50 percent of the residual lignin left in the pulp after cooking is removed in the oxygen delignification stage. The removed lignin is separated from the pulp in post-oxygen delignification pulp washing stages and routed to the recovery process; (7) high shear mixing of pulp—Such mixing results in a better distribution of chemicals thereby reducing the amount of bleach chemicals needed and reducing or eliminating the formation of unwanted byproducts such as chlorinated dioxins and furans which results from the over-chlorination of the pulp; (8) high chlorine dioxide substitution—Chlorine dioxide, which bleaches pulp by a different chemical reaction pathway than chlorine, produces much smaller quantities of chlorinated organic compounds than chlorine. Chlorine dioxide can replace all of the chlorine in the first bleaching stage; (9) enhanced extraction with oxygen and peroxide—Adding oxygen and/or peroxide to the extraction stages of bleaching enhances the removal of dissolved lignin products from the pulp. This allows for a reduction in the total amount of active chlorine in the overall bleach sequence which results in a decrease in the amount of chlorinated organics formed; (10) peroxide bleaching—For some types of pulps and products, peroxides can be substituted for some or all of the chlorine based bleaching chemicals resulting in the reduction or elimination of chlorinated organics discharged; (11) elimination of hypochlorite bleaching—Through the use of other bleaching chemicals such as peroxides and chlorine dioxide, in conjunction with enhanced extraction, hypochlorite bleaching can be eliminated resulting in a substantial reduction in the amount of chloroform formed and discharged to the air and water; (12) high temperature/high alkalinity hypochlorite bleaching—For those cases where it has been asserted by the industry that it may not be possible to eliminate hypochlorite bleaching, such as in the production of some grades of dissolving pulp, the Agency has received preliminary data indicating that high temperature/high alkalinity hypochlorite bleaching can be employed to significantly reduce the amount of chloroform discharged; (13) ozone bleaching—Ozone, in combination with other processes, such as oxygen delignification and peroxide bleaching, may be utilized to replace all chlorine and chlorine-based bleach chemicals resulting in the elimination of all discharges of chlorinated organics. In addition, the elimination of chlorine-based bleach chemicals allows for closure of the bleach plant and eliminates the wastewater discharges from this portion of the facility; and (14) recovery boiler upgrades—Where recovery capacity is not adequate to accommodate the increases in liquor solids and/or flow associated with inplant changes such as extended cooking, oxygen delignification, improved pulp washing, and closed screening and deknotting, recovery boiler upgrades are required. Such upgrades may be accomplished through numerous methods including but not limited to use of anthraquinone and/or polysulfides in pulping, air system modifications, boiler modifications, and installation of high liquor solids firing. In addition, existing boilers can be replaced and additional boiler capacity can be installed.

2. End-of-Pipe Treatment Technologies Considered

The end-of-pipe treatment technologies presently employed by the industry include: steam stripping and reuse of condensates, preliminary treatment (neutralization, equalization, primary clarification, and/or various flotation techniques), biological or equivalent treatment (aerated stabilization basins with and without settling basins, oxidation ponds, and activated sludge systems), and physical/chemical treatment (filtration and chemically-assisted clarification).

For the direct discharging mills surveyed, 3 percent provide no primary or secondary treatment, 14 percent provide only primary treatment. At the remaining 83 percent, secondary biological or equivalent treatment is provided, with aerated stabilization basins the predominant type of treatment system employed. Biologically-treated effluents are further treated at approximately 2 percent of the direct discharging mills.

For the indirect discharging mills surveyed, 3 percent provide primary treatment followed by secondary treatment at a publicly owned treatment works (POTW) while 91 percent provide no treatment followed by primary and/or secondary treatment at a POTW.

There are 37 pulp, paper, and paperboard mills that the Agency believes may not discharge wastewater to navigable waters. Of these, nine dispose of wastewater by land application and the remaining 28 through 100 percent recycle. Of the mills that may achieve zero discharge through 100 percent recycle, one produces paperboard from purchased virgin semi-chemical pulp. The other 27 mills all make products from non-deinked secondary fiber: 21 produce paperboard, builders paper or roofing felt, and six produce other products. However, EPA was unable to confirm its data concerning the discharge status of the six mills making these other products.

As noted above, nine mills may achieve zero discharge of wastewaters through land application. EPA believes these mills are able to employ land application due to specific circumstances at these sites, such as the availability of sufficient land amenable to wastewater application, and suitability of land to accommodate wastewaters with no runoff. Therefore, land disposal to achieve zero discharge is not considered to be an available technology for mills in the industry generally.

*E. Rationale for Selection of Proposed Regulations*

1. BPT

a. *Introduction.* EPA is today proposing revised BPT effluent limitations guidelines for all subcategories in the pulp, paper, and paperboard industry.

b. *Pollutants of Concern.* EPA is proposing BPT effluent limitations controlling the discharge of $BOD_5$ and TSS.

c. *Determination of Technology Basis of BPT.* To determine the technology basis and performance level that is BPT, EPA developed a database consisting of 1989 effluent data supplied in the 1990 Census. The Agency determined that more than 80 percent of direct discharging mills utilize secondary wastewater treatment. Only 2 percent of direct discharging mills had superior, tertiary treatment technology in place and, as a result, EPA decided that secondary treatment would be the technology basis for revised BPT effluent guidelines. Accordingly, the Agency created a database comprised of all mills with wastewater treatment technologies representative of secondary treatment. Examples of mills not included in the database are: indirect and zero discharge mills, mills with no treatment, intermittent or noncontinuous dischargers, mills with poor performance due to the lack of primary or secondary treatment, mills with primary treatment only, and mills with tertiary treatment.

d. *Determination of Performance Level Defining BPT.* To determine the performance level defining proposed BPT, EPA used 1989 data supplied in the 1990 Census for production, $BOD_5$ loadings, and TSS loadings to calculate production-normalized long-term averages (LTA) for $BOD_5$ and TSS.

The performance level analysis was performed using the production-normalized $BOD_5$ effluent loadings because secondary treatment systems are designed with $BOD_5$ control as a primary objective. EPA arranged the mills in each subcategory according to effluent $BOD_5$ loading and considered two options: (1) The performance level representing the average of the best 90 percent of mills in each subcategory, calculated as the average of the LTA for the best 90 percent of mills, and (2) the performance level representing the average of the best 50 percent of mills in each subcategory, calculated as the average of the LTA for the best 50 percent of mills.

The Agency calculated the TSS limits proposed today by averaging the TSS LTA loadings for the best 50 percent of mills in each subcategory, as determined by the $BOD_5$ loadings. EPA determined that a separate subcategorization ranking of mills based on TSS effluent quality and a separate performance level analysis for TSS was not appropriate since treatment systems are designed for optimal $BOD_5$ removal and may not be designed for optimized TSS removal.

After the performance levels of the two options were determined, EPA identified appropriate combinations of in-process flow reductions and end-of-pipe secondary wastewater treatment that could achieve these performance levels. The two secondary treatment technologies commonly used in the pulp and paper industry are aerated stabilization basin (ASB) systems and activated sludge systems. The Agency identified feasible upgrades for each treatment type to achieve the option 1 and option 2 performance levels. The combination of upgrades applicable to a specific mill depends on the characteristics of the mill's wastewater and on the treatment currently employed (e.g., aeration capacity, detention time, and nutrient addition). In some cases, secondary biological-treatment upgrades alone cannot achieve the removal of $BOD_5$ and TSS necessary to achieve the performance levels of option 1 and option 2. In those cases, mills will require in-process flow reduction to meet the performance levels.

For both options, incremental compliance costs were estimated for the mills in each subcategory not meeting the performance levels. These costs, as described in section IX.G. below, were used for BPT cost comparisons and for the economic impact analysis. Before estimating costs for individual mills in each subcategory whose $BOD_5$ or TSS loads exceeded the BPT LTA load, EPA subtracted the load reductions that would result from the implementation of BAT, BMP, and the air emission standards from the mill's current discharge load. The Agency compared the costs to effluent reduction benefits and found that the costs of the additional water pollution controls likely to be incurred for option 1 are $0.14 per pound of BOD and TSS combined and for option 2 are $0.13 per pound of BOD and TSS combined. The Agency concludes that both results are reasonable and justified and is proposing BPT limits based on option 2, because option 2 was as cost-effective as option 1 and provided substantially greater pollutant removals. For all mills that are projected to incur costs to comply with BPT option 2, the Agency estimates capital investment costs of $356 million and total annualized costs of $67 million. These costs could result in three to nine mill closures with a potential approximate employment effect of 1,000 lost jobs.

The analysis described above, which resulted in the selection of the performance level representing the average of the best 50 percent of mills in each subcategory, was not used to determine the performance level defining BPT for the Dissolving Sulfite Pulp subcategory, Subpart D. A different approach was developed for the following reasons: (1) Existing production-normalized effluent loadings for $BOD_5$ and TSS in this subcategory are significantly greater than the loadings for other subcategories (for example, the effluent loadings associated with the Dissolving Sulfite Pulp subcategory are four times greater than the loadings for the Dissolving Kraft subcategory, which utilizes similar processes that produce high $BOD_5$ raw waste loads); (2) the performance level analysis described above would result in proposed BPT effluent limitations less stringent than the current BPT limitations; and (3) the CWA authorizes EPA to require higher levels of performance than the "average of the best" in a subcategory where present practices in controlling the discharge of conventional pollutants are uniformly inadequate.

Because available data show that the existing performance of conventional pollutant control technologies in this subcategory are uniformly inadequate, the Agency developed an alternative approach which accounted for raw waste load reductions resulting from in-plant process changes that form the technology bases for BMPs and BAT COD controls. Also included were further reductions based on treatment performance from a well-designed and operated primary and secondary biological treatment system.

The first step in the analysis involved the calculation of current average $BOD_5$ and TSS production-normalized raw waste loads for the subcategory. Adjusted raw waste loads were then determined based on $BOD_5$ and TSS reductions achieved by BMPs and BAT COD control technologies. The final effluent performance level was calculated by applying removal rates for primary and secondary treatment currently demonstrated in the subcategory to the adjusted average raw waste load. A detailed description of the development of the performance level defining BPT for the Dissolving Sulfite Pulp subcategory is presented in section 9.0 of the technical water development document.

Incremental compliance costs were estimated for the mills in this subcategory not meeting the performance level, and these costs were used for BPT cost comparisons and for the economic impact analysis. The Agency compared the costs to effluent reduction benefits and found that the costs of the additional water pollution controls likely to be incurred are reasonable and justified. As a result, the Agency is proposing BPT for the Dissolving Sulfite Pulp subcategory based on the level of performance achieved by raw waste load reductions resulting from BMPs and BAT COD controls and additional raw waste load reductions resulting from the application of well-operated primary and secondary treatment.

Since the generation of the conventional pollutants $BOD_5$ and TSS is related to pulping, bleaching and papermaking processes, the production normalizing parameter for BPT and BCT limitations is the off-machine metric tons (OMMT) of final production of pulp, paper, and/or paperboard at the site. This production is defined as the annual OMMT (including coating where applicable) divided by the number of operating days during that year. The final paper and paperboard production shall be measured as the off-the-machine moisture content. The final production of market pulp shall be measured in air-dry-metric tons (10 percent moisture).

The development of the variability factors used to determine the effluent limitations from the LTA is discussed in section IX.F. A detailed explanation of the development of BPT effluent limitations is found in the technical water development document, section 9.0.

e. *Solicitation of Comments Concerning BPT Revisions.* EPA invites comment on whether the Agency should revise the current BPT effluent limitations for this industry. During the development of these proposed regulations, industry representatives argued that EPA lacks the authority to revise promulgated BPT effluent limitations guidelines and that the current BPT effluent limitations, which were promulgated in three phases in 1974, 1977, and 1982, should remain forever fixed. Representatives of environmental groups offered a different view—that EPA is required to revise BPT and other guidelines where new data indicate that existing limits are out of date. EPA solicits comment on whether the Agency is either legally proscribed from, or legally required to, revise BPT effluent limitations guidelines. EPA further solicits comment on the merits of the revisions contained herein. See section XIII.

EPA is interested in comments on the alternative option of addressing conventional pollutant discharges exclusively by revising BCT, as outlined in section 2.b below. EPA solicits data on the costs, effluent reduction benefits, water quality benefits, and any other factors that may be related to the proposed BPT revisions, BCT revisions, and the alternative approach for revising BCT outlined below. EPA will continue to analyze these factors and will consider all comments on the merits of revising BPT and BCT. See section XIII.

2. BCT

a. *Methodology for Determining Revised BCT Limits.* EPA is today proposing revised BCT effluent limitations guidelines for the pulp, paper, and paperboard industry. In eleven subcategories, these guidelines are based on the average performance of the best 50 percent of mills in the subcategory. In one subcategory (Mechanical Pulp), these guidelines are based upon multimedia filtration as the BCT technology.

In developing revised BCT limits, EPA considered whether there are technologies that achieve greater removals of conventional pollutants than proposed BPT, and whether those technologies are cost-reasonable according to the BCT cost test. In eleven subcategories, EPA identified no technologies that achieve greater removals of conventional pollutants than proposed BPT that are also cost-reasonable under the BCT cost test, and accordingly proposes BCT limits equal to proposed BPT for those subcategories. In one subcategory (Mechanical Pulp), EPA found that multimedia filtration would achieve greater removals of conventional pollutants and would also be cost-reasonable under the BCT cost test, and therefore proposes this technology as BCT.

EPA's analysis had several steps. First, EPA considered how best to define the BPT "baseline" for these purposes. In performing the BCT cost tests, the BPT baseline serves as the starting point against which more stringent technologies are analyzed. EPA considered three possible baselines: (i) The revised BPT limits set forth in today's proposal, (ii) the actual long-term average discharge of conventional pollutants from mills in this industry, based on EPA's survey data, and (iii) a hypothetical level of control equal to the precise amount of discharge allowed under existing BPT regulations. Of these, the first is the most stringent and the third the least stringent level of control. EPA determined that selecting the revised BPT limits proposed today as the BPT baseline would best serve the purposes of the BCT cost test. Such an approach best reflects today's proposal to revise BPT limits, by starting with those limits as the baseline from which more stringent BCT candidate technologies are analyzed.

Second, EPA identified candidate BCT technologies. Two candidate technologies were identified: first, the technology in use by the best-performing mill in each subcategory and, second, multimedia filtration. (In subcategories where the best performer uses multimedia filtration, these two candidate technologies were the same). EPA was unable to evaluate the first candidate technology fully. Specifically, EPA was unable to evaluate the cost of retrofitting existing facilities to match the best performance in each subcategory. EPA solicits comment and further data on this candidate BCT technology. EPA was able to evaluate the second candidate technology, multimedia filtration, by estimating costs and pollutant removals on a mill-by-mill basis for each subcategory. The design parameters and other engineering assumptions for these estimates are explained in the technical water development document. The Agency solicits comment on other candidate technologies that might be more cost-effective than multimedia filtration.

EPA found that multimedia filtration failed the BCT cost test in eleven subcategories. As a result, EPA is today proposing to set BCT equal to proposed BPT in these eleven subcategories. These revised BCT limits would be based on the average performance of the best 50 percent of mills in each subcategory. EPA found that multimedia filtration passed the BCT cost test in one subcategory (Mechanical Pulp). As a result, EPA is today proposing multimedia filtration as the BCT technology in the Mechanical Pulp Subcategory. However, EPA does not have sufficient data at this time to propose limits for $BOD_5$ and TSS discharges from the Mechanical Pulp Subcategory based upon the use of multimedia filtration. EPA solicits data concerning the limits that could be achieved by mills within the Mechanical Pulp Subcategory using multimedia filtration. See the technical water development document for a complete discussion of the BCT methodology as applied in each of the subcategories.

b. *Alternative Methodology for Developing BCT Limits.* EPA performed an alternative BCT analysis, in addition to the foregoing. This alternative analysis is based on the assumption that, notwithstanding today's proposal, BPT limits for this industry ultimately are not revised. EPA concluded that, even if BPT limits ultimately are not revised, BCT limits more stringent than those currently in place would nevertheless be appropriate in six subcategories. These six subcategories are: Dissolving kraft; bleached papergrade kraft and soda; papergrade sulfite; mechanical pulp; tissue, filter, nonwoven and paperboard from purchased pulp; and secondary fiber deink. Revised BCT limits for the first five subcategories would be based on the average of the best 50 percent of mills; revised BCT limits in the secondary fiber deink subcategory would be based on the average of the best 90 percent of mills.

The alternative analysis proceeded in the same manner as the principal BCT analysis set forth immediately above. As with the principal BCT analysis, EPA considered whether there are technologies that achieve greater removals of conventional pollutants than existing BPT, and whether those technologies are cost-reasonable according to the BCT cost test. As with the principal BCT analysis, EPA considered first how best to define the BPT "baseline" for these purposes. However, because the alternative analysis was based upon the assumption that BPT limits were not being revised, EPA did not select revised BPT limits as the BPT "baseline." Instead, EPA considered further the two other options for setting the BPT baseline described above—the actual long-term average discharge of conventional pollutants from mills in this industry (the "LTA"), and a hypothetical level of control equal to the precise amount of discharge allowed under existing BPT limits.

EPA decided that the LTA was the most appropriate choice for the BPT baseline under this alternative analysis. Selection of the LTA—which represents actual discharges from the industry—permitted EPA to perform the most accurate and meaningful cost calculations as part of the BCT test. EPA decided not to use a hypothetical level of control based on existing BPT limits, in part because actual performance of the industry varies from these limits, and the necessary cost calculations (estimating the incremental cost to upgrade a mill from the hypothetical BPT level of control to the candidate BCT technology) would have been far more speculative than those based on the actual discharges from the industry. EPA's choice of the LTA as the baseline under this alternative analysis is consistent with EPA's 1986 BCT methodology, which provides that in situations with "a lack of comparable industry data . . . EPA [may] develop appropriate procedures to evaluate cost-reasonableness on an industry-specific basis" (51 FR 24976).

EPA next identified candidate BCT technologies. Four were identified. These were: (i) The technology required to perform at the level achieved by the best 90 percent of mills in the subcategory; (ii) the technology required to perform at the level achieved by the best 50 percent of mills in the subcategory; (iii) the technology required to perform at the level achieved by the best performing mill in the subcategory; and (iv) multimedia filtration. However, for candidate technologies (iii) and (iv), EPA had inadequate time and resources to fully evaluate the technology for purposes of the alternative BCT cost test. Specifically, EPA was unable to develop adequate costing information concerning the cost increments between the current LTA, on the one-hand, and either the technology required to perform at the level achieved by the best performing mill in the subcategory or multimedia filtration, on the other. EPA solicits data and comments concerning the cost of upgrading wastewater treatment facilities in this manner.

EPA did, however, evaluate candidate technologies (i) and (ii) under this alternative analysis. The first candidate technology passed the BCT cost test in six subcategories—Dissolving kraft;

bleached papergrade kraft and soda; papergrade sulfite; mechanical pulp; tissue, filter, nonwoven and paperboard from purchased pulp; and secondary fiber deink—and failed in the remaining subcategories. The second candidate technology passed the BCT cost test for five of the six subcategories that passed the first candidate technology. The second candidate technology failed in the secondary fiber deink subcategory and all remaining subcategories. Because the second technology described above is more stringent than the first, EPA considers that technology—the level of control achieved by the best 50 percent of mills in each subcategory—to be the appropriate basis for revised BCT limits for five subcategories under this alternative analysis. EPA considers the level of control achieved by the best 90 percent of mills in the subcategory to be the appropriate basis for revised BCT limits for the secondary fiber deink subcategory under this alternative analysis.

In addition to the BCT cost test, the Agency considered the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, and non-water quality environmental impacts. No basis was found for identifying alternative BCT limits based on these factors for any subcategories.

c. *Costs and Effluent Reduction Benefits.* EPA is today proposing revised BCT limits (based on using revised BPT as the baseline) in all subcategories of the pulp and paper industry. EPA estimates that, under this proposal, mills would incur annualized costs of $67 million and would reduce conventional pollutant loadings by 427 million pounds per year. If EPA were to revise BCT limits for only six subcategories based on the alternative BCT methodology described above (using current loadings as the baseline), annual compliance costs would be $39 million and conventional pollutant loading reductions would be 270 million pounds annually.

d. *Conclusion.* EPA is today proposing revised BCT limits in all subcategories of the pulp and paper industry. In six subcategories, these BCT revised limits are based upon the assumption that BPT limits for the industry are revised from their current levels. In six other subcategories—dissolving kraft; bleached papergrade kraft and soda; papergrade sulfite; mechanical pulp; tissue, filter, nonwoven and paperboard from purchased pulp; and secondary fiber deink—these revised BCT limits are not based on any assumptions concerning the revision of BPT, and would be appropriate whether or not BPT is revised.

3. BAT

a. *Introduction.* EPA today is proposing additional and revised BAT effluent limitations for certain subcategories of the pulp, paper, and paperboard industry. The BAT effluent limitations proposed today would control certain toxic and nonconventional pollutants discharged from mills in six subcategories, including all mills that bleach chemical pulps.

The Agency is concerned about potential discharges of toxic and nonconventional pollutants from the pulp, paper, and paperboard industry not addressed in today's proposal or in existing regulations. EPA will further evaluate these concerns in connection with its effluent guidelines planning process under sec. 304(m) of the CWA. Section IX.C discusses the pollutants and subcategories that the Agency is continuing to study.

b. *Establishing BAT Limits*— (1) Production Normalizing Parameters.

In order to establish mass-based BAT effluent limitations, the mass of pollutants being regulated (which is a product of the pollutant concentration, the wastewater flow, and the necessary conversion constants) is related to the appropriate measure of production (usually in metric tons). This appropriate measure of production is known as the "production-normalizing parameter."

Many of the BAT pollutants (TCDD, TCDF, chlorinated phenolic compounds, chloroform, methylene chloride, acetone, MEK, and AOX) are generated in the bleach plant of mills that bleach chemically pulped wood with chlorine-containing compounds. Therefore, the production-normalizing parameter for BAT limitations of these pollutants is air-dry-metric tons (ADMT) of brown stock pulp (10 percent moisture) entering the bleach plant at the stage during which chlorine or chlorine-containing compounds are first applied to the pulp. This production-normalizing factor is different than that for BPT (see section IX.E.1.).

Wastewater COD and color loadings result primarily from pulp mill wastewaters and bleach plant caustic extraction stages. Therefore, the production-normalizing parameter for BAT limitations for these pollutants is ADMT of total brown stock pulp (10 percent moisture) defined as the sum of all brown stock pulp produced on-site measured between the digester outlet and pulp storage. This production normalizing parameter is different than the parameter for toxic pollutants because it includes brown stock pulp that is not bleached and brown stock pulp entering the bleach plant.

(2) Point of Regulation—(i) BAT Limitations for Bleach Plant Effluent.

EPA proposes today to set limits on certain pollutants inside the discharger's facility, at the point the wastewater containing those pollutants leaves the bleach plant. Such limits are authorized by the Clean Water Act and EPA's regulations at 40 CFR § 122.45(h). As set forth in more detail below, EPA proposes to establish limits on certain internal wastewater streams because limits for some pollutants at the point of discharge ("end-of-pipe") are impractical and infeasible as measures of the performance of process technologies. In the case of dioxins, furans, and several other chlorinated organic pollutants, such limits are impractical and infeasible in light of the detection capabilities of available analytical methods. In the case of chlorinated compounds, including chloroform and methylene chloride, and non-chlorinated compounds including acetone and methyl ethyl ketone, limits at the point of effluent discharge are impractical and infeasible because these pollutants would be lost as air emissions in wastewater conveyances and treatment facilities (e.g., collection boxes and aeration tanks) without bleach plant limits.

EPA believes that these in-plant limitations are critical in order to measure the performance of the process changes proposed as the basis for BAT limits in today's regulations. These process changes, in turn, are critical to multimedia pollution prevention in the pulp, paper, and paperboard industry.

BAT limitations for TCDD, TCDF, and several other pollutants will be applied at the effluent from the bleach plant. Control at this point is necessary because, with the chemical analytical methods currently available, discharges of TCDD, TCDF, and most chlorinated phenolic compounds of concern from the bleach plant will be near or below analytical method detection limits for mills using the technologies that form the basis of today's proposed BAT effluent limitations. Thus, if the effluent limitations were not applied at the effluent from the bleach plant, compliance could be achieved without using the best available technology economically achievable, but instead by diluting bleach plant wastewaters with the large wastewater flows from the rest of the mill. TCDD and TCDF, present but in concentrations below detection limits, would then either be discharged to receiving streams (where these pollutants bioaccumulate), or partition to the sludge generated by the mill's secondary wastewater treatment system.

The BAT limitations that the Agency is proposing today would be applied to the total discharge from each physical bleach line operated at the mill. At most mills that chemically pulp and bleach wood, acid and alkaline bleach stage wastewaters are discharged to separate sewers; however, at some mills, bleach plant wastewaters are discharged to a combined sewer containing both acid and alkaline wastewaters. For nonvolatile compounds (TCDD, TCDF, and the chlorinated phenolic compounds) compliance with the BAT limitations can be demonstrated by collecting separate samples of the acid and alkaline discharges and preparing a flow-proportioned composite of these samples, resulting in one sample of bleach plant effluent for analysis. For volatile compounds, however, separate samples and analyses of all bleach plant filtrates discharged separately will be required. This is to prevent the loss of volatile compounds through air stripping as the samples are collected, measured, and composited or through chemical reaction when the acid and alkaline samples are combined. If separate acid and alkaline sewers do not exist, compliance samples must be collected from the point closest to the bleach plant that is physically accessible.

EPA solicits comments and data on its proposal to set limits on certain pollutants inside the discharger's facility, at the point the wastewater containing these pollutants leaves the bleach plant. EPA solicits any comments or data that might indicate that limits for these pollutants at the end-of-pipe could practically or feasibly be used to evaluate compliance with the BAT, PSES, NSPS and PSNS regulations proposed today.

(ii) BAT Limitations for Final Effluent. EPA today also proposes to set certain BAT effluent limitations at the final mill effluent discharged to the receiving stream. This compliance point is identical to the point used to demonstrate compliance with BPT limitations. All pollutants not limited at the bleach plant (i.e., AOX, COD and color) will be limited at the end-of-pipe.

The Agency is concerned that periodic discharges of dioxins, furans and other chlorinated organic pollutants may occur as a result of inventories of those pollutants in sludge on the bottom of aerated stabilization basins, overloaded clarifiers and appurtenant sludge management components of activated sludge systems. The Agency also is concerned that dioxins and furans that partition to pulp may find their way into paper machine white water and may be discharged in the effluent. In addition, miscellaneous wastewater streams ancillary to the bleach plant (as defined for compliance purposes in the regulation) may contain dioxin and furan and may not otherwise be controlled. These miscellaneous streams include bleach plant floor washings, bleach plant chemical preparation areas, bleaching tower and other bleach plant vent wet scrubber wastewaters. The Agency believes it is possible that control of chlorinated phenolic compounds not achieved through process changes alone would be achieved with end-of-pipe limits for AOX.

EPA solicits comments and data on whether end-of-pipe limits for dioxins, furans and chlorinated phenolics, in addition to the in-plant limits proposed today, would be appropriate to address the concerns set forth in the foregoing paragraph. The Agency also solicits comments on whether end-of-pipe limits for AOX are an effective means of controlling any chlorinated phenolic compounds that may not be consistently reduced to non-detect values by bleach plant process changes alone.

(3) Fundamentally Different Factors Variances. The CWA authorizes EPA to establish alternative limitations more or less stringent than those contained in the national effluent limitations guidelines on a case-by-case basis. These alternative limitations are permissible when there are factors present at a specific plant that are fundamentally different from the factors EPA considered during development of the limitations. See Section IX.I.3.

c. *Rationale for BAT Limitations by Subcategory.* Section V.A summarizes the factors to be considered in establishing the BAT level of control. In general, BAT represents the best existing economically achievable performance among plants with shared characteristics. Where existing pollution control technologies are uniformly inadequate, BAT may be transferred from a different subcategory or industrial category. BAT limitations may be based upon process changes, as well as measures that are not common industry practice.

The Agency is today proposing BAT effluent limitations under Subcategories A, B, C, D, E, and F. The rationale for the proposed effluent limitations in each subcategory is presented in the following paragraphs.

(1) Bleached Papergrade Kraft and Soda Subcategory, Subpart B. The Agency considered many technologies as regulatory options to reduce the generation of toxic and nonconventional pollutants from bleached papergrade kraft and soda mills. Of these, six options received the most serious consideration.

First, the Agency considered a totally chlorine-free (TCF) option for this subcategory. Worldwide, more than 15 mills produce TCF bleached kraft pulp. Most of the TCF pulp production is of a lower brightness (75–80 ISO), bleached with combinations of oxygen, ozone, enzymes, and peroxide. Only one mill routinely produces commercial quantities of high brightness (88–90 ISO) TCF kraft pulp from hardwood and bleached with ozone. In January 1993, this mill began to produce TCF softwood kraft pulp of lower brightness using ozone in short trials. Very little information is available concerning this process. One U.S. mill recently began producing lower brightness pulp (approximately 82–83 ISO) from softwood using an ozone bleaching process; however, the mill uses a final chlorine dioxide brightening stage and thus does not use a TCF process.

EPA does not consider TCF bleaching to be an available pollution prevention technology for the bleached papergrade kraft and soda subcategory at this time. This is because of the limited worldwide experience with and data for TCF bleaching of softwood in papergrade kraft and soda mills, and the fact that the majority of the kraft pulp in the U.S. is produced from softwood. (Softwood contains more lignin than hardwood and is thus more difficult to bleach to high brightness). However, EPA strongly encourages continuing innovation in the development of processes to reduce or eliminate the discharge of pollutants from this and other subcategories. EPA is today proposing alternative BAT effluent limits for those mills in this subcategory that adopt TCF process.

The remaining five regulatory options for this subcategory all include these elements:

- Adequate wood chip size control, achieved by close control of chipping equipment tolerances or use of chip-thickness screens. Chip size control is assumed to pay for itself through improved yield (fewer rejects) and more consistent pulp quality.
- Elimination of defoamers containing dioxin precursors, which the Agency believes is uniformly practiced by the U.S. pulp industry.
- Brown stock washing that achieves a washing loss of 10 kg $Na_2SO_4$ per metric ton or less.
- The elimination of hypochlorite, and replacing it with oxygen or

peroxide enhanced extraction, as needed.

- Addition of high shear mixing for the addition of chlorine and/or chlorine dioxide.

In addition to these elements, the five technology options considered for the Bleached Papergrade Kraft and Soda BAT effluent limitations are as follows:

- *Option 1—Split Addition of Chlorine.* For this option, the total equivalent chlorine added to the first stage of bleaching is applied in two steps. The pH of the first bleaching stage is controlled by the addition of sodium hydroxide.
- *Option 2—Substitution of Chlorine Dioxide for Chlorine.* This option includes the use of some elemental chlorine, and maintains the current active chlorine multiple for the first bleaching stage (ACM-equivalent chlorine as percent on pulp, divided by the prechlorination kappa number). However, enough of the chlorine is replaced by chlorine dioxide to reduce the "active chlorine multiple ratio" for the first stage to 0.90 or less. Active chlorine multiple ratio, based on work by Paprican is that combination of active chlorine multiple and percent chlorine dioxide substitution that results in bleaching conditions in which TCDD and TCDF are theoretically not formed. The active chlorine multiple ratio is [ACM(150-% $ClO_2$ substitution)]/24. This results in limiting the elemental chlorine multiple to 0.065 or less, and is approximately equivalent to using chlorine dioxide to provide 70 percent of the bleaching power (measured as oxidizing potential) applied in the first bleaching stage (i.e., 70 percent substitution).
- *Option 3—Oxygen Delignification or Extended Delignification With Substitution of Chlorine Dioxide for Chlorine.* This option includes the reduction of the lignin content as measured by kappa number of the pulp entering the first stage of bleaching. For softwood pulp, the pre-chlorination kappa number is reduced from approximately 30 to 18. For hardwood pulp, kappa number is reduced from approximately 20 to 12. The reduction in kappa number may be achieved either through the use of oxygen delignification or use of extended cooking. The first stage bleaching conditions for Option 3 are the same as those specified for Option 2 (active chlorine multiple ratio 0.90 or less), but because the kappa number of the pulp is lower, a lower mass-based dose of chlorine and chlorine dioxide is used.
- *Option 4—Oxygen Delignification or Extended Delignification With Complete Substitution of Chlorine Dioxide for Chlorine.* This option includes the same reduction of pulp lignin content as specified for Option 3. The use of elemental chlorine is completely eliminated, and the current active chlorine multiple is applied using chlorine dioxide only.
- *Option 5—Oxygen Delignification and Extended Delignification With Complete Substitution of Chlorine Dioxide for Chlorine.* This option includes further reduction of the lignin content of the pulp entering the first stage of bleaching. For softwood pulp, kappa is reduced from approximately 30 to 15. For hardwood pulp, kappa is reduced from 20 to 10. The first stage bleaching conditions for Option 5 are the same as those specified for Option 4 (elimination of elemental chlorine, with the current active chlorine multiple applied as chlorine dioxide).

The performance of each option was determined using data collected by the Agency during the Long-Term and Short-Term studies described in VIII.A. The Agency finds that, moving from Option 1 to Option 5, these options generally show decreasing mass discharges and progressively fewer pollutants detected in bleach plant and final effluents.

The Agency is today proposing Option 4 for BAT effluent limitations guidelines for Subpart B. In making this decision, EPA considered factors including: the effluent reduction attainable, the economic achievability of each option, the age of equipment and facilities involved, the process employed, the engineering aspects of various types of control techniques, process changes, the cost of achieving effluent reductions, and non-water quality environmental impacts (including energy requirements).

EPA selected Option 4 as the proposed technology basis for the papergrade kraft and soda subcategory, in part because no other option that was both technically feasible and economically achievable resulted in greater effluent reductions. The Agency found that Option 4 would achieve reductions of approximately 317 grams per year of TCDD and TCDF, 2,530 metric tons per year of toxic and nonconventional pollutants, and approximately 32,900 metric tons per year of AOX, and approximately 1.1 million metric tons of COD. This compares to reductions of: approximately 317 grams per year of TCDD and TCDF, 2,570 metric tons per year of toxic and nonconventional pollutants, and approximately 25,400 metric tons per year of AOX for Option 3; approximately 315 grams per year of TCDD and TCDF, 2,330 metric tons per year of toxic and nonconventional pollutants, and approximately 8,550 metric tons per year of AOX for Option 2; and approximately 300 grams per year of TCDD and TCDF, 2,410 metric tons per year of toxic and nonconventional pollutants, and approximately 10,800 metric tons per year of AOX for Option 1.

The Agency decided not to propose Option 1 as the best available technology for this subcategory because that option will not ensure that discharges of TCDD and TCDF in bleach plant effluents are below the analytical method detection limits. The measurable levels of TCDD and TCDF clearly will result in contamination of wastewater treatment sludges. The Agency decided not to propose Options 2 and 3 as the best available technology for this subcategory because Option 4, which is elemental chlorine-free, will achieve significantly more reduction in the discharge of highly chlorinated phenolic compounds, to near or below the limits of detection, and significantly greater reductions in AOX, than these options. The Agency believes this is particularly important because reductions of these highly chlorinated phenolic compounds have been associated with further reductions in TCDD and TCDF below the current minimum level of detection. In addition, neither Option 1 nor Option 2 offers the opportunity for increased pulping liquor recovery and concomitant reductions in consumable chemical costs, and improved consistency of pulp quality that result from oxygen delignification or extended cooking. Further benefits of Option 4 are the reductions achieved in concentrations of dioxin (1.0 ppt) and furan (1.9 ppt), and total organic chlorine content of wastewater treatment sludges (ten-fold reduction below Option 1). This finding will be particularly important in the Agency's assessment of the need to regulate land disposal practices for pulp and paper mill wastewater treatment sludges. An exception to this trend is that further reductions in chloroform in wastewater are not achieved beyond Option 2.

The Agency decided not to propose Option 5 because the costs of retrofitting Option 5 process technology (i.e., both extended delignification *and* oxygen delignification, as well as added recovery boiler capacity to handle the additional pulping liquor solids) may be very high for an existing source. Upon examining the economic impacts of Option 5, EPA concluded that Option 5 was not economically achievable.

The Agency estimated that the 78 mills with direct discharge would incur total annualized cost of $260 million in complying with Option 4. This compared to the following total annualized costs for other options: $97 million for Option 1, $113 million for Option 2, $200 million for Option 3, and $562 million for Option 5. The Agency estimated that Option 4 would result in a range of one to three plant closures and an estimated employment effect in the range of 500 to 4,400 lost jobs. The comparable figures for other options range from one to two plant closures and up to 3,700 lost jobs for Option 1 to a maximum of eight plant closures and up to 11,300 lost jobs at Option 5. These impacts, and the methodology behind them, are explained in greater detail in the economic impact analysis. Based upon these findings, the Agency concludes that BAT effluent limitations based on Option 4 for the papergrade kraft and soda subcategory would be economically achievable.

As stated above, the Agency determined that the available data does not suggest that Option 5 is economically achievable. In making this determination, the Agency noted that total job loss under Option 5 could be as high as approximately 11,300 and that a maximum of eight mills would close; this is five mill closures more than the corresponding maximum impacts for Option 4.

Industry has expressed concern that the cost of implementing oxygen delignification is significantly higher than estimated by EPA. The difference may be attributable to industry's inclusion of cost estimates for installing a significant number of new recovery boilers to handle the increase in pulping liquor solids sent to recovery from oxygen delignification. The Agency believes that any modest upgrades of existing recovery boiler capacity necessary can be made to accommodate the marginal increases in solids loadings from oxygen delignification and other technologies that are part of BAT. The costs of these upgrades have been included in EPA's cost estimates. Decisions for installing additional recovery boiler capacity beyond these upgrades are production-based, and those costs are therefore unnecessary to comply with the proposed regulations. See section XIII for solicitation of comments and data.

The Agency found that the incremental increase in annual electrical power consumption for all mills to achieve Option 4 was 114 megawatts (MW). This is equivalent to an increase of approximately 4 percent for a typical 500 ton per day market kraft pulp mill. The incremental increases in electrical power consumption for the remaining options were: for Option 1, an increase of 41 MW; for Option 2, an increase of 22 MW; for Option 3, an increase of 114 MW; and for Option 5, an increase of 234 MW. The Agency did not find that the age of equipment and facilities involved provided any basis for choosing among the options. The Agency considered the different processes and engineering aspects of Options 1, 2, 3, 4, and 5 in evaluating each option.

In addition to the options described above, EPA considered, but did not have adequate data to evaluate, an option based on the complete substitution of chlorine dioxide for elemental chlorine in the first stage of bleaching. The Agency has received some data demonstrating the effectiveness of this option for reducing some of the pollutants selected for regulation. The Agency received additional data concerning the impact of this option on AOX discharges on October 21, 1993. Several industry representatives indicated that more complete information will be provided during the comment period. EPA solicits further data and comments on this option. If these data demonstrate technical feasibility, economic achievability and other statutory factors, EPA may revise the technology basis and corresponding effluent limitations for promulgation of the rules for this subcategory accordingly.

EPA today also is proposing COD effluent limitations for the bleached papergrade kraft and soda subcategory. These COD limitations were developed for this subcategory based on engineering evaluation of the best methods to control COD discharges. The COD effluent data used to develop the proposed effluent limitations were collected by EPA during the short-term studies and supplied by mills with their questionnaire responses.

The technology basis for the proposed COD effluent limitations consists of effective brownstock washing, closed brownstock pulp screen room operation, application of pulping liquor spill prevention and control (BMPs), and BPT level secondary treatment performance. The first three technologies described above focus on preventing or capturing losses of pulping liquors and associated wood extractives and returning them to a heat or chemical recovery process. Closing screen rooms at older mills with open screen rooms is generally accomplished by reusing decker screen filtrates as pulp dilution water ahead of the screens, or as wash liquor on a preceding stage of washing. BPT level secondary treatment reduces the biodegradable portion of COD that remains after process changes. The Agency was not able to identify other technologies for controlling COD, and therefore concluded that this combination of technologies represents the best available technology for the control of COD.

The Agency considered the age, size, processes, other engineering factors, and non-water quality environmental impacts pertinent to mills in this subcategory. No basis could be found for identifying different COD effluent limitations within this subcategory based on age, size, processes, or other engineering factors. EPA has no data to suggest that the combination of technologies upon which COD effluent limitations are based significantly increase non-water quality environmental impacts.

In addition, the Agency concluded that the COD effluent limitations would be achievable based on the control technologies identified above. All costs for complying with the proposed COD effluent limitations, including the cost of closing screen room operations, were incorporated in the option-by-option economic impact analysis presented above and in section XI.B.

The Agency is also proposing today to include an alternative set of effluent limitations applicable to any wastewaters from TCF bleaching processes at mills in this subcategory. EPA is proposing these alternative limitations to provide mills with an incentive to eliminate or nearly eliminate the generation and discharge of chlorinated organic pollutants by using totally chlorine-free processes. These mills would initially be required to certify to the permitting authority that their processes are totally chlorine-free. The alternative limitations applicable to the wastewaters from TCF bleaching processes would not include any limitations on chlorinated organic pollutants (i.e., TCDD, TCDF, chloroform, methylene chloride, chlorinated phenolic compounds) at the bleach plant or end-of-pipe, except for AOX. Mills employing TCF processes would have effluent limitations only for AOX, and would have initial monitoring requirements for specific toxic organic pollutants (i.e., TCDD, TCDF, chloroform, methylene chloride, chlorinated phenolic compounds) which could be terminated if all analytical results in a specified series of sampling events are non-detect.

(2) Dissolving Kraft Subcategory, Subpart A. The Agency studied the existing pollution control technologies used by the three mills in the Dissolving Kraft Subcategory and conducted

sampling programs at two of the three mills. The process technologies studied included the use of high application rates of hypochlorite in the bleaching sequences.

The Agency found existing process technologies to be uniformly inadequate to control the generation of TCDD, TCDF, chloroform, and other toxic and nonconventional pollutants generated during the bleaching of dissolving grade pulp. Data available indicate that all three mills within the subcategory discharged chloroform in final effluent (indicating very high loadings from the bleach plants) as well as a relatively high frequency of detected TCDD and TCDF (indicating the same).

For this reason, the Agency considered in detail three regulatory options transferred from the bleached papergrade kraft and soda subcategory. All of these options include reduction in the amount of chlorine and chlorine-containing compounds applied to the pulp. The Agency also considered a TCF option for this subcategory. However, the Agency determined that TCF technologies could not be practicably applied in this subcategory at this time.

The three options considered in the most detail for the dissolving kraft subcategory included all of the common elements of the bleached papergrade kraft options (adequate chip size control, elimination of defoamers containing dioxin precursors, brown stock washing to a loss of 10 kg $Na_2SO_4$ per metric ton or less, elimination of hypochlorite, oxygen or peroxide reinforced extraction, and high shear mixing for the addition of chlorine and/or chlorine dioxide). In addition to these elements, the three technology options are:

• *Option 1—Substitution of Chlorine Dioxide for Chlorine*, at the addition rates described for bleached papergrade kraft and soda (approximately 70 percent substitution).

• *Option 2—Oxygen Delignification With Substitution of Chlorine Dioxide for Chlorine*. This option differs from the bleached papergrade kraft option. It does not allow for the use of extended delignification, because the Agency has received information indicating that, for technical reasons, extended delignification cannot be applied in the dissolving kraft subcategory. The Agency also has recently received data indicating that oxygen delignification is feasible and will reduce the amounts of toxic and nonconventional pollutants generated during bleaching. The chlorine dioxide substitution rate is defined as for bleached papergrade kraft Option 2, approximately 70 percent.

• *Option 3—Oxygen Delignification With Complete Substitution of Chlorine Dioxide for Chlorine*. As in Option 2, this option does not include extended delignification which the Agency does not believe is technically applicable to dissolving kraft.

The Agency determined that the performance of dissolving kraft Options 1, 2, and 3 would be equivalent to bleached papergrade kraft Options 2, 3, and 4, respectively. This judgment is based upon the similarities of components of the process technologies and best engineering judgment. The performance of each option is summarized in the technical development document for each pollutant. Performance of an option is characterized primarily by the long-term average production-normalized mass discharge in bleach plant effluent.

The Agency is today proposing Option 2 for BAT effluent limitations guidelines for Subcategory A. In making this decision, EPA considered factors including: the effluent reduction attainable, the economic achievability of each option, the age of equipment and facilities involved, the process employed, the engineering aspects of various types of control techniques, process changes, the cost of achieving effluent reductions, and non-water quality environmental impacts (including energy requirements).

EPA selected Option 2 as the proposed technology basis for the dissolving kraft subcategory, in part because no other option that was technically feasible achieved greater effluent reductions. The Agency found that available information did not support a conclusion that Option 3 was technically feasible. More specifically, the Agency recently received data demonstrating that 100 percent substitution of chlorine dioxide for chlorine is not technically feasible in the dissolving kraft subcategory. The Agency also found that Option 2 would achieve significantly greater reductions in the discharges of toxic and nonconventional pollutants than would Option 1. For example, the long-term average in bleach plant effluent of TCDD for Option 1 is 512 ng/ADMT, compared to the data representing Option 2 where the long-term average was 153 ng/ADMT. The estimated reductions of volatile and chlorinated phenolic toxic pollutants (16 metric tons per year) and AOX (1,670 metric tons per year) are the highest for this option. In addition, Option 2 removes approximately 8,560 metric tons per year of COD. These compare to estimated reductions for Option 1 for toxic pollutants of 4.7 metric tons per year and for AOX of 232 metric tons per year.

The Agency estimated that the mills would incur total annualized cost of $1.7 million in complying with Option 1. The Agency estimated that mills would incur total annualized cost of $11.9 million in complying with Option 2. The Agency estimated that neither Option 1 nor Option 2 would result in any lost jobs or mill closures. These impacts, and the methodology behind them, are presented in greater detail in section IX.G. Based upon these findings, the Agency concludes that BAT effluent limitations based on Option 2 for the dissolving kraft subcategory would be economically achievable.

The Agency found that Option 2 would result in an incremental increase in electrical power consumption of 7.8 MW over Option 1. The Agency did not find that the age of equipment and facilities involved, processes, or engineering aspects provided any basis for choosing Option 1 over Option 2. The Agency did not find any significant differences in non-water quality impacts between Options 1 and 2.

The Agency is also proposing today to include an alternative set of effluent limitations applicable to any wastewaters from TCF bleaching processes at mills in this subcategory. EPA is proposing these alternative limitations to provide mills with an incentive to eliminate or nearly eliminate the generation and discharge of chlorinated organic pollutants by using totally chlorine-free processes. These mills would be required initially to certify to the permitting authority that their process is totally chlorine-free. The alternative limitations applicable to the wastewaters from TCF bleaching processes would not include any limitations on chlorinated organic pollutants (i.e., TCDD, TCDF, chloroform, methylene chloride, chlorinated phenolic compounds) at the bleach plant or end-of-pipe, except for AOX. These mills would have BAT effluent limitations only for AOX, and also would have initial monitoring requirements for specific toxic organic pollutants (i.e., TCDD, TCDF, chloroform, methylene chloride, chlorinated phenolic compounds) which could be terminated if all analytical results in a specified series of sampling events are non-detect.

The Agency has recently received data indicating that mills may not be able to produce certain high grade dissolving kraft pulps without the use of hypochlorite to maintain product quality. Specifically, preliminary data received indicate that intrinsic viscosity, a measure of the degree of polymerization of the dissolving pulp, is not maintained within acceptable specifications without the use of hypochlorite. See section XIII of this preamble for solicitation of comments and data to enable EPA to further define this concern. The Agency also solicits information on alternative process and control technologies more environmentally protective than existing processes that may be achievable for these products. Based on these preliminary data, the Agency specifically solicits comment on whether BAT effluent limitations for the dissolving kraft subcategory should be based upon reduced use of hypochlorite, compared to current practice, under specific conditions that achieve a substantial reduction in the amount of chloroform generated and emitted to air and discharged to bleach plant effluents. The Agency requests data on the specific process operating conditions and chloroform generation rates resulting from these conditions (see Section XIII for specific data requests).

EPA today also is proposing COD effluent limitations for the dissolving kraft subcategory. These COD limitations were developed based on engineering evaluation of the best methods to control COD discharges. The COD effluent data used to develop the proposed effluent limitations were collected by EPA during the short-term studies.

The technology basis for the proposed COD effluent limitations for the dissolving kraft subcategory consists of effective brownstock washing, closed brownstock pulp screen room operation, application of pulping liquor spill prevention and control (BMPs), and BPT level secondary treatment performance. The first three technologies described above focus on preventing or capturing losses of pulping liquors and associated wood extractives and returning them to a heat or chemical recovery process. Closing screen rooms at older mills with open screen rooms is generally accomplished by reusing decker screen filtrates as pulp dilution water ahead of the screens, or as wash liquor on a preceding stage of washing. BPT level secondary treatment reduces the biodegradable portion of COD that remains after process changes. The Agency was not able to identify other technologies for controlling COD, and therefore concluded that this combination of technologies represents the best available technology for the control of COD.

The Agency considered the age, size, processes, other engineering factors, and non-water quality environmental impacts pertinent to mills in developing the COD limitations for this subcategory. No basis could be found for identifying different COD effluent limitations within this subcategory based on age, size, processes, or other engineering factors. EPA has no data to suggest that the combination of technologies upon which COD effluent limitations are based significantly increase non-water quality environmental impacts.

In addition, the Agency concluded that the COD effluent limitations would be achievable based on the control technologies identified above. All costs for complying with the proposed COD effluent limitations, including the cost of closing screen room operations, were incorporated in the option-by-option economic impact analysis presented above and in section XI.B.

(3) Dissolving Sulfite Subcategory, Subpart D. The Agency considered three regulatory options to reduce the generation of toxic and nonconventional pollutants during bleaching of dissolving sulfite wood pulps. One of these options (20 percent chlorine dioxide substitution for elemental chlorine) was rejected for reasons including lack of adequate performance data and minimal improvement in control of pollutants beyond existing practices.

The first remaining option is based on oxygen delignification followed by bleaching with complete substitution of chlorine dioxide for elemental chlorine. The second remaining option is a totally chlorine-free (TCF) bleaching process. At present, there is one mill in the U.S. that bleaches dissolving sulfite pulp using oxygen delignification and complete substitution of chlorine dioxide for elemental chlorine. Pollutant loadings at this mill were used to develop Option 1. At present there are no mills in the U.S. that use a TCF process to bleach dissolving sulfite pulp. However, there is a mill in Austria (and there may be others) that uses TCF processes to bleach dissolving sulfite pulp. Information primarily from the Austrian mill was used to analyze and develop Option 2.

Both regulatory options for this subcategory include these elements:

- Adequate wood chip size control, achieved by close control of chipping equipment tolerances or use of chip-thickness screens. Chip size control is assumed to pay for itself through improved yield (fewer rejects) and more consistent quality pulp; and
- Elimination of defoamers containing dioxin precursors, which the Agency believes is uniformly practiced by the U.S. pulp industry.

In addition to these elements, the two regulatory options considered for the dissolving sulfite subcategory are as follows:

- *Option 1—Oxygen Delignification With Complete Substitution of Chlorine Dioxide for Chlorine*

As indicated above, this option is based on using oxygen delignification followed by bleaching with complete substitution of chlorine dioxide for chlorine. Under this option, hypochlorite could be used in the bleach sequence.

- *Option 2—Totally Chlorine Free Bleaching*

As indicated above, this option is based on totally chlorine free (TCF) bleaching processes used by mills in other countries. Although the bleach sequence at each mill varies, all are based on oxygen delignification and use of ozone and/or peroxide in subsequent bleaching stages.

The performance of each option was determined using data collected by the Agency during the Long-Term Study and additional data gathering described in VIII.A. The Agency was not able to collect the same type of performance data from TCF mills in other countries as for the U.S. mill. Effluent limitations for mills in other countries typically consist of only BOD, COD, and AOX, and therefore these are the only data available. The Agency has requested but not been able to obtain data for individual toxic pollutants from any TCF mill. However, because chlorine and chlorine-containing compounds are not used at TCF mills, and because available data for bleach plant and final effluent AOX concentrations at TCF mills are very low, the Agency believes that concentrations of individual chlorinated compounds in wastewaters from TCF mills are not detectable.

The Agency is proposing Option 1 as the technology basis for BAT effluent limitations guidelines for Subpart D. EPA selected this option as the proposed technology basis for the dissolving sulfite subcategory, in part because no other option that was both technically feasible and economically achievable resulted in greater effluent reductions. The Agency found that Option 1 would achieve reductions of approximately 2.4 grams per year of TCDD and TCDF, 56 metric tons per year of toxic and nonconventional pollutants, and approximately 1,010 metric tons per year of AOX.

The Agency decided not to propose Option 2 as the best available technology for this subcategory because information recently supplied by dissolving sulfite producers indicates that their mills cannot currently meet all product specifications for high quality, high purity dissolving sulfite pulp using TCF bleaching processes. The preliminary data that EPA has received suggest that critical product specifications relating to brightness, color, haze, and filterability, cannot currently be met for certain products without the use of some chlorine-containing compounds. Furthermore, the Agency does not have sufficient information on effluent reduction benefits that can be achieved by non-chlorine based bleaching for all grades of dissolving sulfite pulps. Notably, the Agency lacks this information for high purity acetate grades. Based on this data, the Agency does not consider TCF bleaching to be an available technology for some products within the dissolving sulfite subcategory at this time. EPA does, however, consider TCF bleaching to be an available technology for many products made within this subcategory at this time.

In addition, after examining the economic impacts of Option 2, EPA was concerned about the economic achievability of Option 2. The Agency estimated that the total annualized cost of complying with Option 1 would be $5 million and that the cost of complying with Option 2 would be $15 million. The Agency estimated that Option 1 would result in one plant closure and that Option 2 would result in two plant closures. The projected employment loss associated with these plant closures is not reported here because the level of data aggregation is inadequate to protect confidential business information. Based on the foregoing information, the Agency concluded that Option 1 is economically achievable.

The Agency found that Option 2 would result in an incremental increase in annual electrical power consumption of 3.2 MW over Option 1. The Agency did not find that the age of equipment and facilities involved, processes, or engineering aspects provided any basis for choosing Option 2 over Option 1. The Agency did not find any significant differences in non-water quality environmental impacts between Options 2 and 1.

EPA strongly encourages continuing innovation in the development of processes to reduce or eliminate the discharge of pollutants from this subcategory. During development of these proposed regulations, industry representatives expressed their view that some products currently being made at dissolving sulfite mills could not be made with either Option 1 or Option 2. The Agency solicits comments on whether this subcategory should be further divided, based on product specifications or other factors, so that chlorine and chlorine compounds can be minimized to a greater degree.

The Agency is also proposing today to include an alternative set of effluent limitations applicable to any wastewaters from TCF bleaching processes at mills in this subcategory. EPA is proposing these alternative limitations to provide mills with an incentive to eliminate or nearly eliminate the generation and discharge of chlorinated organic pollutants by using totally chlorine-free processes. These mills would initially be required to certify to the permitting authority that their processes are totally chlorine-free. The alternative limitations applicable to the wastewaters from TCF bleaching processes would not include any limitations on chlorinated organic pollutants (i.e., TCDD, TCDF, chloroform, methylene chloride, chlorinated phenolic compounds) at the bleach plant or end-of-pipe, except for AOX. Mills employing TCF processes would have effluent limitations only for AOX, and would have initial monitoring requirements for specific toxic organic pollutants (i.e., TCDD, TCDF, chloroform, methylene chloride, chlorinated phenolic compounds) which could be terminated if all analytical results in a specified series of sampling events are non-detect.

The Agency is not proposing effluent limitations for COD for this subcategory. COD data that reflect available technologies to control refractory pollutants that originate in the pulping and recovery areas of mills (e.g., closed screen rooms, BMPs, etc.) are not available at this time for this subcategory. The methodology for deriving COD limitations is described in the preceding sections for the bleached papergrade kraft and soda subcategory, and the dissolving kraft subcategory. See also section XIII of this preamble for solicitation of comments and data. The Agency may develop COD effluent limitations for this subcategory when data become available.

(4) Papergrade Sulfite Subcategory, Subpart E. The Agency considered three options to reduce the generation of toxic and nonconventional pollutants during bleaching of papergrade sulfite wood pulps. One of these options (based on oxygen and peroxide enhanced extraction) was rejected for reasons including insufficient performance data to characterize the option and minimal improvement in control of pollutants beyond existing practices. Two options were analyzed in detail.

One option is based on oxygen delignification followed by bleaching with complete substitution of chlorine dioxide for elemental chlorine. The second option is a totally chlorine free (TCF) bleaching process. At present, there is one mill in the U.S. that bleaches papergrade sulfite pulp (the mill also bleaches dissolving sulfite pulp) using oxygen delignification and complete substitution of chlorine dioxide for chlorine. Pollutant loadings from production of papergrade sulfite pulp at this mill were used to develop Option 1. At present there are no mills in the U.S. that use a TCF process to bleach papergrade sulfite pulp. However, there are approximately ten mills in other countries (Austria, Canada, France, Germany, Sweden, Switzerland) that use TCF processes to bleach papergrade sulfite pulp. Information from those mills was used to analyze and develop Option 2.

Both regulatory options for this subcategory include these elements:

- Adequate wood chip size control, achieved by close control of chipping equipment tolerances or use of chip-thickness screens. Chip size control is assumed to pay for itself through improved yield (fewer rejects) and more consistent quality pulp;
- Elimination of defoamers containing dioxin precursors, which the Agency believes is uniformly practiced by the U.S. pulp industry; and
- Elimination of hypochlorite in the bleaching sequence.

In addition to these elements, the two regulatory options considered for the papergrade sulfite subcategory are as follows:

- *Option 1—Oxygen Delignification With Complete Substitution of Chlorine Dioxide for Chlorine*

As indicated above, this option is based on using oxygen delignification followed by bleaching with complete substitution of chlorine dioxide for elemental chlorine.

- *Option 2—Totally Chlorine Free Bleaching*

As indicated above, this option is based on totally chlorine free (TCF) bleaching processes used by mills in other countries. Although the bleach sequence at each mill varies, all are based on oxygen delignification or an extraction stage using oxygen and/or peroxide, followed by one or more peroxide bleaching stages. Some mills use other chemicals such as chelating agents or nitrilamine before, between, or in the peroxide bleaching stages.

The performance of each option was determined using data collected by the Agency during the Long-Term Study and additional data gathering described in section VIII.A. The Agency was not able to collect the same type of performance data from TCF mills in other countries as for the U.S. mill. Effluent limitations for mills in other countries typically consist of only BOD, COD, and AOX, and therefore these are the only data available. The Agency has not been able to obtain data for individual toxic pollutants from any TCF mill. However, because chlorine and chlorine-containing compounds are not used at TCF mills, and because effluent AOX concentrations at TCF mills are very low, the Agency believes that concentrations of individual chlorinated compounds in wastewaters from TCF mills should not be detectable.

The Agency is proposing Option 2 for BAT effluent limitations guidelines for Subcategory E. Option 2 will achieve the maximum reduction in the discharge of pollutants to the environment compared to Option 1, primarily because no chlorine or chlorine-containing bleaching chemicals are used, and therefore, chlorinated pollutants are not formed. EPA estimates that Option 2 removes 5,250 metric tons per year of AOX, and 40 metric tons per year of toxic pollutants, compared to Option 1 which removes 4,460 metric tons per year of AOX, and 26 metric tons per year of toxic pollutants.

Under EPA's proposal, mills in the papergrade sulfite subcategory would have effluent limitations only for AOX but would have initial monitoring requirements for toxics (i.e., TCDD, TCDF, chloroform, methylene chloride, chlorinated phenolic compounds) which could be stopped if all results are non-detect.

At this time, the Agency does not have sufficient data for Option 2 to develop limitations for the non-chlorinated pollutants, acetone and methyl ethyl ketone, for mills in this subcategory. These pollutants are generated at mills in this subcategory and the Agency may develop limitations for these pollutants in the future when sufficient data are available.

The Agency has received preliminary information from some papergrade sulfite producers indicating that, for ammonium-base sulfite manufacturing of tissue and towel products, strength requirements may not be achievable with TCF processes. Also, for some other specialty grade pulps (for example, photographic and plastic molding pulps), the comments state that to be suitable for use, the pulp must be not only high in brightness, but have purity, uniform resin absorption rates, no electrical conductivity, no color reversion at high temperature, and high alpha cellulose content. Some of these producers have provided data for EPA to consider during the comment period. See section XIII of this preamble for solicitation of comments and data regarding these pollutants and product quality concerns raised in recent data submissions, and the data EPA is soliciting to define these concerns and alternative technologies beyond existing process technologies.

The Agency estimated that the total annualized cost of complying with Option 1 would be $42 million and that the cost of complying with Option 2 would be $25 million. The Agency estimated that Option 1 would result in four plant closures. Option 2 would result in two plant closures. The estimated employment loss associated with these plant closures is not reported here because the level of data aggregation is inadequate to protect confidential business information. Additional information on economic impacts, including summaries of employment effects, is presented in the economic impact analysis. Based on the foregoing information, the Agency concludes that Option 2 is economically achievable.

The Agency found that Option 2 would result in an incremental decrease in annual electrical power consumption of 0.89 MW over Option 1. The Agency did not find that the age of equipment and facilities involved, processes, or engineering aspects provided any basis for choosing Option 1 over Option 2. The Agency did not find any significant differences in non-water quality environmental impacts between Options 1 and 2.

EPA today also is proposing COD effluent limitations for the papergrade sulfite subcategory. These COD limitations were developed based on engineering evaluation of the best methods to control COD discharges. The COD effluent data used to develop the proposed effluent limitations were supplied by mills with their questionnaire responses.

The technology basis for the proposed COD effluent limitations consists of effective brownstock washing, closed brownstock pulp screen room operation, application of pulping liquor spill prevention and control (BMPs), and BPT level secondary treatment performance. The first three technologies described above focus on preventing or capturing losses of pulping liquors and associated wood extractives and returning them to a heat or chemical recovery process. Closing screen rooms at older mills with open screen rooms is generally accomplished by reusing screen room decker filtrates as pulp dilution water ahead of the screens, or as wash liquor on a preceding stage of washing. BPT level secondary treatment reduces the biodegradable portion of COD that remains after process changes. The Agency was not able to identify other technologies for controlling COD, and therefore concluded that this combination of technologies represents the best available technology for the control of COD. The Agency estimates that Option 2 will remove approximately 200,000 metric tons per year of COD.

The Agency considered the age, size, processes, other engineering factors, and non-water quality environmental impacts pertinent to mills in this subcategory. No basis could be found for identifying different COD effluent limitations within this subcategory based on age, size, processes, or other engineering factors. EPA has no data to suggest that the combination of technologies upon which COD effluent limitations are based significantly increase non-water quality environmental impacts.

In addition, the Agency concluded that the COD effluent limitations would be achievable based on the control technologies identified above. All costs for complying with the proposed COD effluent limitations, including the cost of closing screen room operations, were incorporated in the option-by-option economic impact analysis presented above and in section XI.B.

(5) Unbleached Kraft, Subcategory C. EPA today is proposing COD effluent limitations for the unbleached kraft subcategory. These COD limitations were developed based on engineering evaluation of the best methods to control COD discharges. The COD effluent data used to develop the proposed effluent limitations were supplied by mills with their questionnaire responses.

The technology basis for the proposed COD effluent limitations consists of effective brownstock washing, closed brownstock pulp screen room operation, application of pulping liquor spill prevention and control (BMPs), and BPT level secondary treatment performance. The first three technologies described above focus on preventing or capturing losses of pulping liquors and associated wood extractives and returning them to a heat or chemical recovery process. Closing screen rooms at older mills with open screen rooms is generally accomplished by reusing screen room decker filtrates as pulp dilution water ahead of the screens, or as wash liquor on a preceding stage of washing. BPT level secondary treatment reduces the biodegradable portion of COD that remains after process changes. The

Agency was not able to identify other technologies for controlling COD, and therefore concluded that this combination of technologies represents the best available technology for the control of COD.

The Agency considered the age, size, processes, other engineering factors, and non-water quality environmental impacts pertinent to mills in this subcategory. No basis could be found for identifying different COD effluent limitations within this subcategory based on age, size, processes, or other engineering factors. EPA has no data to suggest that the combination of technologies upon which COD effluent limitations are based significantly increase non-water quality environmental impacts.

In addition, the Agency concluded that the COD effluent limitations would be achievable based on the control technologies identified above. All costs for complying with the proposed COD effluent limitations, including the cost of closing screen room operations, were incorporated in the economic impact analysis presented below and in section XI.B. Compliance with the proposed limitations is estimated to result in removal of approximately 326,000 metric tons per year of COD.

The Agency estimated that the total annualized cost of BMP and COD control in the unbleached kraft subcategory would be $5 million. The Agency projects no incremental plant closures or employment loss associated with these costs. Therefore, the Agency concluded that the COD effluent limitations for the unbleached kraft subcategory would be economically achievable. See also section XIII of this preamble for solicitation of comments and data.

(6) Semi-chemical Subcategory, Subpart F. The Agency today is proposing BAT effluent limitations to control COD. These COD limitations were developed based on engineering evaluation of the best methods to control COD discharges. COD data are not available for technologies that control losses of pulping liquors and wood extractives (e.g., BMPs, etc.) in this subcategory that contribute to the effluent toxicity discussed in section IX.C. However, the Agency is transferring data from the unbleached kraft subcategory as the basis for the proposed effluent limitations. The pulping processes in the unbleached kraft subcategory are similar to those used in the semi-chemical subcategory, and therefore the Agency has concluded that the data transfer is appropriate. The COD effluent data used to develop the proposed effluent limitations, as transferred from the unbleached kraft subcategory, were supplied by mills with their questionnaire responses.

The technology basis for the proposed COD effluent limitations consists of effective brownstock washing, application of pulping liquor spill prevention and control (BMPs), and BPT level secondary treatment performance. The first two technologies described above focus on preventing or capturing losses of pulping liquors and associated wood extractives and returning them to a heat or chemical recovery process. Screening is usually omitted from semi-chemical pulp mills. Therefore, closed screen room operation is not included as part of the technology basis for the COD control at semi-chemical mills. BPT level secondary treatment reduces the biodegradable portion of COD that remains after process changes. The Agency was not able to identify other technologies for controlling COD, and therefore concluded that this combination of technologies represent the best available technology for the control of COD.

The Agency considered the age, size, processes, other engineering factors, and non-water quality environmental impacts pertinent to mills in this subcategory. No basis could be found for identifying different COD effluent limitations within this subcategory based on age, size, processes, or other engineering factors. EPA has no data to suggest that the combination of technologies upon which COD effluent limitations are based significantly increase non-water quality environmental impacts.

In addition, the Agency concluded that the COD effluent limitations would be achievable based on the control technologies identified above. All costs for complying with the proposed COD effluent limitations, including the cost of improved brownstock washing and BMPs, were incorporated in the economic impact analysis presented below and in section XI.B. Compliance with the proposed limitations is estimated to result in removal of 60,700 metric tons per year of COD.

The Agency estimated that the total annualized cost of BMP and COD control would be approximately $7 million. The Agency projects no incremental mill closures or employment losses associated with these costs. Therefore, the Agency concluded that the COD effluent limitations for the semi-chemical subcategory would be economically achievable.

4. New Source Performance Standards

a. *Introduction*. The Agency today is proposing revised NSPS for the following subcategories:

A. Dissolving Kraft
B. Bleached Papergrade Kraft and Soda
C. Unbleached Kraft
D. Dissolving Sulfite
E. Papergrade Sulfite
F. Semi-Chemical
G. Mechanical Pulp
H. Non-Wood Chemical Pulp
I. Secondary Fiber Deink
J. Secondary Fiber Non-Deink
K. Fine and Lightweight Papers from Purchased Pulp
L. Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp

New mills have the opportunity to incorporate the best available demonstrated technologies, including process changes, in-plant controls, and end-of-pipe treatment technologies.

b. *Definitions of New Source*. EPA's NPDES regulations define the term "new source" at 40 CFR 122.2 and 122.29. Pursuant to those regulations, to be a "new source" a source must:

• Be constructed at a site at which no other source is located,

• Totally replace the process or production equipment that causes the discharge of pollutants at an existing source, or

• Be a process substantially independent of an existing source at the same site, considering the extent of integration with the existing source and the extent to which the new facility is engaged in the same general type of activity as the existing source. 40 CFR 122.29(b).

The application of these definitions to particular permitting situations has sometimes caused controversy. In the pulp and paper industry, for example, dischargers, permitting authorities and others have sometimes disagreed concerning a particular facility's status as a "new source" under the foregoing definitions. The determination can be important, because new sources are generally subject to more stringent limits than existing sources.

EPA today is proposing supplemental definitions of the term "new source," applicable to the effluent limitations guidelines for the pulp and paper industry only. These definitions would supplement, rather than replace, EPA's existing regulations defining the term "new source" under the CWA. See 40 CFR 122.2 and 122.29. These definitions are intended to be consistent with EPA's existing regulations defining the term "new source" under the CWA, and are proposed in order to provide NPDES permit writers and other interested parties with more specific rules to follow in determining new source status at facilities in the pulp, paper and paperboard industry. These proposed definitions would not affect the definition of "new source" for purposes of the NESHAP portion of these integrated rules.

The supplemental definitions EPA is proposing today are as follows:

(1) The following are examples of "new sources" within the pulp, paper and paperboard industry:

(i) At chemical pulp mills with bleaching operations (Subcategories A, B, D and E): The construction, within any five year period, of a new pulping digester or pulping digester that completely replaces an existing digester, in combination with a new bleaching facility or bleaching facility that completely replaces an existing bleaching facility.

(ii) At existing chemical pulp mills without bleaching operations (Subcategories C, F, and H) a new pulping digester(s), or a new pulping digester(s) that totally replaces existing pulping digester(s).

(iii) At mechanical, secondary fiber, and nonintegrated mills (Subcategories G, I, J, K, and L): a new paper or paperboard machine, or a paper or paperboard machine that totally replaces an existing paper or paperboard machine.

(2) The following are examples of changes that alone do not cause an existing mill to become a "new source":

(i) Upgrades of existing pulping operations;

(ii) Upgrades or replacement of pulp screening and washing operations;

(iii) Installation of oxygen delignification systems or other post-digester, prebleaching delignification systems; and,

(iv) Bleach plant modifications including changes in method or amounts of chemical applications, new chemical applications, installation of new bleaching towers to facilitate replacement of sodium or calcium hypochlorite, and installation of new pulp washing systems.

c. *NSPS Options and Selection.* (1) Bleached Papergrade Kraft and Soda Subcategory, Subpart B.

EPA today is proposing New Source Performance Standards (NSPS) for 21 toxic, nonconventional and conventional pollutants for the papergrade kraft and soda subcategory. These standards are based on the best available demonstrated control technology, process, operating method, or other alternative. In developing these proposed standards, the Administrator considered factors including the cost of achieving effluent reductions, non-water quality environmental impacts, and energy requirements.

(i) Toxic and Nonconventional Pollutants. EPA today is proposing New Source Performance Standards for 19 toxic and nonconventional pollutants for the papergrade kraft and soda subcategory. In developing NSPS for the papergrade kraft and soda subcategory, EPA evaluated four technologies described in section IX.E.3.C.1. The four technologies are: (i) the option described as "Option 4" (which is the option selected as EPA's proposed technology basis for BAT for this subcategory); (ii) the option described as "Option 5;" (iii) an ozone-based bleaching technology currently being implemented at a U.S. mill, and (iv) a TCF technology currently being implemented at a U.S. mill. EPA is today proposing the technology labeled "Option 5" as the NSPS technology basis for this subcategory.

EPA selected Option 5 as the technology basis for NSPS in the papergrade kraft and soda subcategory because EPA believes that no available technology achieves better control of toxic and nonconventional pollutants. The Agency's conclusions concerning the pollution control capabilities of Option 5 are based upon engineering judgment and the fact that Option 5 combines different pollution control technologies not combined in any other option. Specifically, Option 5 combines both oxygen delignification and extended cooking (followed by 100 percent substitution of chlorine dioxide for elemental chlorine). These are two proven delignification technologies that contribute to the control of toxics and nonconventionals. Option 5 has been implemented by at least two papergrade kraft mills in the U.S. producing high brightness market pulps (88–90 percent ISO) from softwoods. One of these mills has supplied analytical data for bleach plant and end-of-pipe sampling points largely identical in scope (but shorter in duration) and methods to the Agency's long-term study. The Agency is not aware of any reason, based on principles of science or technology, that the combination of oxygen delignification and extended cooking (followed by 100 percent substitution by chlorine dioxide for elemental chlorine) would produce inferior pollution control than either oxygen delignification or extended cooking alone. The Agency notes that the data described above do not confirm the foregoing conclusion; indeed the data received show a few pollutants (chloroform, MEK, 4,5,6-trichloroguaiacol, AOX, COD, color) present in slightly greater quantities at a mill using Option 5 than at a mill using Option 4. The Agency believes that these results are attributable to site-specific characteristics of the mills in question and not attributable to any inherent differences between Option 4 and Option 5. The Agency is not proposing NSPS for some pollutants where reliable data is not available in this subcategory at this time (chloroform, MEK, 4,5,6-trichloroguaiacol, AOX, COD, color), and is soliciting additional data for this technology as described in section XIII of this preamble. The data being used as a basis for the proposed NSPS are presented in the water technical development document along with the methodology for establishing numerical limitations.

In addition to the option selected, EPA considered the same option described as "Option 4" in the discussion of the basis for the proposed BAT limitations. EPA rejected this option (extended cooking or oxygen delignification with complete substitution by chlorine dioxide for elemental chlorine) because it does not provide, based upon available data and engineering judgment as discussed above, the most stringent pollutant reductions. The Agency believes this is true because Option 4 neither provides for as high a degree of lignin removal (as measured by kappa numbers) or pulping chemical recovery, nor provides for the greatest reduction in bleaching chemical usage as the selected option.

EPA also considered an ozone-based process technology as a possible technology basis for NSPS. This technology is currently being used in the integrated mill segment of this subcategory to produce pulps of somewhat lower brightness (80–86 percent ISO) than market pulps. The process technology being considered is based on oxygen delignification followed by ozone bleaching, oxygen and peroxide enhanced extraction, followed by final chlorine dioxide brightening as applied at a U.S. mill. EPA did not select this option because this process has only recently been implemented and adequate data are not available. However, the Agency recently has cooperatively sampled this process with assistance from the mill. Analytical data from this mill not claimed as confidential business information now are available and those data, that have been preliminarily analyzed for acceptable performance of the analytical methods, have been included in the record of this proposed rulemaking. Further thorough engineering and statistical analysis of these data and any preliminary limitations that may be appropriate will be made available at a later date for review and comment. The Agency further anticipates that additional sampling and analysis of wastewaters at this mill will be undertaken at a later date to be determined in concert with the mill. Analysis of the cost and effluent reductions achieved by this technology, and the energy and non-water quality environmental impacts will be completed when appropriate.

Finally, the Agency considered a TCF process technology that one U.S. mill is currently in the process of implementing for pulps of lower brightness. This U.S. mill has committed to installing a totally chlorine-free (TCF) process. While the details of this process are not yet completed, the mill has committed to producing and marketing a pulp with brightness of 75–80 percent ISO by 1995. EPA did not select this option because this process is still being implemented and adequate data are not available. The Agency has solicited trial data from this mill in order to characterize the wastewaters and potential air emissions from this process.

EPA considered the cost of the proposed NSPS technology for new mills. EPA concluded that such costs are not so great as to present a barrier to entry, as demonstrated by the fact that two currently operating mills are using this technology. The Agency also considered energy requirements and other non-water quality environmental impacts for the selected NSPS option. In light of the increased chemical recovery and reduced operating costs for this option, EPA concluded that the energy and non-water quality impacts were no greater and probably less than for the selected BAT technology option.

The Agency is also proposing today to include an alternative set of effluent limitations applicable to any wastewaters from TCF bleaching processes at new source mills in this subcategory. EPA is proposing these alternative limitations to provide mills with an incentive to eliminate or nearly eliminate the generation and discharge of chlorinated organic pollutants by using totally chlorine-free processes. These mills would be required initially to certify to the permitting authority that their process is totally chlorine-free. The alternative limitations applicable to the wastewaters from TCF bleaching processes would not include any limitations on chlorinated organic pollutants (i.e., TCDD, TCDF, chloroform, methylene chloride, chlorinated phenolic compounds) at the bleach plant or end-of-pipe, except for AOX. These mills would have limitations only for AOX, and also would have initial monitoring requirements for specific toxic organic pollutants (i.e., TCDD, TCDF, chloroform, methylene chloride, chlorinated phenolic compounds) which could be terminated if all analytical results in a specified series of sampling events are non-detect.

(ii) Conventional Pollutants—EPA today is proposing New Source Performance Standards for $BOD_5$ and TSS for the papergrade kraft and soda subcategory. Based upon data available for this subcategory, the technology basis for these standards represents the most stringent demonstrated level of performance for the control of $BOD_5$ and TSS in this subcategory.

EPA considered the cost of the proposed NSPS technology for new mills. EPA concluded that such costs are not so great as to present a barrier to entry, as demonstrated by the fact that one currently operating mill is using this technology. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

(2) Dissolving Kraft Subcategory, Subpart A. EPA today is proposing New Source Performance Standards (NSPS) for 22 toxic, nonconventional, and conventional pollutants for the dissolving kraft subcategory. These standards are based on the best available demonstrated control technology, process, operating method, or other alternative. In developing these proposed standards, the Administrator considered factors including the cost of achieving effluent reductions, non-water quality environmental impacts, and energy requirements.

(i) Toxic and Nonconventional Pollutants—EPA today is proposing New Source Performance Standards for 20 toxic and nonconventional pollutants for the dissolving kraft subcategory. The technology basis for these performance standards is the same technology described as "Option 2" in the discussion of proposed BAT limitations for this subcategory (*see* discussion in section IX.E.3.C.5). That option consists of the most stringent demonstrated technology option for this subcategory. The Agency is proposing control of toxic or nonconventional pollutants equal to BAT as NSPS for this subcategory. The technology basis for the proposed BAT effluent limitations for the dissolving kraft subcategory (oxygen delignification and 70 percent substitution of chlorine dioxide for elemental chlorine, and elimination of hypochlorite) was transferred from the papergrade kraft and soda subcategory.

EPA believes, as described in the development of BAT limitations, that the transfer of technology from the papergrade kraft and soda subcategory to the dissolving kraft subcategory is appropriate and applicable. Based on the cost information available to EPA, the Agency has no reason to believe that the costs of this technology would be a barrier to entry in the dissolving kraft subcategory. The Agency considered energy requirements and other non-water quality environmental impacts for the selected NSPS option. The energy and non-water quality impacts were no greater than for the selected BAT technology option.

As noted in the discussion of the basis for BAT for this subcategory, the Agency received comments regarding the ability of mills to maintain acceptable product quality without the use of hypochlorite to maintain intrinsic viscosity and other product quality parameters. The Agency is soliciting additional detailed data from individual mills in order to address this concern (see section XIII).

The Agency is also proposing today to include an alternative set of effluent limitations applicable to any wastewaters from TCF bleaching processes at new source mills in this subcategory. EPA is proposing these alternative limitations to provide mills with an incentive to eliminate or nearly eliminate the generation and discharge of chlorinated organic pollutants by using totally chlorine-free processes. These mills would be required initially to certify to the permitting authority that their process is totally chlorine-free. The alternative limitations applicable to the wastewaters from TCF bleaching processes would not include any limitations on chlorinated organic pollutants (i.e., TCDD, TCDF, chloroform, methylene chloride, chlorinated phenolic compounds) at the bleach plant or end-of-pipe, except for AOX. These mills would have limitations only for AOX, and also would have initial monitoring requirements for specific toxic organic pollutants (i.e., TCDD, TCDF, chloroform, methylene chloride, chlorinated phenolic compounds) which could be terminated if all analytical results in a specified series of sampling events are non-detect.

(ii) Conventional Pollutants—EPA today is proposing New Source Performance Standards for $BOD_5$ and TSS for the dissolving kraft subcategory. Based upon data available for this subcategory, the technology basis for these standards represents the most stringent demonstrated level of performance for the control of $BOD_5$ and TSS in this subcategory.

EPA concluded that, because one currently operating mill in this subcategory has demonstrated the performance of the conventional pollutant control technology, the costs are not so great as to present a barrier to entry of a new mill. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

(3) Unbleached Kraft Subcategory, Subpart C. EPA today is proposing New Source Performance Standards (NSPS) for three nonconventional and conventional pollutants for the unbleached kraft subcategory. These standards are based on the best available demonstrated control technology, process, operating method, or other alternative. In developing these proposed standards, the Administrator considered factors including the cost of achieving effluent reductions, non-water quality environmental impacts, and energy requirements.

(i) Nonconventional Pollutant—EPA today is proposing New Source Performance Standards for the nonconventional pollutant COD for the unbleached kraft subcategory. The technology basis for these performance standards is the same technology described in the discussion of proposed BAT limitations for this subcategory (*see* discussion in section IX.E.3.C.5). That option consists of the most stringent demonstrated COD control technology option for this subcategory.

The technology basis for the proposed COD effluent limitations consists of effective brownstock washing, closed brownstock pulp screen room operation, application of pulping liquor spill prevention and control (BMPs), and BPT level secondary treatment performance. These technologies have been widely demonstrated across chemical pulp mills in this industry and are readily incorporated in new mills in this subcategory. The Agency was not able to identify other technologies for controlling COD, and therefore concluded that this combination of technologies represent the best available demonstrated technology for the control of COD.

The Agency considered the age, size, processes, other engineering factors, and non-water quality impacts pertinent to mills in this subcategory. The Agency did not identify different COD effluent limitations within this subcategory based on age, size, processes, or other engineering factors. The combination of technologies upon which COD effluent limitations are based do not significantly increase non-water quality environmental impacts.

EPA considered the cost of the proposed NSPS technology for new mills. EPA concluded that such costs are not so great as to present a barrier to entry, as demonstrated by the fact that currently operating mills are using this technology. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS.

(ii) Conventional Pollutants—EPA today is proposing New Source Performance Standards for $BOD_5$ and TSS for the Unbleached Kraft Subcategory. Based upon data available for this subcategory, the technology basis for these standards represents the most stringent demonstrated level of performance for the control of $BOD_5$ and TSS in this subcategory.

EPA concluded that, because one currently operating mill in this subcategory has demonstrated the performance of the conventional pollutant control technology, the costs are not so great as to present a barrier to entry of a new mill. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

(4) Dissolving Sulfite Subcategory, Subpart D. EPA today is proposing New Source Performance Standards (NSPS) for 21 toxic, nonconventional and conventional pollutants for the dissolving sulfite subcategory. These standards are based on the best available demonstrated control technology, process, operating method, or other alternative. In developing these proposed standards, the Administrator considered factors including the cost of achieving effluent reductions, non-water quality environmental impacts, and energy requirements.

(i) Nonconventional Pollutant—EPA today is proposing New Source Performance Standards for 19 toxic and nonconventional pollutants for the dissolving sulfite subcategory. In developing NSPS for the dissolving sulfite subcategory, EPA evaluated the two technologies described in section IX.E.3.c.3. These two technologies are oxygen delignification followed by complete substitution of elemental chlorine with chlorine dioxide ("Option 1") and totally chlorine-free bleaching ("Option 2").

EPA selected Option 1 as the technology basis for NSPS in the dissolving sulfite subcategory because EPA believes that no available technology achieves better control of toxic and nonconventional pollutants. As set forth in Section IX.E.3.c.3, information recently supplied by dissolving sulfite producers raises questions concerning the ability of dissolving sulfite mills to meet all product specifications using Option 2 (TCF technologies). EPA does, however, consider TCF to be an available technology for many products within this subcategory at this time. EPA solicits comments and data on whether this subcategory should be further divided, based on product specifications or otherwise, for purposes of establishing NSPS.

EPA considered the cost of the proposed NSPS technology for new mills. EPA concluded that such costs are not so great as to present a barrier to entry, as demonstrated by the fact that at least one currently operating U.S. mill is using this technology. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS.

The Agency is not proposing NSPS limits for COD for this subcategory. COD data that reflects available technologies to control refractory pollutants that originate in the pulping and recovery areas of mills (e.g., closed screen rooms, BMPs, etc.) are not available at this time for this subcategory. The methodology for deriving COD limitations is described in the preceding sections that present the basis for BAT limitations for the bleached papergrade kraft and soda subcategory, and the dissolving kraft subcategory. See also Section XIII of this preamble for solicitation of comments and data. The Agency may develop COD NSPS limits for this subcategory when data become available.

(ii) Conventional Pollutants—EPA today is proposing New Source Performance Standards for $BOD_5$ and TSS for the dissolving sulfite subcategory equal to the proposed BPT effluent limitations. The basis for the BPT effluent limitations developed by EPA is described in section IX.E.1.

EPA concluded for the dissolving sulfite subcategory that the cost of upgrading conventional pollutant control technology would be economically achievable, and that the new conventional pollutant limitations would be achievable at existing mills in this subcategory. Therefore, the Agency concluded that the incremental cost for installing this technology would be no barrier to entry of a new mill in this subcategory. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

(5) Papergrade Sulfite Subcategory, Subpart E. EPA today is proposing New Source Performance Standards (NSPS) for four nonconventional and conventional pollutants for the papergrade sulfite subcategory. These standards are based on the best available demonstrated control technology, process, operating method, or other alternative. In developing these proposed standards, the Administrator considered factors including the cost of achieving effluent reductions, non-water quality environmental impacts, and energy requirements.

(i) Nonconventional Pollutants—EPA today is proposing New Source Performance Standards for two nonconventional pollutants for the papergrade sulfite subcategory. First, the Agency is proposing control of the nonconventional pollutant AOX equal to BAT as NSPS for this subcategory. The technology basis for the AOX standard is totally chlorine-free process technology, which is the same technology described as "Option 2" in the discussion of proposed BAT limitations for this subcategory (*see* discussion in section IX.E.3.c.4). That option consists of the most stringent demonstrated technology option for this subcategory. New mills would have initial monitoring requirements for specific toxic organic pollutants (i.e., TCDD, TCDF, chloroform, methylene chloride, chlorinated phenolic compounds) which could be terminated if all analytical results in a specified series of sampling events are non-detect.

EPA considered the cost of the proposed NSPS technology for new mills. EPA concluded that such costs are not so great as to present a barrier to entry, as demonstrated by the fact that currently operating mills in Europe are using this technology. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

Mill-specific data received recently by the Agency indicates that certain of the higher grade papergrade products may not be made with acceptable quality by TCF process technology. Papergrade sulfite mills in the U.S. currently are not using this technology for certain of the products being made. However, approximately ten mills in European countries are utilizing TCF process technologies. The Agency is soliciting additional detailed data from individual mills in order to address this concern. See section XIII of this preamble.

EPA today is proposing New Source Performance Standards for the nonconventional pollutant COD for the papergrade sulfite subcategory. The technology basis for this standard is the same technology described in the discussion of proposed BAT limitations for this subcategory (*see* discussion in section IX.E.3.c.4). That option consists of the most stringent demonstrated COD control technology option for this subcategory. The Agency is proposing control of the nonconventional pollutant COD equal to BAT as NSPS for this subcategory. The technology basis for the proposed NSPS limitations consists of effective brownstock washing, closed brownstock pulp screen room operation, application of pulping liquor spill prevention and control (BMPs), and BPT level secondary treatment performance. These technologies have been widely demonstrated across chemical pulp mills in this industry and are readily incorporated in new mills in this subcategory. The Agency was not able to identify other technologies for controlling COD, and therefore concluded that this combination of technologies represent the best available demonstrated technology for the control of COD.

The Agency considered the age, size, processes, other engineering factors, and non-water quality environmental impacts pertinent to mills in this subcategory. The Agency did not identify different COD effluent limitations within this subcategory based on age, size, processes, or other engineering factors. The combination of technologies upon which COD effluent limitations are based do not significantly increase non-water quality environmental impacts.

EPA considered the cost of the proposed NSPS technology for new mills. EPA concluded that such costs are not so great as to present a barrier to entry, as demonstrated by the fact that currently operating mills are using these technologies. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

(ii) Conventional Pollutants—EPA today is proposing New Source Performance Standards for $BOD_5$ and TSS for the papergrade sulfite subcategory. Based upon data available for this subcategory, the technology basis for these standards represents the most stringent demonstrated level of performance for the control of $BOD_5$ and TSS in this subcategory.

EPA concluded that, because one currently operating mill in this subcategory has demonstrated the performance of the conventional pollutant control technology, the costs are not so great as to present a barrier to entry of a new mill. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

(6) Semi-Chemical Subcategory, Subpart F. EPA today is proposing New Source Performance Standards (NSPS) for three nonconventional and conventional pollutants for the semi-chemical subcategory. These standards are based on the best available demonstrated control technology, process, operating method, or other alternative. In developing these proposed standards, the Administrator considered factors including the cost of achieving effluent reductions, non-water quality environmental impacts, and energy requirements.

(i) Nonconventional Pollutant—EPA today is proposing New Source Performance Standards for the nonconventional pollutant COD for the semi-chemical subcategory. The technology basis for these performance standards is the same technology described in the discussion of proposed BAT limitations for this subcategory (see discussion in section IX.E.3.c.6). That option consists of the most stringent demonstrated COD control technology option for this subcategory. The technology basis for the proposed COD effluent limitations consists of effective brownstock washing, application of pulping liquor spill prevention and control (BMPs), and BPT level secondary treatment performance. These technologies have been widely demonstrated across chemical pulp mills in this industry and are readily incorporated in new mills in this subcategory. The Agency was not able to identify other technologies for controlling COD, and therefore concluded that this combination of technologies represent the best available demonstrated technology for the control of COD.

The Agency considered the age, size, processes, other engineering factors, and non-water quality impacts pertinent to mills in this subcategory. The Agency did not identify different COD effluent limitations within this subcategory based on age, size, processes, or other engineering factors. The combination of technologies upon which COD effluent limitations are based do not significantly increase non-water quality environmental impacts.

EPA considered the cost of the proposed NSPS technology for new mills. EPA concluded that such costs are not so great as to present a barrier to entry, as demonstrated by the fact that currently operating mills are using these technologies. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS.

(ii) Conventional Pollutants—EPA today is proposing New Source Performance Standards for $BOD_5$ and TSS for the semi-chemical subcategory. Based upon data available for this subcategory, the technology basis for these standards represents the most stringent demonstrated level of performance for the control of $BOD_5$ and TSS in this subcategory.

EPA concluded that, because one currently operating mill in this subcategory has demonstrated the performance of the conventional pollutant control technology, the costs are not so great as to present a barrier to entry of a new mill. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

(7) Mechanical Pulp Subcategory, Subpart G. EPA today is proposing New Source Performance Standards (NSPS) for conventional pollutants for the mechanical pulp subcategory. These standards are based on the best available demonstrated control technology, process, operating method, or other alternative. In developing these proposed standards, the Administrator considered factors including the cost of achieving effluent reductions, non-water quality environmental impacts, and energy requirements.

(i) Toxic and Nonconventional Pollutants—NSPS for toxic and nonconventional pollutants are not being proposed pending further study. See the solicitation of comments in section XIII.

(ii) Conventional Pollutants—EPA today is proposing New Source Performance Standards for $BOD_5$ and TSS for the mechanical pulp subcategory. Based upon data available for this subcategory, the technology basis for these standards represents the most stringent demonstrated level of performance for the control of $BOD_5$ and TSS in this subcategory.

EPA concluded that, because one currently operating mill in this subcategory has demonstrated the performance of the conventional pollutant control technology, the costs are not so great as to present a barrier to entry of a new mill. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

(8) Non-Wood Chemical Pulp Subcategory, Subpart H. EPA today is proposing New Source Performance Standards (NSPS) for conventional pollutants for the non-wood chemical pulp subcategory. These standards are based on the best available demonstrated control technology, process, operating method, or other alternative. In developing these proposed standards, the Administrator considered factors including the cost of achieving effluent reductions, non-water quality environmental impacts, and energy requirements.

(i) Toxic and Nonconventional Pollutants—As noted in section IX.C.2.c., EPA has received data indicating the presence of certain toxic chlorinated organic compounds due to the use of limited bleaching processes at mills in this subcategory. However, the data are not sufficient to propose NSPS for toxic and nonconventional pollutants at this time. See the solicitation of comments in section XIII.

(ii) Conventional Pollutants—EPA today is proposing New Source Performance Standards for $BOD_5$ and TSS for the non-wood chemical pulp subcategory. Based upon data available for this subcategory, the technology basis for these standards represents the most stringent demonstrated level of performance for the control of $BOD_5$ and TSS in this subcategory.

EPA concluded that, because one currently operating mill in this subcategory has demonstrated the performance of the conventional pollutant control technology, the costs are not so great as to present a barrier to entry of a new mill. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

(9) Secondary Fiber Deink Subcategory, Subpart I. EPA today is proposing New Source Performance Standards (NSPS) for conventional pollutants for the secondary fiber deink subcategory. These standards are based on the best available demonstrated control technology, process, operating method, or other alternative. In developing these proposed standards, the Administrator considered factors including the cost of achieving effluent reductions, non-water quality environmental impacts, and energy requirements.

(i) Toxic and Nonconventional Pollutants—As noted in section IX.C., EPA has received data indicating the presence of certain toxic chlorinated organic compounds due to the use of limited bleaching processes at mills in this subcategory. However, the data are not sufficient to propose NSPS for toxic and nonconventional pollutants at this time. See the solicitation of comments in section XIII.

(ii) Conventional Pollutants—EPA today is proposing New Source Performance Standards for $BOD_5$ and TSS for the secondary fiber deink subcategory. Based upon data available for this subcategory, the technology basis for these standards represents the most stringent demonstrated level of performance for the control of $BOD_5$ and TSS in this subcategory.

EPA concluded that, because one currently operating mill in this subcategory has demonstrated the performance of the conventional pollutant control technology, the costs are not so great as to present a barrier to entry of a new mill. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

(10) Secondary Fiber Non-Deink Subcategory, Subpart J. EPA today is proposing New Source Performance Standards (NSPS) for conventional pollutants for the secondary fiber non-deink subcategory. EPA is also proposing NSPS for toxic and nonconventional pollutants for a portion of this subcategory. These standards are based on the best available demonstrated control technology, process, operating method, or other alternative. In developing these proposed standards, the Administrator considered factors including the cost of achieving effluent reductions, non-water quality environmental impacts, and energy requirements.

For purposes of these proposed NSPS, EPA divided this subcategory into two segments. Segment A is comprised of those mills that produce paperboard, builder's paper or roofing felt. Segment B is comprised of those mills that produce other products. The decision to segment this subcategory was based upon EPA's finding that many mills making paperboard, builder's paper or roofing felt operate with zero discharge of wastewater. EPA lacked reliable data to indicate that mills producing other products operated with zero discharge, or that zero discharge of wastewaters was a demonstrated technology for producers of these other products.

According to the 1990 Census and other information, EPA concluded that 21 mills in this subcategory operate with zero discharge of process wastewater. Of these 21 mills, 15 mills manufacture paperboard from wastepaper, and six mills manufacture builders' paper and roofing felt. Zero discharge is defined as a system where the sum of fresh water and water entering the system in raw materials is equal to the sum of water exiting the system via evaporation/vaporization, water in the final product, and water included in any rejects streams from screening, including sludges.

Paperboard, Builders' Paper and Roofing Felt Segment. This segment includes production of paperboard and builders' paper and roofing felt from wastepaper that has not undergone deinking processes. The Agency developed and analyzed two regulatory options for NSPS for this segment of the Secondary Fiber Non-deink Subcategory as follows:

Option 1: Secondary Treatment Performance at the Level of the Best Mill in the Segment
Option 2: Zero Discharge of Wastewater Achieved by 100 Percent Recycle of Wastewater

The Agency is proposing Option 2, zero discharge of wastewater achieved by 100 percent recycle of wastewater, for the Paperboard, Builders' Paper and Roofing Felt Segment. The Agency selected this option because (1) the technology is demonstrated by a significant number of mills as discussed above, (2) the environmental benefit is the greatest as a result of zero discharge of TSS and $BOD_5$, and (3) the barrier to entry costs are minimal because increased costs to achieve 100 percent recycle of wastewater are significantly offset by reduced costs for raw water, energy, and elimination of wastewater treatment costs, when the recycle equipment required is included in the design and construction of a new mill. Because 21 mills in this segment operate with zero discharge of process wastewater, the Agency concludes that these costs do not present a barrier to entry for a new mill. The Agency rejected Option 1 because any discharge of conventional pollutants is not as stringent as a standard based on 100 percent recycle and no discharge of process wastewater. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

Producers of Other Products from Non-Deink Secondary Fiber Segment. This segment includes production of secondary fiber products that have not undergone deinking processes, except for production of paperboard, builders' paper and roofing felt from wastepaper that has not undergone deinking processes. Data from EPA's 1990 Census indicate that some mills in this segment may achieve zero discharge through 100 percent recycle of wastewaters. However, EPA was unable to confirm this information or determine which products are made by some mills in this segment that may be achieving zero discharge. EPA solicits comments and data on the extent to which secondary fiber nondeink mills other than those making paperboard, builders' paper or roofing felt are achieving zero discharge through 100 percent recycle of wastewater, and whether this technology should serve as the technology basis for NSPS for the entire secondary fiber nondeink subcategory.

(i) Toxic and Nonconventional Pollutants—EPA has received data indicating the presence of certain toxic chlorinated organic compounds due to the use of limited bleaching processes at mills in this segment of this subcategory. However, the data are not sufficient to propose NSPS for toxic and nonconventional pollutants at this time. See the solicitation of comments in section XIII.

(ii) Conventional Pollutants—EPA today is proposing New Source Performance Standards for $BOD_5$ and TSS for this segment of the secondary fiber non-deink subcategory. Based upon data available for this segment, the technology basis for these standards represents the most stringent demonstrated level of performance for the control of $BOD_5$ and TSS in this subcategory.

EPA concluded that, because one currently operating mill in this subcategory has demonstrated the performance of the conventional pollutant control technology, the costs are not so great as to present a barrier to entry of a new mill. The Agency considered energy requirements and other non- water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

EPA considered not segmenting this subcategory, and proposing NSPS for the entire Secondary Fiber Non-Deink Subcategory as zero discharge of wastewater. This alternative was rejected because the Agency does not believe that this technology basis for NSPS is adequately demonstrated for producers of final products other than paperboard, builder's paper or roofing felt. EPA also considered not segmenting this subcategory, and proposing NSPS for the entire Secondary Fiber Non-Deink Subcategory as the most stringent demonstrated level of performance for the control of $BOD_5$ and TSS at mills not achieving zero discharge of wastewater in this subcategory. This alternative was rejected because the Agency believes that zero discharge is a demonstrated technology in a discrete segment of this subcategory and that segmenting the subcategory was feasible, from a technical and administrative standpoint, and would provide superior pollution control.

(11) Fine and Lightweight Papers from Purchased Pulp Subcategory, Subpart K. EPA today is proposing New Source Performance Standards (NSPS) for conventional pollutants for the fine and lightweight papers from purchased pulp subcategory. These standards are based on the best available demonstrated control technology, process, operating method, or other alternative. In developing these proposed standards, the Administrator considered factors including the cost of achieving effluent reductions, non-water quality environmental impacts, and energy requirements.

(i) Toxic and Nonconventional Pollutants—EPA is not proposing NSPS for this subcategory for toxic and nonconventional pollutants, pending further study.

(ii) Conventional Pollutants—EPA today is proposing New Source Performance Standards for $BOD_5$ and TSS for the fine and lightweight papers from purchased pulp subcategory. Based upon data available for this subcategory, the technology basis for these standards represents the most stringent demonstrated level of performance for the control of $BOD_5$ and TSS in this subcategory.

EPA concluded that, because one currently operating mill in this subcategory has demonstrated the performance of the conventional pollutant control technology, the costs are not so great as to present a barrier to entry of a new mill. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

(12) Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp Subcategory, Subpart L. EPA today is proposing New Source Performance Standards (NSPS) for conventional pollutants for the tissue, filter, non-woven, and paperboard from purchased

pulp subcategory. These standards are based on the best available demonstrated control technology, process, operating method, or other alternative. In developing these proposed standards, the Administrator considered factors including the cost of achieving effluent reductions, non-water quality environmental impacts, and energy requirements.

(i) Toxic and Nonconventional Pollutants—EPA is not proposing today NSPS for toxic and nonconventional pollutants pending further study.

(ii) Conventional Pollutants—EPA today is proposing New Source Performance Standards for $BOD_5$ and TSS for the tissue, filter, non-woven, and paperboard from purchased pulp subcategory. Based upon data available for this subcategory, the technology basis for these standards represents the most stringent demonstrated level of performance for the control of $BOD_5$ and TSS in this subcategory.

EPA concluded that, because one currently operating mill in this subcategory has demonstrated the performance of the conventional pollutant control technology, the costs are not so great as to present a barrier to entry of a new mill. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected NSPS for conventional pollutants.

5. Pretreatment Standards for Existing Sources

The Agency today is proposing to establish pretreatment standards for existing sources (PSES) in the pulp, paper and paperboard industry. These standards would apply to all existing mills in the bleached papergrade kraft and soda, unbleached kraft, papergrade sulfite, and semi-chemical subcategories that indirectly discharge wastewater to publicly owned treatment works (POTWs). There are a total of 13 indirect discharging mills and associated POTWs in these four subcategories, as follows: nine mills in the bleached papergrade kraft and soda subcategory; one mill in the papergrade sulfite subcategory; two mills in the unbleached kraft subcategory; and one mill in the semi-chemical subcategory. The Agency is individually identifying the 13 associated POTWs to facilitate comment on these proposed PSES. The 13 POTWs are Gulf Coast Waste Disposal Authority, Pasadena, Texas; Muskegon County Wastewater Management System, Muskegon, Michigan; Upper Potomac River Commission, Westernport, Maryland; City of St. Helens, St. Helens, Oregon; Jackson County Port Authority, Pascagoula, Mississippi; Western Lake Superior Sanitary District, Duluth, Minnesota; Bay County Waste Treatment Plant No. 1, Panama City, Florida; Erie City Wastewater Treatment Facility, Erie, Pennsylvania; City of Port St. Joe Wastewater Treatment Plant, Port St. Joe, Florida; Peshtigo Joint Wastewater Treatment Facility, Peshtigo, Wisconsin; Hopewell Regional Wastewater Treatment Facility, Hopewell, Virginia; Macon-Bibb County Water and Sewerage Authority, Macon, Georgia; and Water Pollution Control Plant, Plattsburgh, New York.

Pretreatment standards are established to prevent pass-through of pollutants from POTWs to waters of the U.S., or to prevent pollutants from interfering with the operation of POTWs. CWA § 307(b). EPA is establishing PSES for this industry to prevent pass-through of the same pollutants controlled by BAT from POTWs to waters of the U.S.

a. *Pass-Through Analysis.* To determine whether pollutants indirectly discharged by mills in this industry pass-through POTWs, EPA reviewed sampling data for direct dischargers, performance data for POTWs, and technical literature. Based on preliminary review of circumstances at some of the POTWs receiving pulp and paper mill effluent, and EPA's best engineering judgment, EPA concludes that biological treatment systems at these POTWs, while designed to accommodate pulp and paper wastewaters, are not designed to the same standards as those installed and operated at direct discharging mills. Activated sludge systems and aerated stabilization basin systems, as designed and operated at direct discharging mills, typically include substantially longer detention times and other features that in combination achieve greater removals of $BOD_5$ and TSS than are achieved at POTWs receiving effluent from these mills. This is evidenced by the fact that the BPT and BCT effluent limitations EPA is proposing for certain subcategories are substantially more stringent than the secondary treatment effluent limitations applied to most POTWs (30 mg/l each of $BOD_5$ and TSS). Therefore, the Agency concludes that $BOD_5$ and TSS pass-through these POTWs. Although the Agency is not proposing pretreatment standards for $BOD_5$ and TSS today, EPA solicits comments and data on whether discharges of these conventional pollutants should be addressed with PSES and PSNS regulations.

In addition, the Agency concluded that other pollutants, including AOX, COD, and (for the bleached papergrade kraft and soda subcategory only) color, also pass-through POTWs. In part, this is because these toxic and nonconventional pollutants typically are less biodegradable than the conventional pollutant parameters ($BOD_5$ and TSS). For example, biological treatment systems at direct discharging pulp and paper mills (for which EPA has data) remove approximately 40 percent of the influent AOX, which is representative of chlorinated organic compounds. The literature indicates that the biodegradability of certain chlorinated organic compounds varies in comparison to AOX, but generally these compounds are less biodegradable than nonchlorinated biodegradable organic matter measured as $BOD_5$. The Agency does not have detailed analytical data from POTWs for these and other pollutants of concern in this industry to serve as the basis for a detailed, quantitative pass-through analysis. However, in view of the lower removal of conventional pollutants achieved at POTWs in comparison to the removals being proposed for direct dischargers in this industry, the Agency concludes that AOX, COD, and color (for the bleached papergrade kraft and soda subcategory) also pass-through these POTWs.

Because EPA believes that dioxin and furan, and certain other pollutants, cannot practicably or feasibly be controlled with limits at the point of discharge to the POTW, EPA is today proposing PSES and PSNS limits for those pollutants at the end of the bleach plant. The Agency's sampling data show that dioxins and furans can only be effectively removed by process changes. Dioxins and furans are known to become associated with suspended solids in process wastewaters. Internal stream pretreatment technologies (e.g., ultrafiltration) and end-of-pipe treatment technologies (e.g., chemical precipitation and clarification, and filtration) are not capable of removing sufficient quantities of total suspended solids (TSS) to achieve the same bleach plant or end-of-pipe dioxin and furan concentrations (i.e., below detection limits) as achieved through process changes. Therefore, without process changes and bleach plant limits, dioxins and furans would pass-through POTWs. Moreover, removal of dioxin and furan from wastewaters using only end-of-pipe treatment would substantially increase, rather than decrease, the dioxin and furan concentrations in wastewater treatment system sludges, thereby further limiting POTWs sludge disposal alternatives. Similarly, volatile organic compounds, such as chloroform (which is a hazardous air pollutant), will be liberated from process wastewaters to the atmosphere in collection, conveyance, and aeration systems, and thus are best removed in bleach plants through process changes. These circumstances lead to pass-through and unacceptable non-water quality environmental impacts on sludges and air emissions. Moreover, certain of the volatile organics are hazardous air pollutants subject to control under the Clean Air Act in this integrated rulemaking. Because it is neither practical nor feasible to set limits for some pollutants at the point of discharge to the POTW sewer, EPA is proposing to set PSES limits for those pollutants inside the mill, at the bleach plant, in a similar fashion as proposed today in revising BAT limits for the direct discharging mills.

b. *Options Considered.* The first option, which EPA is proposing today as PSES, would set effluent limitations on the same pollutants controlled with BAT limits for direct dischargers, at the point of discharge from the indirect discharging mill to the industrial POTW as well as at certain internal bleach plant wastewater streams. These limitations were developed based on the same technologies as proposed today for BPT and for BAT, as applicable to each of the affected subcategories. PSES set at these points would prevent pass-through of pollutants, help control sludge contamination and reduce air emissions.

EPA estimated the cost of complete secondary treatment facilities at the indirect discharging mills, and where necessary, the cost of primary treatment. These costs were found to be economically achievable. EPA did not consider the availability of land for installation of the secondary biological treatment systems on a site-by-site basis in developing these proposed PSES regulations. EPA solicits comments and data concerning the availability of sufficient land for such treatment systems at mills subject to these PSES limits.

The Agency estimated the compliance costs and economic impacts of process changes, COD control, and BMP for each of the mills subject to bleach plant and final effluent pretreatment standards. The summary of results presented here is summed across indirect dischargers in all subcategories. The estimated total annualized cost for the selected options is approximately $33 million. The Agency estimated that these costs would result in one plant closure. Additional details are not reported in this section because the level of data aggregation is inadequate to protect confidential business information. Additional information is provided in the economic impact analysis.

The Agency considered the age, size, processes, other engineering factors, and non-water quality environmental impacts pertinent to mills in developing PSES. The Agency did not identify any basis for establishing different PSES limitations based on age, size, processes, or other engineering factors. EPA has no data to suggest that the combination of technologies upon which PSES limitations are based significantly increase non-water quality environmental impacts.

EPA considered a second option in establishing PSES limits for today's rule. This option may provide a more cost-effective way of obtaining the effluent reductions obtained under Option 1.

Under this second option, EPA would establish PSES limits identical to those established under the first option. However, EPA would also provide that, in the event the POTW receiving a mill's discharge voluntarily accepted certain limits in a legally enforceable NPDES permit, that mill would no longer be subject to those PSES limits that apply at the mill's discharge to the POTW's sewer. (The bleach plant limits would still apply). The additional limits in the POTW's permit would cover all pollutants for which the mill would otherwise have had PSES limits at the point of discharge to the sewer, and would in each case need to be at least as stringent as the BAT limits for the pollutants in question applicable to direct dischargers in the subcategory.

EPA's interest in this second alternative is based in part on the fact that, in the four subcategories for which EPA is proposing PSES limits, all of the affected POTWs receive a majority of either flow, $BOD_5$ loadings or TSS loadings from pulp and paper mills. The Agency refers to such POTWs as "industrial POTWs." The Agency believes that, in some cases, upgrading of these "industrial" POTWs' secondary biological treatment system would be more cost-effective than installing a complete biological treatment system on the mill site. EPA also notes that, even beyond these four subcategories, a very large percentage of indirect-discharging mills in this industry dominate the POTWs into which they discharge (i.e., those mills contribute more than half of the flow or $BOD_5$ and TSS loadings of the treatment works). In calculating the POTW's limits, the percentage of the POTW's flow from domestic sources and from industrial sources other than pulp, paper and paperboard mills would also be considered.

EPA notes that its secondary treatment regulations provide, at 40 CFR 133.103, for adjustment of POTW $BOD_5$ and TSS effluent limitations in cases where industrial effluent guidelines include less stringent $BOD_5$ and TSS effluent limitations than required by secondary treatment. EPA solicits comment on whether the regulations should be amended to explicitly allow for more stringent $BOD_5$ and TSS effluent limitations for industrial POTWs in industries with effluent limitations guidelines that include $BOD_5$ and TSS limits more stringent than secondary treatment.

The Agency has developed costs for upgrading the biological treatment systems at each of the affected POTWs. These costs are set forth in section IX.G.

The Agency also considered a third option under which EPA would not promulgate PSES limits for these mills. Under this option, pretreatment authorities would use best engineering judgment to develop local limits for the mills, and end-of-pipe limits for these industrial POTWs. The Agency is concerned that this would impose difficult or unrealistic administrative burdens on POTWs. This option also may not achieve the same levels of discharge by the industrial POTWs as for direct dischargers.

EPA solicits comments and data on all three options described above. In particular, EPA solicits comments and data on any legal or practical issues presented by the second option described above, as well as any cost savings that the second option might provide.

c. *Solicitation of Comments and Data on Additional Subcategories.* Beyond the foregoing three options, EPA solicits comments on whether the Agency should develop PSES limits for conventional pollutants in subcategories other than the four in which the Agency is today proposing PSES limits. The conventional pollutant limitations for direct dischargers proposed today in all subcategories of the pulp and paper industry are more stringent than EPA's secondary treatment requirements for POTWs. Therefore, the conventional pollutants discharged from pulp and paper mills would pass through POTWs. The Agency has identified 19 additional industrial POTWs in the pulp and paper industry, in the following subcategories: mechanical pulp; deink secondary fibers; non-deink secondary fibers; fine and lightweight papers from purchased pulp; tissue, filter, non- woven, and paperboard from purchased pulp. EPA further solicits comments on whether any PSES limits should cease to apply at mills discharging to those POTWs if the POTW voluntarily accepted sufficiently stringent limits on the discharge of conventional pollutants in its NPDES permit. The Agency believes that upgrading of an industrial POTW's secondary biological treatment system might be more cost-effective than installing a complete biological treatment system at some mills.

See section XIII of this preamble for solicitation of comments and data for the proposed PSES.

6. Pretreatment Standards for New Sources

Section 307(c) of the Act requires EPA to promulgate pretreatment standards for new sources (PSNS) at the same time it promulgates new source performance standards (NSPS). New indirect discharging mills, like new direct discharging mills, have the opportunity to incorporate the best available demonstrated technologies, including process changes, in-plant controls, and end-of-pipe treatment technologies.

As set forth in section IX.E.5(a) of this preamble, EPA determined that a broad range of pollutants discharged by pulp and paper mills (including dioxins, furans, AOX, BOD and TSS) pass-through POTWs. The same technologies discussed previously for BAT, NSPS, and PSES are available as the basis for PSNS.

EPA is proposing that pretreatment standards for new sources be set equal to NSPS for toxic and nonconventional pollutants for the following subcategories: papergrade kraft and soda, dissolving kraft, papergrade sulfite, dissolving sulfite, unbleached kraft, and semi-chemical. The Agency is proposing to establish PSNS for the same pollutants and the same points of application as are being proposed for NSPS.

EPA considered the cost of the proposed PSNS technology for new mills. EPA concluded that such costs are not so great as to present a barrier to entry, as demonstrated by the fact that currently operating mills are using these technologies. The Agency considered energy requirements and other non-water quality environmental impacts and found no basis for any different standards than the selected PSNS.

7. Best Management Practices

The Agency is proposing to require mills to follow best management practices (BMPs) to prevent, contain and control spills of pulping liquors. These BMPs would apply to mills in the following effluent guideline subcategories: Dissolving Kraft; Bleached Papergrade Kraft and Soda; Unbleached Kraft; Dissolving Sulfite; Papergrade Sulfite; Semi-Chemical, and Non-Wood Chemical Pulp.

The practices proposed today as BMPs are known to reduce the amount of pulping liquor (e.g., "black liquor," "red liquor") discharged to wastewater treatment systems, and to reduce the cost of process operation through increased chemical recovery. BMPs would include:

- Employee training;
- Engineering analyses of problem areas and appropriate prevention and control strategies;
- Preventative maintenance;
- Engineered controls and containment;
- Work practices;
- Surveillance and repair programs;
- Dedicated monitoring and alarm systems; and
- Record keeping to document implementation of these practices.

BMPs would also include other practices chosen from a "menu" of practices that are applicable to individual mills or groups of mills, such as:

- Secondary containment diking around pulping liquor and storage tanks;
- Covered storage tank capacity for collected spills and planned liquor diversions;
- Automated spill detection systems, such as high level, flow and conductivity monitors and alarms; and
- Backup equipment capacity to handle process upset conditions.

Losses of pulping liquors contribute significant loads of BOD, COD, non-chlorinated organic compounds, and color. Pulping liquors have been identified as a likely source of non-chlorinated organic compounds in effluents that exhibit aquatic toxicity. These liquors may contain specific toxic pollutants among those listed under sections 307(a) and 311(e) of the CWA. Naturally occurring phenolic compounds are known from literature sources to be present in these liquors, including phenol (a 307(a)(1) toxic pollutant). EPA solicits data on the specific compounds present in pulping liquors.

Measures similar to the BMPs proposed today have sometimes been included as special conditions in NPDES permits for pulp and paper mills. The BMPs proposed today are similar to spill prevention, containment and control (SPCC) plans for oil and hazardous materials under Section 311 of the Clean Water Act. In view of the rapidly changing processes and the nature of the toxic and nonconventional pollutants discharged by this industry, EPA is proposing that BMPs be included as special conditions in NPDES permits. The Agency is proposing that mills be required to submit a BMP plan within 120 days of promulgation of this rule to EPA (or the state permit authority) for approval. The Agency also is proposing that each mill be required to implement the BMP plan within 24 months of promulgation of these rules, and to review and update the plan every three years thereafter.

*F. Determination of Long-Term Averages, Variability Factors, and Limitations*

The effluent limitations in today's notice are based on statistical procedures that estimate long-term averages, variability factors, and effluent limitations and standards. Effluent limitations and standards are provided as daily maximums and monthly averages for continuous direct dischargers and as annual averages or daily maximums for the non-continuous direct dischargers. The following sections describe the statistical methodology used to develop long-term averages, variability factors, and limitations for BPT, BCT, BAT, PSES, and standards for new sources.

1. Long-Term Averages, Variability Factors, and Limitations for BPT

The long-term averages, variability factors, and limitations were based upon biochemical oxygen demand ($BOD_5$) and total suspended solids (TSS) concentrations, flow rates, and total annual production reported in the 1990 Census.

The EPA used the total annual production for 1989 as a normalizing parameter for the monthly average mass loadings provided by each mill in the 1990 Census. The long-term averages for the $BOD_5$ and TSS production normalized mass loadings were calculated for each mill by arithmetically averaging its monthly average loadings. For all subcategories except the dissolving sulfite subcategory, the long-term averages that were used in developing the limitations were the averages of the long-term averages from the best 50 percent of the mills in each subcategory. The methodology used to develop the $BOD_5$ and TSS long-term averages for the dissolving sulfite subcategory is described in the technical water development document.

The daily variability factor is the ratio of the estimated 99th percentile of the distribution of daily values divided by the expected value, or mean, of the distribution of the daily data. The monthly variability factor is the estimated 95th percentile of the distribution of monthly averages of the data divided by the expected value of the monthly averages. The number of measurements used to calculate the monthly averages corresponds to the number of days that the pollutant is expected to be monitored during the month. $BOD_5$ and TSS are expected to be monitored daily; therefore, the monthly variability factor was based upon the distribution of 30-day averages.

The daily and monthly variability factors were calculated using daily measurements of $BOD_5$ and TSS concentrations, daily flow measurements, and total annual production from selected mills in each subcategory with the BPT technology basis. In general, the data were from the best 50 percent of the direct discharge mills in each subcategory as determined by $BOD_5$ loadings, where those mills had a minimum of 85 percent of their production in one subcategory. Additional selection criteria were that daily data were available, and that all of the current subcategories within the proposed subcategories were represented whenever possible.

The daily $BOD_5$ and TSS concentrations, the daily flow, and total annual production were used to calculate the daily production normalized mass loadings for $BOD_5$ and TSS. The statistical analysis of the daily mass loadings indicated that positive autocorrelations exist between values measured on consecutive days for both $BOD_5$ and TSS. When data are said to be autocorrelated, it means that measurements taken at different time periods are similar. For example, measurements taken on a daily basis of treated final effluent are often correlated from one day to the next. When the data are positively autocorrelated, the average has greater variance than an average of independent measurements. The average of positively autocorrelated measurements is not affected by the autocorrelation; therefore, long-term averages do not require adjustment for any autocorrelation in the data. The autocorrelation was incorporated into the development of the variability factors by using a time series analysis, as described in the statistical support document.

The variability factor for each subcategory was the average of the variability factors for the selected mills in the subcategory. The statistical support document lists these variability factors and provides a detailed description of the methodology used to develop the limitations and variability factors.

The $BOD_5$ and TSS limitations for each subcategory, as presented in today's notice, were developed using the long-term average and the variability factor for the subcategory. The daily maximum limitation for continuous dischargers for each subcategory is the product of the long-term average and the daily variability factor for that subcategory. The monthly average limitation for continuous dischargers for each subcategory is the product of the long-term average and the monthly variability factor for the subcategory. The annual average limitation for non-continuous dischargers has been set equal to the long-term average.

2. Long-Term Averages, Variability Factors, and Limitations for BAT

The long-term averages, variability factors, and limitations were developed using pollutant concentration data, flow rates, and brownstock pulp production rates.

When concentrations for a pollutant were all reported as being below the sample-specific detection limit in data representing a technology option, EPA set the daily maximum limitation for continuous and non-continuous dischargers to be equal to the minimum level in concentration units for the analytical method that is specified in the proposed regulation ("ND limitation"). For one case where the dataset had only one detected value (all other measurements were below detection), the EPA set the daily maximum limitation to be an ND limitation. This one detected value was reported with a concentration value less than the minimum level for the analytical method for the pollutant. When the daily maximum limitation is an ND limitation (i.e., equal to the lowest measurable value for the pollutant), the monthly average limitation for continuous dischargers and the annual average limitation for non-continuous dischargers are not necessary.

The estimation of the AOX daily maximum limitation for totally chlorine-free processes is described in Section IX.E.3. In all other cases, the limitations were developed as described below and are provided in production normalized mass units in the proposed regulation. The production normalized pollutant mass loadings were calculated using the concentration values, the flow rate at each sampling point, and the brownstock pulp production.

The EPA proposes to regulate some pollutants in the effluent from the bleach plant and some pollutants in the final effluent (as described in section IX.E.3). For the mills representing the recommended options, the acid and alkaline streams were discharged separately from the bleach plant. Limitations were estimated for the acid and alkaline streams separately and then summed to provide one limitation for each pollutant for the bleach plant effluent.

The long-term averages and the variability factors for the pollutants were determined by fitting a modified delta-lognormal distribution to the data from the mills representing the options. The modified delta-lognormal distribution and the reasons for its selection are explained in more detail in the statistical support document.

The long-term average of a pollutant for the data from each mill representing an option was estimated by the mean of the modified delta-lognormal distribution when the data met the criteria of a minimum of four observations with a minimum of two measured ("non-censored") values. When a dataset had less than four observations, the long-term average was the arithmetic average of the pollutant mass loadings. The statistical support document describes the derivation of long-term averages for the remaining cases where the dataset had more than four observations and less than two non-censored values.

The long-term average for a pollutant in an option was based upon a weighted average of the long-term averages from the mills that represented the option. The weighted average was calculated using weights equal to the square root of the sample size of the data from each mill.

As described in section IX.F.1, the daily variability factor is the ratio of the estimated 99th percentile of the distribution of daily values divided by the expected value, or mean, of the distribution. The monthly variability factor is the estimated 95th percentile of the distribution of the monthly averages of the data divided by the expected value of the monthly averages. The number of measurements used to calculate the monthly averages corresponds to the number of days that the pollutant is expected to be monitored during the month. For example, the toxic volatile compounds are expected to be monitored once a week (which is approximately four times a month); therefore, the monthly variability factor was based upon the distribution of four-day averages. Color, COD, and AOX are expected to be monitored daily; therefore, the monthly variability factor was based upon the distribution of 30-day averages. The chlorinated phenolic compounds, TCDD, and TCDF are expected to be monitored monthly; therefore, only the daily maximum limitation applies for continuous dischargers.

The percentiles used to develop the variability factors for the data from each mill representing an option were based upon the modified delta-lognormal distribution when the data met the criteria of a minimum of four observations with a minimum of two non-censored values. In most cases, this criteria was met by only one mill in each option, and the data from the one mill determined the variability factor for the option. The variability factors are provided in the statistical support document.

The daily maximum limitation for continuous dischargers of a pollutant in each option was estimated by the product of the long-term average and the daily variability factor. The monthly average limitation for continuous dischargers of a pollutant in each option was estimated by the product of the long-term average and the monthly variability factor for those pollutants that are expected to be monitored more than once a month. The daily maximum limitation for non-continuous dischargers applies only when the limitation has been set equal to the minimum level in concentration units for the analytical method. In all other cases, the annual average limitation for non-continuous dischargers applies. The annual average limitation has been set equal to the long-term average.

The EPA believes that there are likely to be positive autocorrelations between values measured on consecutive days for AOX, COD and color. As explained in section IX.F.1, when data are positively autocorrelated, the average has greater variance than an average of independent measurements. Because these measurements are expected to be monitored on a daily basis, the EPA believes that the variability factors should account for the autocorrelation in the data. The EPA has incorporated the autocorrelation into the variability factors for COD. However, the EPA did not have enough AOX and color data to estimate the autocorrelation in daily measurements of AOX and color for the proposal. Section XIII, Solicitation of Comments, requests daily measurements for AOX, COD, and color. These data will be used to evaluate the autocorrelation.

3. Long-Term Averages, Variability Factors, and Standards for New Sources

For all subcategories except the dissolving sulfite subcategory, performance standards for new sources for $BOD_5$ and TSS are based on the data from the best mill in each subcategory. In general, the best mill was selected by considering the $BOD_5$ treatment performance. The methodology used to develop the $BOD_5$ and TSS long-term averages for the dissolving sulfite subcategory is described in the technical water development document. For all other subcategories, the long-term averages were estimated using the average of the monthly average loadings reported in the 1990 Census by the best mill in the subcategory. The variability factors were developed using the daily concentration and flow data from the best mill when these data were provided to the EPA. The estimation of these variability factors used the same methodology as described in section IX.F.1 for BPT limitations. When the best mill had not provided daily data, the EPA used the variability factors developed for the BPT limitations to estimate the performance standards for new sources. The daily maximum and monthly average standard for continuous direct dischargers in each subcategory was the product of the long-term average and the appropriate daily or monthly variability factor. The annual average limitation for non-continuous dischargers was set equal to the long-term average.

Performance standards for new sources for toxic and nonconventional pollutants for the bleached papergrade kraft and soda subcategory were estimated using the same methodology described in section IX.F.2 for BAT limitations.

*G. Costs*

The Agency estimated the cost for the pulp, paper, and paperboard industry to achieve each of the effluent regulations proposed today. These estimated costs are summarized in this section and discussed in more detail in the technical water development document. All cost estimates in this section are expressed in 1991 dollars. The cost components reported in this section are engineering estimates of the investment cost of purchasing and installing equipment and the annual operating and maintenance costs associated with that equipment. In sections IX.E and XI.B, a different cost component, total annualized cost, is reported. The total annualized cost, which is used to estimate economic impacts, better describes the actual compliance cost that a company will incur, allowing for interest, depreciation, and taxes. A summary of the economic impact analysis for the proposed regulation is contained in Section XI.B of today's notice. See also the economic impact analysis.

1. BPT Costs

The Agency estimated the costs of implementing BPT with a mill-specific engineering cost assessment. If a mill's 1989 discharges of both $BOD_5$ and TSS, as reported in the questionnaire, were less than the long-term average loads achievable by the technology basis for today's proposed BPT, the mill was estimated to have no compliance costs. If a mill's $BOD_5$ or TSS load exceeded the BPT long-term average load, load reductions that would result from the implementation of BAT, MACT standards, and BMP were subtracted from the current discharge load. If the resulting $BOD_5$ or TSS load still exceeded the BPT long-term average load, costs for in-plant flow reduction and/or treatment system upgrades were estimated. The capital expenditures for BPT are estimated to be $337 million, with annual operating and maintenance (O&M) costs of $29 million. The estimated cost for implementing BPT is summarized, by subcategory, in Table IX.G.1-1.

2. BAT and BMP Costs

The Agency estimated the costs of implementing BAT, which has two cost components—process changes and COD control—and the additional cost for best management practices (BMP). The engineering cost assessment for BAT process changes began with a mill-specific review of pulping and bleaching technologies. If, as of January 1, 1993, the Agency determined that a mill was using the technology basis for today's proposed BAT, the Agency assumed the mill would incur no costs to achieve BAT. If a mill did not have BAT operations in place, costs to modify the mill's operations to achieve BAT were estimated. The Agency believes that this approach overestimates the costs to achieve BAT because many mills can achieve BAT level discharges without using all of the components of the technology basis described in section IX.E. The Agency solicits comment on these costing assumptions. The capital expenditures for the process change component of BAT are estimated to be $2.16 billion with annual O&M costs of $18 million.

TABLE IX.G.1-1.—COST OF IMPLEMENTING BPT[1] REGULATIONS

[In millions of 1991 dollars]

| Subcategory[2] | Number of mills[3] | Capital costs | Annual O&M costs |
|---|---|---|---|
| Dissolving Kraft | 3 | 3.2 | 0.08 |
| Bleached Papergrade Kraft and Soda | 78 | 120 | 10 |
| Unbleached Kraft | 53 | 35 | 3.7 |
| Dissolving Sulfite | 5 | 22 | 2.7 |
| Papergrade Sulfite | 11 | 19 | 0.7 |
| Semi-Chemical | 20 | 5.9 | 0.6 |
| Mechanical Pulp | 41 | 20 | 1.8 |
| Nonwood Chemical Pulp | 7 | 3.5 | 0.04 |
| Secondary Fiber Deink | 24 | 26 | 1.4 |
| Secondary Fiber Non-deink | 158 | 27 | 2.5 |
| Fine and Lightweight Papers from Purchased Pulp | 85 | 24 | 2.1 |
| Tissue, Filter, Non-woven, and Paperboard from Purchased Pulp | 112 | 32 | 2.8 |
| Industry Total | 325 | 337 | 29 |

[1] Flow reduction and end-of-pipe treatment system costs.
[2] Costs for mills with operations in more than one subcategory have been apportioned based on annual production (OMT).
[3] Number of mills with any production to which BPT would apply.

The costs of most of the technologies that form the basis for COD control were estimated as part of BAT, BPT, or BMPs. The Agency estimated the costs of COD control for the technologies that were not already included in previous cost estimates: screen room closure for mills in the dissolving kraft, bleached papergrade kraft and soda, unbleached kraft, and papergrade sulfite subcategories, and good brownstock washing for mills in the semi-chemical subcategory. The Agency determined the status of screen rooms at mills from the questionnaire. If a mill already had a closed screen room, the Agency assumed the mill would incur no costs for COD control above the costs for BAT, BPT, and BMP. If a mill had an open screen room, the capital costs to close the screen room were estimated. The Agency assumed that the net annual O&M costs for screen room closure were zero, because the new equipment would replace existing equipment and would require equal or lower O&M expenses. For semi-chemical mills, the Agency determined which mills had inadequate brownstock washing from information in the questionnaire, and the capital and O&M costs of a brownstock washing upgrade were estimated for those mills. The capital expenditures for the COD controls are estimated to be $237 million with annual O&M costs of $1.2 million.

The Agency estimated the cost of implementing BMP based on a mill-specific assessment of the current status of management practices. For the kraft segment of the industry, the Agency estimated that one-third of the mills have systems equivalent to the proposed BMPs in place; one-third require moderate upgrades; and one-third require major upgrades. Based upon examples of recent installations of pulping liquor spill prevention and control systems, the Agency estimated that kraft mills that require major upgrades would incur an average capital expenditure of $1.5 million, with annual O&M savings of $500,000, while kraft mills that require moderate upgrades would incur an average capital expenditure of $750,000, with annual O&M savings of $250,000. Mills with complete implementation of BMPs were assumed to have no additional capital costs; annual O&M savings were also assumed to be zero. The cost savings are expected due to savings in chemicals, energy, and wastewater treatment. A similar approach was used to estimate the cost of implementing BMP at other subcategories, except that annual O&M was not estimated to result in a net cost savings. The capital expenditures for BMP are estimated to be $76 million, with annual O&M savings of $19 million.

Table IX.G.2-1 summarizes, by subcategory, the capital expenditures and annual O&M costs for implementing BAT process changes, COD controls, and BMP.

TABLE IX.G.2-1.—COST OF IMPLEMENTING BAT[1] AND BMPs FOR DIRECT DISCHARGERS

[In millions of 1991 dollars]

| Subcategory[2] | Number of mills[3] | Capital costs | Annual O&M costs (savings) |
|---|---|---|---|
| Dissolving Kraft | 3 | 139 | (10) |
| Bleached Papergrade Kraft and Soda | 78 | 1,948 | 12 |
| Unbleached Kraft | 56 | 125 | (8.0) |
| Dissolving Sulfite | 5 | 110 | (13) |
| Papergrade Sulfite | 10 | 104 | 17 |
| Semi-Chemical | 20 | 42 | 2.1 |
| Nonwood Chemical Pulp | 7 | 1.8 | 0 |
| Industry Total | 178 | 2,473 | (0.2) |

[1] Process change and COD control costs.
[2] Costs for mills with operations in more than one subcategory have been apportioned based on annual production.
[3] Number of mills with any production to which BAT or BMPs would apply.

3. PSES Costs

The Agency considered three factors in estimating costs for PSES: process changes, COD control, and BMP. The Agency estimated the cost for implementing PSES with the same assumptions and methodology used to estimate BAT process changes, COD control, and BMP costs for direct dischargers. The capital expenditures for the process change component of PSES are estimated to be $235 million with annual O&M costs of $2.2 million. The capital expenditures for the COD controls are estimated to be $29.4 million with annual O&M costs of $50,000. The capital expenditures for BMP for indirect dischargers are estimated to be $11 million, with annual O&M savings of $2.7 million.

These costs were estimated for the 18 mills that would be regulated by PSES and BMPs for indirect dischargers. These costs are not reported by subcategory because the level of data aggregation is insufficient to protect confidential business information.

As discussed in section IX.E., the Agency is proposing end-of-pipe PSES equivalent to end-of-pipe BAT for several pollutants. The technology basis for end-of-pipe PSES for these pollutants is secondary wastewater treatment. These costs were estimated using the same methodology used to estimate BPT costs.

Section IX.E explains why the Agency believes this is not a likely treatment decision for an indirect discharger but for purposes of achievability analysis, the Agency includes these secondary treatment costs. The capital expenditures for all indirect dischargers to achieve end-of-pipe PSES are estimated to be $66 million with annual O&M costs of $5.7 million. The total capital expenditures for all components (process changes, COD controls, BMP, and end-of-pipe treatment) of PSES are estimated to be $342 million with annual O&M costs of $5.2 million.

As discussed in section IX.E., the Agency is soliciting comment on an alternative approach to establishing end-of-pipe PSES on-site at the facility. Under this alternative approach, certain mills would not be subject to the PSES limits if the POTWs into which they are discharging voluntarily accept certain limits in their NPDES permits. The Agency estimated the cost for these POTWs to achieve limits comparable to these PSES limits, based on the costs the Agency estimated for similarly-sized mill treatment systems to be upgraded to today's proposed BPT. The capital expenditures for industrial POTWs to achieve limits comparable to these PSES limits is estimated to be $6.1 million with annual O&M costs of $0.6 million.

*H. Pollutant Reductions*

The Agency estimated the reduction in the mass of pollutants that would be discharged from pulp and paper mills after the implementation of the regulations being proposed today. The reduction in pollutant mass is attributable both to process changes and improved end-of-pipe treatment. Process changes that form the technology basis of BAT and PSES reduce the formation of certain pollutants; that is, these process changes prevent pollution. Other process changes, including wastewater recycle practices that are part of the BPT technology basis and BMP, reduce pollutant discharges by diverting certain waste streams from wastewater treatment. The pollutants contained in these diverted waste streams may be captured in the product, recovered for reuse, routed to on-site combustion where they are destroyed while their heating value is recovered, or eventually discharged to wastewater treatment in other wastewater streams. When wastewater discharge volumes are reduced by recycle and reuse, pollutants are typically concentrated in the remaining waste streams. This is advantageous, from a treatment standpoint, because more concentrated pollutants can be removed more efficiently in wastewater treatment.

Additional information on the methodology used to estimate the pollutant reductions resulting from the implementation of effluent limitations is included in Section 9 of the technical water development document and in the public record for this proposal.

1. Conventional Pollutant Reductions

For each subcategory, the Agency developed an estimate of the long-term average production normalized mass loading (LTA) of $BOD_5$ and TSS that would be discharged after the implementation of BAT, BMP, MACT, and BPT. The reduction in the mass of $BOD_5$ and TSS achieved was estimated on a mill-specific basis. The BPT LTA was multiplied by each mill's 1989 production for all subcategories present at the mill. The total mill BPT mass was subtracted from the 1989 discharge of $BOD_5$ and TSS (as reported in the questionnaire), to estimate the mill's pollutant reduction. To calculate a total subcategory pollutant reduction, the pollutant reduction achieved by each multi-subcategory mill was apportioned to each subcategory present at the mill on the basis of production. The Agency estimates that the proposed regulations will reduce $BOD_5$ discharges by approximately 94,500 metric tons per year. Of the total $BOD_5$ pollutant reduction, approximately 12,300 metric tons per year (13 percent) results from implementation of BAT; approximately 12,500 metric tons per year (13 percent) results from implementation of NESHAP; approximately 5,090 metric tons per year (5 percent) results from implementation of BMP; and approximately 64,700 metric tons per year (69 percent) results from implementation of BPT. TSS discharges will be reduced by approximately 128,000 metric tons per year. All TSS pollutant reductions result from implementation of BPT. Table IX.H.1–1 is a summary of the estimated conventional pollutant reductions that will result from implementation of BAT, BMP, NESHAP, and BPT.

2. Toxic and Nonconventional Pollutant Reductions

*a. Methodology.* The proposed BAT and PSES limitations will control the discharge of toxic and nonconventional pollutants. These limitations and standards will be applied at two control points: The combined discharge from the bleach plant and the treated final effluent discharge. The Agency developed an estimate of the long-term average production normalized mass loading (LTA) of several pollutants that would be discharged from each of these control points after the implementation of BAT and PSES. These pollutants consisted of three groups of chlorinated compounds (chlorinated phenolic compounds, chlorinated dioxins and furans, and the chlorinated volatile organic compounds chloroform and methylene chloride), two nonchlorinated volatile compounds (acetone and methyl ethyl ketone), and two aggregate pollutant parameters (AOX and COD). The specific pollutant compounds are listed in section IX.C.

Using a methodology similar to that used to estimate BPT pollutant reductions, the BAT pollutant reductions were estimated on a mill-specific basis. The BAT or PSES LTA, multiplied by each mill's 1989 production or more recent production, if available, was subtracted from an estimate of the mill's baseline pollutant loading. Baseline pollutant loadings were estimated for both the bleach plant effluent and final effluent control points using data collected by the Agency in the short- and long-term sampling programs and data supplied by the industry. Only data believed to be representative of the mill's operations as of January 1, 1993 were used. For many mills, data were not available for all pollutants of concern. For those mills, baseline discharge loads were estimated from mills with similar pulping and bleaching operations. Very few data were available to represent baseline bleach plant discharge loads of chlorinated phenolic compounds. For these pollutants, the Agency has not estimated bleach plant pollutant reductions achievable by BAT or PSES. Also, standardized data were not available to represent baseline color loadings, and the Agency has not estimated the reduction in color discharges that would result from BAT or PSES.

TABLE IX.H.1–1.—REDUCTION IN ANNUAL DIRECT DISCHARGE OF CONVENTIONAL POLLUTANTS AFTER IMPLEMENTATION OF BAT, BMP, NESHAP, AND BPT REGULATIONS

[In metric tons per year]

| Subcategory [1] | $BOD_5$ | TSS |
|---|---|---|
| Dissolving Kraft | 2,240 | 3,640 |
| Bleached Papergrade Kraft and Soda | 43,700 | 56,500 |
| Unbleached Kraft | 12,300 | 13,600 |
| Dissolving Sulfite | 12,900 | 23,000 |
| Papergrade Sulfite | 5,540 | 7,210 |
| Semi-Chemical | 2,330 | 2,700 |
| Mechanical Pulp | 3,750 | 6,860 |
| Nonwood Chemical Pulp | 217 | 208 |
| Secondary Fiber Deink | 2,240 | 3,570 |
| Secondary Fiber Non-deink | 3,310 | 4,590 |
| Fine and Lightweight Papers from Purchased Pulp | 2,770 | 3,880 |
| Tissue, Filter, Nonwoven, and Paperboard from Purchased Pulp | 3,300 | 2,400 |
| Industry Total | 94,500 | 128,000 |

[1] Reductions for mills with operations in more than one subcategory have been apportioned based on annual production (OMT) in the subcategories to which each regulation applies.

*b. Bleach Plant Discharge.* All reductions in bleach plant pollutant loadings result from the process changes that are the technology bases for both BAT and PSES. As noted above, the process changes reduce the generation of pollutants of concern. Export vectors for pollutants generated in the bleach plant are the pulp itself, air emissions and wastewater streams discharged to treatment. In the treatment system, some pollutants are biodegraded, while others (particularly TCDD and TCDF) partition between the treated wastewater and biological sludges. The Agency estimated the reduction in the annual bleach plant discharge of regulated pollutants to account for the reduction in pollutants generated (other than those that may be exported in pulp). For the Bleached Papergrade Kraft and Soda Subcategory, bleach plant discharge of TCDD and TCDF was estimated to be reduced by 517 g/yr, and the discharge of AOX was estimated to be reduced by 43,800 kkg/yr. Reduced generation of volatile compounds will lower both bleach plant discharges and air emissions. For example, for the bleached papergrade kraft and soda subcategory, the bleach plant effluent discharges of chloroform, methylene chloride, acetone, and methyl ethyl ketone decrease by 2,160 kkg/yr. The Agency does not have sufficient bleach plant baseline data to accurately quantitate the reductions in the other three subcategories but has determined that the reductions will follow similar trends. The reductions discussed in c and d, below, and shown in Table IX.H.2–1 only account for the reductions in the pollutant loads discharged in treated wastewater, only a portion of the total reduction in pollutants generated.

*c. Direct Mill Discharges (BAT).* The Agency estimates that proposed BAT regulations will reduce direct mill discharge of the combined mass of two dioxin compounds, TCDD plus TCDF, by 354 grams per year. Discharge of AOX is estimated to be reduced by 40,800 metric tons per year. The estimated reductions in pollutants directly discharged in treated final effluent resulting from implementation of BAT are listed in Table IX.H.2–1.

TABLE IX.H.2-1.—REDUCTION IN MILL DIRECT DISCHARGE OF PRIORITY AND NONCONVENTIONAL POLLUTANTS AFTER IMPLEMENTATION OF BAT REGULATIONS

| Subcategory [1] (Units) | TCDD and TCDF (g/yr) | Volatile compounds [2] (kkg/yr) | Chlorinated phenolic compounds [3] (kkg/yr) | AOX (kkg/yr) | COD (kkg/yr) |
|---|---|---|---|---|---|
| Dissolving Kraft | 26.3 | 12.6 | 3.52 | 1,670 | 8,560 |
| Bleached Papergrade Kraft and Soda | 317 | 1,060 | 1,470 | 32,900 | 1,110,000 |
| Unbleached Kraft | 0 | 0 | 0 | 0 | 326,000 |
| Dissolving Sulfite | 2.41 | 53.8 | 2.41 | 1,010 | 0 |
| Papergrade Sulfite | 8.16 | 21.7 | 18.7 | 5,250 | 200,000 |
| Semi-Chemical | 0 | 0 | 0 | 0 | 60,700 |
| Total Industry | 354 | 1,150 | 1,490 | 40,800 | 1,700,000 |

[1] Reductions for mills with operations in more than one subcategory have been apportioned based on annual production (ADMT brownstock pulp).
[2] Total mass of chloroform, methylene chloride, acetone, and MEK.
[3] Total mass of compounds listed in IX.C.

*d. POTW Effluent Discharge (PSES).* In section IX.E., the Agency identifies and solicits comment on an alternative procedure for establishing PSES. The alternative suggests that PSES be transferred to POTWs at which 50 percent or more of the total flow or $BOD_5$ load or TSS load is derived from sources in the pulp, paper, and paperboard category. The Agency estimated the reduction in pollutants discharged from such POTWs resulting from the potential transfer of PSES, as follows. The Agency first estimated the mass of each pollutant of concern that is currently discharged from the industry source to the POTW. For conventional pollutants, the 1989 mass discharges reported to the Agency in the questionnaire were used. For toxic and nonconventional pollutants, each mill's baseline discharges were estimated by the methodology described above. Final effluent loadings for the upgraded POTWs were estimated assuming the performance of the POTW secondary treatment systems was equivalent to those at direct-discharging pulp mills meeting the proposed BPT level of control. The result was an estimate of the current POTW discharge of the pollutants of concern. Next, the Agency estimated the POTW discharge of pollutants of concern after transfer of PSES limitations. The Agency estimates that discharges of AOX from POTWs will be reduced by 4,250 metric tons per year. The combined mass of two dioxin compounds, TCDD and TCDF, discharged from POTWs will be reduced by 49 grams per year. Discharge of chlorinated phenolic compounds will be reduced by 26 metric tons per year. Discharge of volatile compounds will be reduced by 132 metric tons per year. Discharge of COD will be reduced by 106 metric tons per year. Discharge of $BOD_5$ and TSS will be reduced by 3,320 and 1,190 metric tons per year, respectively.

*I. Regulatory Implementation*

1. Applicability

The regulations proposed today are just that—proposed regulations. As such, though they represent EPA's best judgment at this time, they are not intended to be relied upon by permit writers in establishing effluent limitations. The technology basis described in today's notice and the proposed effluent limitations included in today's action are provided for public comment.

2. Upset and Bypass Provisions

A "bypass" is an intentional diversion of waste streams from any portion of a treatment facility. An "upset" is an exceptional incident in which there is unintentional noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. EPA's regulations concerning bypasses and upsets are set forth at 40 CFR 122.41.

3. Variances and Modifications

*a. Introduction.* In addition to specifying national goals for water pollution control, the CWA provides a mechanism for modifying some requirements of the CWA in exceptional cases. These modifications are called variances. Very specific data requirements must be met by an applicant before a variance may be granted.

*b. Fundamentally Different Factors Variances.* EPA regulations at 40 CFR Part 125 Subpart D contain provisions authorizing EPA Regional Administrators to establish alternative limitations more or less stringent than those contained in the national effluent limitations guidelines. The EPA applies these regulations to BPT variance requests. These alternative limitations are permissible when there are factors present at a specific plant that are fundamentally different from the factors the EPA considered during development of the limitations. The regulations detail the substantive factors used to evaluate fundamentally different factors (FDF) variance requests for direct dischargers. 40 CFR 125.31(d) establishes six factors that may be considered in determining if a facility is fundamentally different. The Agency must determine whether, on the basis of one or more of these factors, the facility in question is fundamentally different from the facilities and factors considered by the EPA in developing the nationally applicable effluent guidelines. In addition to the six factors that may be considered in granting variances, 40 CFR 125.31(e) lists four factors that may not be the basis for an FDF variance. If the EPA finds that fundamentally different factors exist, and that compliance with the national limitations would result in either (a) a removal cost wholly out of proportion to the removal cost considered during development of the national limitations, or (b) a non-water quality environmental impact (including energy requirements) fundamentally more adverse than the impact considered during development of the national limits, and that all other applicable provisions of the regulations are satisfied, then EPA may establish alternative effluent limitations that are imposed in the applicant's NPDES permit.

Other provisions relating to application deadlines and procedures for processing variances for direct dischargers are contained in the NPDES regulations in 40 CFR Parts 122 and 124.

Section 306 of the Water Quality Act of 1987 amended Sec. 301 of the CWA by adding a new subsection (n) for FDF variances. Section 306 provides a statutory basis for FDF variances from BAT, BCT, and PSES. The provisions of Section 301(n) include four criteria for approval of BAT, BCT, and PSES FDF variances. In addition to the provisions of 301(n), the EPA regulations at 40 CFR Part 403.13 provide that an FDF variance may be granted when there are factors present at a specific Industrial User (IU) that are fundamentally different from the factors the EPA considered during the development of the Standards. These regulations detail the substantive factors used to evaluate FDF variance requests for indirect dischargers.

40 CFR 403.13(d) establishes six factors which are used to determine if an IU is fundamentally different. The Agency must determine whether, on the basis of one or more of these factors, the facility in question is fundamentally different from the facilities and factors considered by EPA in developing the applicable Pretreatment Standards. In addition to the six factors that may be considered in granting variances, 40 CFR § 403.13(e) lists four factors that may not be the basis for an FDF variance. Other provisions relating to application deadlines and procedures for processing variances are also contained in the regulations in 40 CFR part 403.

The legislative history of Section 301(n) states that the FDF variance applicant has the burden of proving eligibility for an FDF variance. Similarly, 40 CFR § 125.32(b)(1) specifically imposes the burden upon the applicant to show that the factors relating to the discharge controlled by the applicant's permit which are claimed to be fundamentally different, are, in fact, fundamentally different from those factors considered by the EPA in establishing the applicable guidelines. Similarly, 40 CFR § 403.13(h)(9) specifically imposes upon the applicant the burden of demonstrating that the factors relating to the IU's pollutant limitations in the Pretreatment Standard which are claimed to be fundamentally different are, in fact, fundamentally different from those factors considered by EPA in establishing the applicable Standard.

*c. Economic Variances.* Section 301(c) of the CWA provides for a variance for nonconventional pollutants for BAT effluent guidelines due to economic factors. The request for the variance from effluent limitations developed from BAT guidelines is normally filed by the discharger during the public notice period for the draft permit. Other filing time periods may apply, as specified in 40 CFR 122.21(l)(2). Specific guidance for this type of variance is available from EPA's Office of Wastewater Enforcement and Compliance.

*d. Water Quality Variances.* Section 301(g) of the CWA provides for a variance for certain nonconventional pollutants from BAT effluent guidelines due to localized environmental factors. These pollutants include ammonia, chlorine, color, iron, and total phenols.

*e. Permit Modifications.* After the final permit is issued, the permit may still need to be modified. In a permit modification, only the conditions subject to change are reconsidered while all other permit conditions remain in effect. A permit modification may be triggered in several ways, such as when the regulatory agency inspects the facility and finds a need for the modification, or when information submitted by the permittee suggests a need for a modification. Any interested person may request that a permit modification be made. There are two classifications of modifications: major and minor. From a procedural standpoint, they differ primarily with respect to the public notice requirements. Major modifications require public notice while minor modifications do not. Virtually all modifications that result in less stringent conditions are treated as a major modification, with provisions for public notice and comment. Conditions that would necessitate a major modification of a permit are described in 40 CFR 122.62. Minor modifications are generally non-substantive changes. The conditions for minor modification are described in 40 CFR 122.63.

4. Relationship of Effluent Limitations to NPDES Permits and Monitoring Requirements

Effluent limitations act as a primary mechanism to control the discharges of pollutants to waters of the United States. These limitations are applied to individual mills through NPDES permits issued by the EPA or authorized States under section 402 of the Act.

The Agency has developed the limitations and standards for this proposed rule to cover the discharge of pollutants for this industrial category. In specific cases, the NPDES permitting authority may elect to establish technology-based permit limits for pollutants not covered by this proposed regulation. In addition, if State water quality standards or other provisions of State or Federal Law require limits on pollutants not covered by this regulation (or require more stringent limits on covered pollutants), the permitting authority must apply those limitations.

For determination of effluent limits where there are multiple products or multiple categories and subcategories, the effluent guidelines are applied using a production-weighted combination of the appropriate guideline for each category or subcategory. Where a facility has added a new bleach line in conjunction with existing bleach lines, the effluent guidelines would also be applied by using a production-weighted combination of the NSPS limit for the new line and the BAT and BCT standards to the existing lines to derive the limitations. However, as stated above, if State water quality standards or other provisions of State or Federal Law require limits on pollutants not covered by this regulation (or require more stringent limits on covered pollutants), the permitting authority must apply those limitations regardless of the limitation derived using the production-weighted combinations.

For non-continuous discharging plants, EPA is today proposing that NPDES permit authorities and pretreatment authorities apply the mass-based annual average end-of-pipe effluent limitations or standards. A non-continuous discharger is a mill that does not discharge wastewater during specific periods of time for reasons other than treatment plant upset, such periods being at least 24 hours in duration. An example of a non-continuous discharger is a plant where wastewaters are routinely stored for periods in excess of 24 hours to be treated on a batch basis.

EPA has learned of specific situations during scheduled maintenance shutdowns or during activities associated with the closure of a mill, when mills may sewer a variety of materials as a means of disposal. Some mills have recently acknowledged that they regularly sewer white, green, and black liquors, sodium hydroxide, acids, bleaching solutions, other feedstock chemicals, sludges, and dregs.

The effluent guidelines for the pulp and paper industry that are being proposed today are for the discharge of process wastewaters directly associated with the day-to-day manufacturing of pulp or paper. The Agency recognizes that scheduled maintenance and shutdowns are necessary for the safe and efficient operation of a mill. However, the Agency does not consider the discharges described above to be of process wastewaters. Any pulp or paper mill wishing NPDES authorization to discharge any non-process wastestream such as those referred to above must specifically disclose this in its permit application. If the permitting authority wishes to authorize this discharge, the permit must specifically authorize the discharge of the specified non-process wastestream. The effluent limitations in the permit must also reflect a separate analysis, done by the permitting authority on a best professional judgment basis, of the levels of pollutants in such non-process wastestreams that are commensurate with the application of BPT, BCT, and BAT. Caution should be exercised in permitting such discharges. Facility treatment systems may not be designed to accommodate these types of materials and their discharge could adversely impact the treatment system and receiving waters.

Working in conjunction with the effluent limitations are the monitoring conditions set out in a NPDES permit. An integral part of the monitoring conditions are the monitoring points. The point at which a sample is collected can have a dramatic effect on the monitoring results for that facility. Therefore, it may be necessary to require internal monitoring points in order to assure compliance. Authority to address internal waste streams is provided in 40 CFR 122.44(i)(1)(iii) and 122.45(h). Today's proposed integrated rule establishes several internal monitoring points to ensure compliance with both the MACT standards and the effluent guideline limitations. Permit writers may establish additional internal monitoring points to the extent consistent with EPA's regulations.

5. Best Management Practices

In addition to pollutant-specific effluent limitations guidelines and standards, the EPA is proposing best management practices (BMP) pursuant to Section 304(e) of the Clean Water Act. BMPs are different from effluent limits principally because BMPs are specific requirements for conduct, not performance standards. When the EPA sets effluent limits, those limits may be achieved by any technology a discharger may choose. However, when the EPA establishes BMPs under Section 304(e) of the CWA, and those BMPs are incorporated into a discharger's permit, the discharger must perform those specific BMPs. The fact that a discharger met all its effluent limits would not be a defense, if the discharger were charged with a permit violation for failing to perform its BMPs.

The proposed BMPs are applicable to all chemical pulp mills in the following subcategories: dissolving kraft (Subpart A), bleached papergrade kraft and soda (Subpart B), unbleached kraft (Subpart C), dissolving sulfite (Subpart D), papergrade sulfite (Subpart E), semi-chemical (Subpart F), and nonwood chemical pulp mills (Subpart G). The principal focus of the BMPs are prevention and control of losses of pulping liquors from spills, equipment leaks, and intentional liquor diversions from the pulping and chemical recovery processes. More information related to the BMPs is outlined in Section IX.E.7 and in the technical water development document.

The EPA believes these BMPs are important because: (1) Losses of pulping liquor are not recognized process wastewaters and contribute significant portions of untreated wastewater loadings and discharge loadings of color, oxygen demanding substances, and non-chlorinated toxic compounds from chemical pulp mills; (2) pulping liquor spills and intentional liquor diversions are a principal cause of upsets and loss of efficiency of biological wastewater treatment systems that are nearly universally used for treatment of chemical pulp mill wastewaters; (3) prevention and control of pulping liquor losses is a form of pollution prevention that will result in less demand for pulping liquor make-up chemicals; energy efficiency through recovery of liquor solids; more effective and less costly wastewater treatment system operations; and reduced formation of wastewater treatment sludges; and (4) control of pulping liquor losses will result in reduced atmospheric emissions of total reduced sulfur (TRS) from kraft mills and hazardous air pollutants (HAPs) from all chemical pulp mills.

6. Analytical Methods

Sec. 304(h) of the Clean Water Act (CWA) directs the EPA to promulgate guidelines establishing test procedures (methods) for the analysis of pollutants. These methods are used to determine the presence and concentration of pollutants in wastewater, and for compliance monitoring. They are also used for filing applications for the National Pollutant Discharge Elimination System (NPDES) program under 40 CFR 122.41(j)(4) and 122.21(g)(7), and under 40 CFR 403.7(d) for the pretreatment program.

The EPA has promulgated analytical methods for monitoring discharges to surface water at 40 CFR part 136, and has promulgated methods for parameters specific to a given industrial category and for other purposes at parts 400–480 of 40 CFR. In today's proposed rule, EPA is providing notice of methods that have not been promulgated at 40 CFR part 136. Those methods are presented in "Analytical Methods for the Determination of Pollutants in Pulp and Paper Industry Wastewater," a compendium of analytical methods. These methods would be promulgated at 40 CFR part 430 to support regulation of discharges in the pulp, paper, and paperboard industrial category.

Method 1613 is applicable to the determination of tetra through octa chlorinated dioxins and furans in water, soil, sludge and other matrices. It employs high resolution capillary column gas chromatography (HRGC) combined with high resolution mass spectrometry (HRMS) to separate and quantify dioxins and furans. Detected dioxins and furans are quantified by the isotope dilution technique. Although Method 613 has been promulgated at 40 CFR part 136 for the analysis of 2,3,7,8-tetrachlorodibenzo-p-dioxin, Method 1613 is the basis for measurement for the proposed effluent guidelines. Method 1613 has the advantage of much lower detection limits than Method 613. Further, Method 1613 provides the ability to determine all 2,3,7,8-substituted chlorinated dioxins and furans, while Method 613 is specific to the determination of 2,3,7,8–TCDD.

Aqueous samples are prepared by passage through a 0.45 micron filter that is extracted with toluene in a Soxhlet/Dean-Stark (SDS) extractor. The filtrate is extracted with methylene chloride in a separatory funnel. Extracts from the SDS extractor and separatory funnel are combined and concentrated. Extracts are then subjected to a variety of cleanup procedures to remove interfering contaminants prior to injection of the sample extract into the HRGC/HRMS.

Method 1650 is applicable to the determination of adsorbable organic halides in water and wastewater. Results are reported as organic chloride. The concentration of organic halides is determined by adsorption onto granular activated carbon, removal of inorganic halides by washing, and combustion of the organic halides to form hydrogen halide. Subsequent titration with a micro-coulometer quantifies the organic halides, which are not speciated by this procedure.

Method 1624 is applicable to the determination of volatile pollutants in water and wastewater for the proposed effluent guidelines. It employs gas chromatography 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 compounds 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. The sensitivity of this method is sufficient to detect and quantify volatile organics at parts per billion (ppb) levels in environmental samples. This method is the only method promulgated in 40 CFR part 136 that provides analysis for all four of the regulated volatile pollutants.

Method 1653 is designed to determine chlorinated phenolics (chlorinated phenols, guaiacols, catechols, vanillins, syringaldehydes) and other compounds that are amenable to *in-situ* acetylation, extraction, and analysis by high resolution GC combined with low resolution mass spectrometry (HRGC/LRMS). This method is applicable to water and wastewater samples. Although methods other than method 1653 have been promulgated at 40 CFR part 136 for some of the regulated analytes (e.g., pentachlorophenol), only method 1653 may be used for monitoring because of the sensitivity of this method. Chlorophenolics are converted *in-situ* to acetate derivatives which are extracted with hexane, concentrated, and injected into the HRGC/LRMS where separation and detection occur. Detected chlorophenols are quantified by isotope dilution if a labeled analog is available. Where labeled analogs are not available, detected chlorophenols are quantified by the internal standard technique.

Methods 410.1 and 410.2 are two of several methods allowed for determination of chemical oxygen demand (COD) in water and wastewater. Other methods allowed for the determination of COD in this industry are those in 40 CFR part 136 that use analytical technologies equivalent to the technologies used in EPA methods 410.1 and 410.2, specifically oxidation by potassium dichromate and titration with ferrous ammonium sulfate, as described below. Other methods for COD that are intended for brines (e.g., EPA method 410.3) that are interfered with by color (e.g., EPA method 410.4) and the methods in 40 CFR part 136 equivalent to these methods are specifically not allowed for monitoring pulp and paper wastewaters. Method 410.2 is specific for levels of COD less than 50 mg/L, and Method 410.1 for levels greater than 50 mg/L.

NCASI Method 253 is applicable to the measurement of water and wastewater color. It is designed specifically for measurement of color in pulping and bleaching effluents. Color is determined by spectrophotometric comparison of the sample with known concentrations of colored solutions after the sample is first filtered and pH adjusted to 7.6. EPA has supplemented NCASI method 253 with quality control procedures and specifications similar to those in other highly developed wastewater methods, and requires the use of these procedures and the meeting of the added specifications in monitoring color in wastewaters in this industry.

## X. Development of Air Emission Standards

### *A. Selection of Source Category and Pollutants for Control*

#### 1. Source Category Covered by Standard

Section 112 of the Clean Air Act (CAA) requires that national emission standards for hazardous air pollutants (NESHAP) be promulgated for categories of major sources of hazardous air pollutants (HAPs). Major sources are defined as those that emit or have the potential to emit at least 10 tons per year of any single HAP or 25 tons per year of any combination of HAPs.

On July 16, 1992, EPA promulgated the initial list of categories of stationary sources that emit one or more of the 189 HAPs (57 FR 31576). The category of pulp and paper production was included in that list of categories of major sources of HAP emissions. The pulp and paper source category was described to include integrated mills, non-integrated mills, and secondary fiber mills. As indicated in the July 1992 **Federal Register** notice, the final description of each source category is developed as part of the regulatory development process for establishing the NESHAP.

The draft schedule (57 FR 44147, September 24, 1992) for the development of NESHAP published under the authority of Section 112(e) would require promulgation of standards for the pulp and paper source category no later than November 15, 1997. EPA expects to promulgate this NESHAP in 1995, consistent with the requirement of CAA § 112(e)(1) that the Agency "promulgate regulations . . . as expeditiously as practicable."

The standards proposed today would regulate HAP emissions from mills that chemically pulp wood fiber using kraft, sulfite, soda, and semi-chemical methods. Approximately 161 mills would be affected by today's proposed NESHAP. Today's standards are limited to the non-combustion emission points in the pulping and bleaching processes and in the process wastewater collection and treatment systems associated with these processes. Specific emission points are discussed in Section X.B. Based upon available information, EPA believes all sources that chemically pulp wood fiber within the category of pulp and paper production are major sources and, therefore, would be subject to the standards.

The standards proposed today do not include HAP emission points within all areas of the source category. For example, HAP emissions from combustion sources, from wood yards, and from papermaking areas of mills are not addressed in today's proposal. The standards do address those areas of the source category that offer the best opportunity for integration with the effluent guidelines also being proposed today.

Adequate data were not available to evaluate potential controls for emission points within the pulp and paper source category not addressed in today's proposal. Standards for the remaining portion of the source category will be proposed separately. EPA plans to propose standards for the combustion emission points at chemical pulping processes approximately one year after today's proposal and promulgate these standards together with the standards for the noncombustion points.

#### 2. Subcategorization

A subcategory is a distinct group of sources within a source category. Section 112 of the CAA provides for, but does not require, the development of standards for distinct subcategories within the source category. EPA has the discretion to determine whether to subcategorize. For today's proposed NESHAP, EPA is not proposing to subcategorize the pulp and paper production source category. The reasons for not subcategorizing are discussed in section X.D.2.

#### 3. Pollutants Covered

Section 112(b) of the CAA lists 189 chemicals, compounds, or groups of chemicals identified as HAPs, and provides EPA with authority to modify that list. Emissions from pulping, bleaching, and wastewater processes typically include a mixture of HAPs. The major HAPs (in terms of mass) emitted from these processes that would be controlled by the standards proposed today include methanol, hexane, toluene, methyl ethyl ketone, chloroform, chlorine, formaldehyde, acrolein, and acetaldehyde. Emission estimates for these and other individual HAPs, as well as additional pollutants that are not HAPs, are presented in the background information document (BID).

The control technologies being considered for today's proposed standards remove multiple HAPs. Today's proposed regulations limit total HAP emissions because they are technology-based standards that do not distinguish among individual HAPs according to particular characteristics, such as toxicity. In addition, analytical methods are not available for each individual HAP, but are available for those compounds believed to represent the majority of total HAP emissions. Therefore, today's proposed regulations limit total HAP emissions. This approach will achieve the maximum reduction in hazardous air pollutant emissions.

EPA considered, but rejected, proposing regulations to limit emissions of a few individual HAPs of concern (e.g., chloroform and chlorine) in addition to aggregate HAPs. This consideration is further discussed in Section X.D.4, which presents the maximum achievable control technology (MACT) floor level control technology. Because the control technologies differ in the amount of specific HAPs they reduce, EPA solicits comment on setting regulations to limit emissions of both total HAP and one or more individual HAPs.

Many of the HAPs emitted from the pulp and paper source category are also volatile organic compounds (VOC). Although the air emission standards being proposed today do not require control of VOC emissions, the control technologies upon which these standards are based also significantly reduce VOC emissions. Emissions of VOC are of concern because, among other reasons, they contribute to ozone formation. Air emissions of total reduced sulfur (TRS) compounds from pulping processes and process wastewater streams are also controlled with the HAP and VOC. Emissions of TRS produce foul odors.

*B. Selection of Emission Points*

The air emission points selected for today's proposed regulations include all significant points in the pulping and bleaching processes and in the process wastewater collection and treatment systems. The pulping process emission points include all open process equipment and vents associated with pulping process equipment, beginning with the digester, and up to and including the last piece of pulp conditioning equipment prior to bleaching. These last pieces of pulp conditioning equipment generally serve the purpose of removing dirt, fines, and shives from the washed pulp and thickening of the pulp prior to bleaching. The emission points within the pulping process include, but are not limited to, those listed in Table X–1.

The bleaching process emission points include all open process equipment and vents associated with each bleaching stage where oxidizing chemicals are used to delignify and brighten the pulp. This definition includes, but is not limited to, oxygen delignification stages, pre-chlorination stages, chlorine and chlorine dioxide stages, and totally chlorine-free stages such as ozonation, oxygen, and peroxide stages. Common emission points within the bleaching stages include tower vents, open washers and washer vents, and seal tank vents.

TABLE X–1.—LIST OF COMMON POTENTIAL EMISSION POINTS WITHIN THE PULPING PROCESS

| |
|---|
| Digester relief vents |
| Turpentine recovery system vents |
| Digester blow gas vents |
| Noncondensible gas system vents |
| Knotter |
| Brownstock or pulp washer |
| Washer foam tanks |
| Washer filtrate tanks |
| Decker |
| Screen |
| Weak black liquor storage tank |
| Evaporator noncondensible gas vent |
| Evaporator hotwell gas vent |

Different technologies are effective for controlling halogenated and nonhalogenated compounds. The selection of the floor level of control technology, discussed in Section X.D.4, is in part a function of whether halogenated compounds are emitted. Halogenated compounds are present in air emissions from bleaching processes where chlorine and chlorine-containing compounds are applied, but are not emitted from pulping processes. Therefore, for the purpose of the air emission standards being proposed today, the pulping component (as opposed to the pulping process) shall be defined to include all process equipment beginning with the digester system and up to and including the last piece of pulp conditioning equipment prior to the bleaching component. The bleaching component (as opposed to the bleaching process) shall be defined to include all process equipment beginning with the first application of chlorine or chlorine-containing compounds up to and including the final bleaching stage. Treatment with ozone, oxygen, and peroxide may occur before or after the addition of chlorine. If treatment occurs before this chlorine addition, these stages are included in the pulping component; if treatment occurs after the addition of chlorine, these bleaching stages are included in the bleaching component. This delineation of the pulping and the bleaching components corresponds to the MACT floor level of control.

The process wastewater component includes air emissions from all process wastewater streams produced from the pulping and bleaching processes. Process wastewater streams commonly produced from pulping processes include digester condensates (e.g., digester blow gas condensates, non-condensible gas (NCG) system condensates, digester relief condensates), decanted wastewaters from turpentine recovery systems, and evaporator condensates. The process wastewater streams associated with bleaching processes include acid and caustic filtrates from all bleaching stages. The air emission release points in the process wastewater collection and treatment system include individual drain systems, which are comprised of equipment such as open trenches, drains, manholes, junction boxes, lift stations, and weirs; surface impoundments; wastewater tanks; clarifiers; and biological treatment units. At these release points, HAPs can be transferred from the process wastewater streams to the air.

*C. Definition of Source*

For today's regulations, EPA is proposing to define a single source to include the pulping processes, the bleaching processes, and the pulping and bleaching process wastewater streams at a pulp and paper mill. With this definition, all pulping process emissions, all bleaching process emissions, and all emissions from process wastewater streams from the pulping and bleaching processes will be subject to the standards.

EPA considered three definitions of "source" for today's regulations. One option was to define each piece of equipment in the pulping and bleaching processes, as well as each process wastewater stream, as a source. This definition would result in the existence of multiple sources within a mill, each subject to today's standards. EPA also considered identifying three kinds of sources: the pulping process, the bleaching process, and all associated process wastewater streams. The third option defined a single source that included all pulping processes, all bleaching processes, and process wastewater streams, combined. Using this definition, there would be only one source within a mill.

In deciding which definition of source to propose with today's rule, 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 will be deemed "new sources" under the CAA.

The CAA and the CWA differ regarding applicability requirements and compliance deadlines for new sources. Under the CAA, sources that are constructed or reconstructed after *proposal* of a standard are considered to be new sources. With limited exceptions, these new sources must be in compliance with new source standards on the date those standards are promulgated. Under the CWA, only those sources constructed or reconstructed after *promulgation* of an effluent guideline are considered to be new sources (with limited exceptions). Compliance with the limitations in the effluent guidelines is required when those sources begin discharging.

In light of the foregoing, any 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 of promulgation) without knowing the requirements of the effluent guidelines for the industry. This could lead to situations where mills install expensive air controls to comply with the NESHAP, only to find that the equipment on which those controls are installed must be changed to comply with the effluent guidelines. This situation would appear to be inconsistent with one objective of the integrated rulemaking: allowing facilities to do integrated compliance planning.

One means of addressing this problem is to define "source" broadly for this NESHAP. If "source" is defined to include all pulping processes, all bleaching processes, and all associated process wastewater streams at mills, there will be far fewer instances in which a source will be constructed or reconstructed between proposal and promulgation than if "source" is defined to be an individual process or individual piece of process equipment. If "source" is defined to mean all pulping processes, all bleaching processes, and all process wastewater streams at mills, a piece of equipment that is added will not constitute a "new source", in most situations, but instead will be considered a change to an existing source. Such changes would be required to comply with the existing source standards at some period of time after promulgation of the standards, when all requirements of the effluent guidelines are known. If a change occurs after a State has an approved part 70 Permit program in place, it may be considered a modification and thus subject to case-by-case MACT determinations. Further details on this process are given in Section X.L.

EPA solicits comments on the definition of "source" that would be most appropriate for this rule. In particular, EPA solicits comments on whether the broad definition of "source" in today's proposal defining a single source to include all pulping processes, bleaching processes, and process wastewaters) will in fact promote integrated compliance planning, either during the period between proposal and promulgation or once the rule is promulgated. EPA also solicits comment on the impact of adopting either of the two alternative approaches considered, but not selected, in defining the source for today's proposal.

*D. Determination of MACT Floor*

Emission standards for new and existing sources promulgated under Section 112(d) of the CAA must represent the maximum degree of emission reduction achievable; this is typically referred to as MACT. The CAA establishes minimum levels, often referred to as MACT floors, for NESHAP. The floors must be determined as follows:

- for existing sources in a category or subcategory with 30 or more sources, the MACT floor cannot be less stringent than the "average emission limitation achieved by the best performing 12 percent of the existing sources . . ."
- for existing sources in a category or subcategory with less than 30 sources, the MACT floor cannot be less stringent than the "average emission limitation achieved by the best performing 5 sources."
- for new sources, the MACT floor cannot be "less stringent than the emission control that is achieved by the best controlled similar source . . ."

EPA considered three primary factors in establishing the MACT floor for this source category:

- the meaning of the statutory language used in Section 112(d)(3);
- whether there was a need to subcategorize the industry, given that MACT floors are established on a category or subcategory basis; and
- the control technologies in use in the industry.

EPA relied on the survey described in Section X.D.3 to determine which control technologies were being used in the industry and the extent to which these control technologies are used. EPA then determined the emission limitation achieved by these control technologies. The MACT floor level of control is described in Section X.D.4. The MACT floor established for existing and new sources is identified in Sections X.D.5 and 6.

1. Interpretation of Statutory Language

CAA sections 112(d)(3) (A) and (B) require that EPA set standards no less stringent than "the average emission limitation achieved by the best performing 12 percent of the existing sources" if there are at least 30 sources in a category or "the average emission limitation achieved by the best performing 5 sources" if there are fewer than 30 sources in a category. During the development of these proposed rules, EPA considered two interpretations of this statutory language. One interpretation groups the words "average emission limitation achieved by" together in a single phrase and asks what is the "average emission limitation achieved by" the best performing 12 percent. This interpretation places the emphasis on "average." It would correspond to first identifying the best performing 12 percent of the existing sources, then determining the average emission limitation achieved by these sources as a group. Another interpretation groups the words "average emission limitation" into a single phrase and asks what "average emission limitation" is "achieved by" all members of the best performing 12 percent. In this case, the "average emission limitation" might be interpreted as the average reduction across the HAPs emitted by an emission point over time. Under this interpretation, EPA would look at the average emission limits achieved by each of the best performing 12 percent of existing sources, and take the lowest. This interpretation would correspond to the level of control achieved by the source at the 88th percentile if all sources were ranked from the most controlled (100th percentile) to the least controlled (1st percentile). For today's proposed regulation, the Administrator is using the first interpretation described above, which interprets the statutory language to mean that the MACT floor for existing sources should be set at the level of control achieved by the "average" of the best performing 12 percent.

In establishing the MACT floor for today's proposed regulations, EPA also considered two possible meanings for the word "average" as the term is used in CAA section 112 (d)(3)(A) and (B). First, EPA considered interpreting "average" as the arithmetic mean. The arithmetic mean of a set of measurements is the sum of the measurements divided by the number of measurements in the set. EPA determined that the arithmetic mean of the emissions limitations achieved by the best performing 12 percent of existing sources in some cases would yield an emission limitation that fails to correspond to the limitation achieved by any particular technology. Accordingly, EPA decided not to select this approach. EPA also considered interpreting "average" as the median emission limitation value. The median is the value in a set of measurements below and above which there are an equal number of values (when the measurements are arranged in order of magnitude). EPA selected this interpretation because, for all cases in the pulp and paper industry, it yields a value that corresponds to a particular emission control technology.

Thus, in identifying the MACT floor for this source category, EPA determined the median emission limitation achieved by the best performing 12 percent of existing sources. This determination was made by identifying the emission limitation achieved by those sources within the top 12 percent, arranging those emissions limitations by magnitude, and taking the control level achieved by the median source. This is mathematically equivalent to identifying the emission limitation achieved by the mill at approximately the observed 94th percentile level of emissions control. For purposes of today's proposal, EPA identified the emission limitation achieved at a mill based upon the type of control technology used.

One possible way to establish the MACT floor, not used by EPA in this proposal, would be to identify a mass emission limit or a mass emission reduction percentage across the source as a whole, or across the process area. For the broad source definition in today's proposal, this would mean identifying the floor based upon a mass emission limit or a mass emission reduction percentage achieved at the best performing 12 percent of the process areas as a whole. For the more narrow definition of source by process area, this would mean identifying the floor based upon a mass emission limit or a mass emission reduction percentage at the best performing 12 percent of the process areas (e.g., the best performing 12 percent of the pulping area sources). However, EPA does not consider data currently available as sufficient to establish either a mass emission limit or a mass emission reduction percentage for process areas or entire sources. In part as a result, EPA elected to establish the MACT floor on a emission point basis according to control technologies currently in use in the industry at individual emission points and knowledge of the performance capabilities of these control technologies.

EPA solicits comment on its interpretation of "the average emission limitation achieved by the best performing 12 percent of the existing sources" (CAA § 112(d)(3)(A)) and its methodology for determining the MACT floor. EPA specifically solicits comment on whether the MACT floor should be set at the 88th or 94th percentile level of control. EPA also requests information and data necessary to develop a mass emission limit or mass emission reduction percentage and comments on whether a model plant and emission factor approach could be used to estimate these values.

2. Subcategorization

Another step in establishing the MACT floor was deciding whether to subcategorize the source category.

Subcategorization may be appropriate if some segments of the industry have relevant characteristics, such as applicable control technologies or costs of implementation that are significantly different from others. In developing today's emission standards, EPA considered subcategorizing according to pulping process (kraft, sulfite, soda, and semi-chemical), end product (papergrade or dissolving grade pulp), and wood species (hardwood or softwood). However, common control technologies, described in the following section, are applicable to all segments of the industry regardless of pulping process, end product, or wood species. Based upon available data, the application of these technologies effectively controls HAP emissions from the source (i.e., the pulping, bleaching, and process wastewater components) for all mills subject to today's proposed regulations. Accordingly, EPA decided not to propose subcategories for this NESHAP.

EPA is aware that scrubbing, rather than venting to a combustion device, is utilized in sulfite mills to control pulping process emissions. EPA solicits comments and requests data regarding: The efficiency of scrubbers for controlling HAP emissions from pulping process vents at sulfite mills; whether standards for sulfite mill pulping processes should be based on the use of scrubbing; and whether this NESHAP should contain a separate subcategory for sulfite mills.

EPA is also aware that soda mills do not have gas collection systems in place for pulping area vents, because soda mills do not use sulfur-containing chemicals to digest the wood. EPA believes that gas collection followed by combustion is a feasible control technology to reduce HAP emissions from soda pulping processes. However, during the development of these proposed regulations, representatives of soda mills urged EPA to create a separate subcategory for those mills, due in part to the extra expense soda mills might incur for installing gas collection systems. Such systems are already in place in most kraft mills, which emit (and are currently required to control) sulfur-containing compounds. EPA solicits comments on the HAP content of soda mill pulping process vent streams, the capacity of existing combustion devices, the costs of collecting and routing these vent streams to a combustion device, and whether this NESHAP should contain a separate subcategory for soda mills.

3. Industry Survey

To determine what control technologies are being used in the industry, and the frequency with which those control technologies are used, EPA utilized results from a voluntary survey conducted by the American Forest and Paper Association (AFPA; formerly the American Paper Institute [API]) and the National Council of the Paper Industry for Air and Stream Improvement (NCASI). The AFPA and NCASI sent a voluntary survey in February 1992 to member institutions, including the majority of mills that would be regulated under today's proposed emission standards. Of the 124 facilities that responded, 116 are estimated to be subject to today's proposal. The responses came from a cross section of mills of varying size and location, using the range of pulping and bleaching processes subject to today's proposed rules. Data from the survey included information on the percentage of emission points controlled from individual process units and the control technologies utilized in each of the three main emission areas—pulping, bleaching, and wastewater.

4. MACT Floor Level Control Technologies for Existing and New Sources

As described in Section X.D, the MACT floor technologies are based upon technologies in use in the industry. Survey responses indicated that the following technologies are in use: combustion devices, process changes, gas scrubbers, steam strippers, and air strippers. Combustion devices are applicable for controlling HAP emissions from the pulping component, as well as for controlling emissions from the bleaching and process wastewater components. Process changes and gas scrubbing are used to reduce HAP emissions in the bleaching component. Steam strippers and air strippers are used to remove HAPs from process wastewaters. Combustion devices are used to destroy the HAPs removed by steam stripping and air stripping. A detailed description of these control technologies is included in the BID. Combustion devices are also used in the industry to reduce HAP emissions from the pulping component. These include stand-alone control devices such as thermal incinerators and existing devices such as lime kilns, power boilers, and recovery furnaces.

The potential floor technologies for the bleaching component include gas scrubbing and process changes. Process changes affect the formation of bleach plant HAP compounds in the pulping and bleaching processes by changing characteristics of the emission point or by altering the process operating conditions or bleaching chemicals used. Pulping process changes (e.g., extended cooking and improved washing) reduce the quantity of lignin in the pulp going to the bleaching process, thereby reducing the amount of chlorinated bleaching chemicals used and potentially reducing the quantity of chlorinated compounds formed. The bleaching process changes include reduced use of chlorinated bleaching chemicals, thereby further reducing the quantity of chlorinated compounds formed.

Based upon the available data, process change technologies applied to the bleaching process are projected to decrease emissions of chlorinated HAPs, including chloroform, chlorine, and hydrochloric acid, but increase air emissions of some nonchlorinated HAPs, including methanol, methyl ethyl ketone, and formaldehyde. EPA did not find process changes to be the MACT floor for the bleaching area because their overall effect is no statistically significant net impact on total HAP emissions. Emission factors used to conduct this assessment are presented in the BID. EPA solicits data on the effect of process changes on air emissions of total HAP as well as specific HAPs.

EPA also evaluated the HAP air emission reductions achieved by scrubbing bleaching component emissions. Based upon available information, gas scrubbers are the most effective technology in use for reducing total HAP emissions from the bleaching component. Thus, gas scrubbers were selected as the floor technology for the bleaching component.

However, because available data indicate that process changes are particularly effective for reducing emissions of chlorinated organics, some of which are not controlled effectively through scrubbing, EPA also considered the use of process changes in conjunction with scrubbing as a control technology for the floor. Based upon available data, the use of these technologies in combination results in no additional overall air emission reduction from a source than scrubbing alone. Because no additional air emission reduction would occur, EPA rejected this combination as the basis for the floor.

EPA solicits data and comments on the following aspects on the floor technology for the bleaching component:

- The types of process changes in use in the industry, and the effectiveness of these changes for reducing emissions of total HAP, as well as individual compounds.
- Whether the combination of process changes and gas scrubbing could be identified as the MACT floor for purposes of these standards.
- Because a significant number of mills have greater than 50 percent chlorine dioxide substitution, which reduces the emissions of chlorinated organic HAPs, process changes could be considered as candidates for a MACT floor technology for chlorinated HAPs. Therefore, EPA solicits comment on whether emission limits for chlorinated organic compounds should be set, based on the reductions obtained by process changes.

Technologies used in the industry to remove organic compounds from process wastewaters include steam stripping and air stripping. Although air strippers are employed in the pulp and paper industry to reduce TRS emissions, steam strippers achieve a higher percent removal of total HAP emissions. Therefore, steam stripping is the best technology in use for removing organic compounds from process wastewater. The overhead gases from these strippers are typically sent to combustion devices.

After identifying the best technologies in use, EPA used industry survey data to identify the percentage of emission points that were controlled by these technologies. This information, summarized in Table X-2, was used to establish the MACT floor for existing and new sources.

TABLE X-2.—MACT FLOOR FOR EXISTING AND NEW SOURCES

| Emission point | Characteristics of baseline: Percent controlled | Characteristics of baseline: Control efficiency [1] (percent) | Characteristics of floor: *Existing:* control efficiency of median of best performing 12% (percent) | Characteristics of floor: *New:* control efficiency of best controlled similar source (percent) |
|---|---|---|---|---|
| Pulping Component: | | | | |
| Digester Blow or NCG System | 82 | 98 | 98 | 98 |
| Digester Relief or Turpentine Recovery System | 80 | 98 | 98 | 98 |
| Evaporator NCG and Evaporator Hotwell Gases | 80 | 98 | 98 | 98 |
| Oxygen Delignification Unit [2] (Blow Gas and Washer) | 25 | 98 | 98 | 98 |
| Foam Breaker Tank or Filtrate Tanks | 25 | 98 | 98 | 98 |
| Weak Black Liquor Storage | 25 | 98 | 98 | 98 |
| Knotter | 7 | 98 | 98 | 98 |
| Brownstock or Pulp Washer | 7 | 98 | 98 | 98 |
| Deckers and/or Screens | 4 | 98 | 0 | 98 |
| Bleaching Component [3] | | | | |
| Washer Vents | 15 | 99 | 99 | 99 |

TABLE X-2.—MACT FLOOR FOR EXISTING AND NEW SOURCES—Continued

| Emission point | Characteristics of baseline: Percent controlled | Characteristics of baseline: Control efficiency [1] (percent) | Characteristics of floor: *Existing:* control efficiency of median of best performing 12% (percent) | Characteristics of floor: *New:* control efficiency of best controlled similar source (percent) |
|---|---|---|---|---|
| Tower Vents | 15 | 99 | 99 | 99 |
| Seal Tank Vents | 15 | 99 | 99 | 99 |
| Process Wastewater Component: | | | | |
| Digester Condensates | 12 | 90 | 90 | 90 |
| Evaporator Foul Condensates [4] | 26 | 90 | 90 | 90 |
| Turpentine Recovery Wastewaters | 22 | 90 | 90 | 90 |

[1] Control efficiency of pulping component based upon use of a combustion device. Control efficiency of bleaching component based upon use of a gas scrubber. Control efficiency of process wastewater component based upon use of a steam stripper.
[2] 3 of 12 units.
[3] Vents are for C, $E_1$, H, $D_1$, $E_2$, and $D_2$ stages.
[4] Foul means ≥500 ppmw HAP.

The column labeled "control efficiency" is based on EPA's knowledge of the performance levels achievable by the control technology used. This information forms the basis of the MACT floor level of control.

5. MACT Floor for Existing Sources

As shown in Table X-2, the control basis of the floor for existing sources is:

• Combustion of all pulping component emission points except equipment after primary washing that is used to remove dirt, fines, and shives or to thicken the pulp (e.g., deckers and screens);

• Scrubbing of all bleaching component emission points; and

• Steam stripping of certain pulping process wastewater streams in the process wastewater component to remove HAP from the process wastewater, followed by combustion of stripper overhead gases.

The best controlled existing sources control all pulping and bleaching emission points (with the exception noted above) for which information is available. However, there exist low flow or episodic pulping and bleaching component vents for which no information was gathered, but which are believed to be uncontrolled. Sections X.G and X.H discuss the development of applicability levels to identify those vents that are not controlled at the floor.

Similarly, the best controlled existing sources do not apply steam strippers to every pulping process wastewater stream. There are three types of pulping process wastewater streams that are steam stripped—digester condensates, evaporator condensates, and turpentine recovery wastewaters. The MACT floor control technology, steam stripping followed by combustion, is not currently applied to any bleaching process wastewater streams. In addition, there are also pulping process wastewater streams that are not controlled. Therefore, the floor for these process wastewater streams is no control. Similar to pulping and bleaching component emission points, the development of applicability levels to identify those process wastewater streams not requiring control are discussed in Sections X.G and X.H.

The floor level of control for the pulping component includes combustion of emissions from oxygen delignification units. Based upon available information, there are 12 oxygen delignification units in use in the industry and three of these are controlled. Applying the framework set forth in § 112(d)(3)(B), and interpreting "average" to mean median, the average emission limitation achieved by the best performing 5 sources would be the level of control used by the third best-controlled source. That unit controls its oxygen delignification by venting to a combustion device to achieve a 98 percent reduction in HAP emissions. Therefore, the floor level of control for oxygen delignification units, where those units are found, is combustion designed to achieve a 98% reduction.

In establishing MACT, EPA also evaluated options in which the oxygen delignification units were not included in the MACT floor level of control, but were instead included in the option above the floor. This analysis indicated that it was highly cost-effective ($750/Mg) to control at the level above the floor, which included oxygen delignification units. Using this analysis, the selected MACT technology basis would have been the option above the floor. Oxygen delignification units would also have been controlled by combustion. EPA solicits comment on the inclusion of oxygen delignification units in the MACT floor with other pulping component emission points, and requests data on the use of such units within the industry.

6. MACT Floor for New Sources

The MACT floor for new sources (also shown in Table X-2) is the MACT floor for existing sources plus combustion of HAP emissions from equipment following primary washing that is used to remove dirt, fines, and shives or to thicken the pulp (e.g., deckers and screens). As shown in Table X-2, this technology was selected because it is used by the best controlled similar source.

*E. Selection of Basis of Proposed Standards for Existing Sources*

1. Analyzing MACT Options

In addition to evaluating the MACT floor level of control, EPA also evaluated a number of more stringent options. This evaluation included consideration of technologies to control HAP emissions from emission points not controlled at the floor. It also included consideration of controlling emission points to a level more stringent than the floor level of control.

The MACT floor for existing sources does not include the control of certain emission points within the pulping, bleaching, and process wastewater components. Specifically, the floor does not include control of:

• Emissions from pulping component equipment used to remove dirt, fines, and shives or to thicken the pulp (e.g., deckers and screens) that follows primary washing;

• Emissions from low flow or episodic pulping and bleaching component vents not controlled at existing mills;

- Scrubber off-gases in the bleaching component; and
- All bleaching process wastewater streams and pulping process wastewater streams with low HAP concentrations and flow rates.

No other technologies were identified that would further reduce emissions from points controlled at the floor. EPA did not have sufficient data to fully characterize the low flow or episodic pulping and bleaching component vents not controlled at the floor. As a result, a complete analysis of the potential to control these sources is not possible. EPA solicits comments and data on the characterization of these vents and their control potential.

EPA considered but rejected further control of the process wastewater streams listed above. Based on knowledge and information that EPA has been developing on steam stripping wastewater in the Synthetic Organic Chemical Manufacturing Industry (SOCMI), the costs of controlling process wastewater streams with low HAP concentrations is unreasonable.

Thus, Table X–3 presents three MACT control options for existing sources—the floor and two additional options representing control levels more stringent than the floor. Each of these control options contain pulping, bleaching, and process wastewater components. Although additional options were considered, EPA selected these three options as the best candidates for the MACT technology basis.

The MACT control options for existing sources are shown in Table X–3. A mill-specific industry profile and model process units were used to estimate the impacts of the options. The mill-specific industry profile contains information on the 161 mills to be regulated under the NESHAP and was developed using information from EPA's wastewater sampling program, emissions testing program, 1990 census questionnaire, API/NCASI survey, and other sources.

EPA developed model process units to estimate the national impacts of implementing each of the control options. The model process units developed include 18 pulping and 12 bleaching processes. The model process units were assigned to the mills in the mill-specific industry profile based upon capacity and process type.

TABLE X–3.—MACT CONTROL OPTIONS FOR EXISTING SOURCES

| Pulping component | Bleaching component | Wastewater component |
|---|---|---|
| Floor—Combust Emissions from:<br>Digester blow or NCG system<br>Digester relief or turpentine recovery system<br>Evaporator noncondensible gases and evaporator hotwell gases<br>Foam breaker tank or filtrate tank<br>Weak black liquor<br>Knotter<br>Brownstock or pulp washer<br>Oxygen delignification unit (blow gas and washer) | Scrub:<br>1st C stage<br>All D stages<br>1st and 2nd E stage<br>1st H-stage | Steam strip:<br>Digester Condensates.<br>Evaporator Foul Condensates.<br>Turpentine Recovery Wastewaters. |
| Option 1—Same as floor, but add combustion of emissions from deckers and screens | Same as floor | Same as floor. |
| Option 2—Same as floor | Same as floor, but add combustion of scrubber off-gases | Same as floor. |

EPA used outputs generated by assigning these model processes to specific mills to calculate the pollutant reductions and costs of various levels of control. For example, uncontrolled air emissions were calculated by multiplying model process emission factors by mill-specific process capacities.

Baseline air emissions were calculated from the uncontrolled air emissions by assigning appropriate control efficiencies to the control devices (if any) known to be present at each facility The baseline emissions, calculated by emission point, were then summed for each process and mill. National baseline emissions were estimated by summing emissions from all individual mills.

Air emission control impacts (i.e., emissions, emission reductions, costs) were calculated for each mill for each MACT control option. To calculate controlled air emissions, the control efficiency required by each control option was assigned to each emission point not already controlled to this level at baseline. Emission reductions were calculated as the difference between baseline emissions and controlled emissions.

The emission reductions achieved for each option were summed for each process line, for each mill, and then for all mills combined, to generate national air emission reduction impacts.

Costs were calculated for each control device using procedures described in the BID. Because the air controls may be applied to multiple emission points within a mill, control costs were not calculated by emission point, but, instead, were calculated by process line or by mill. That is, depending on the capacity of the applicable control device, multiple streams were assumed to be routed to the device together (e.g., via a common header). Costs for each mill were summed to determine an estimate of national cost impacts.

2. Selection of Basis of Standard For Existing Sources

EPA considered several factors in selecting the MACT technology upon which the proposed standards are based. These factors include: The magnitude of the emission reductions achievable, cost of the emission reductions, other non-air quality health and environmental impacts, and energy requirements. The non-air quality health and environmental impacts, as well as the energy impacts, of the three options are not significantly different. Therefore, cost effectiveness, which is a function of emission reductions and associated costs, was used as the primary criterion for option selection.

For existing sources, EPA evaluated the national impacts of the baseline level of control, the floor level of control, and two control levels based upon options more stringent than the floor. The floor level of control reduces total HAP emissions by 120,000 Mg (approximately 70 percent).

Option 1 includes the floor level of control and combustion control of emissions from pulping equipment used to remove dirt, fines, and shives or to thicken the pulp (e.g., deckers and screens) that follows primary washing. An additional 320 Mg of HAPs are reduced at an incremental cost effectiveness of $91,400 per Mg.

Option 2 includes the floor level of control and combustion control of bleaching process scrubber off-gases. An additional 1,000 Mg of HAPs are reduced from that achieved at the floor at an incremental cost effectiveness of $91,200 per Mg.

Scrubbing followed by combustion of the scrubber off-gases reduces more HAP emissions than scrubbing alone, as scrubbing removes inorganic chlorine and methanol, and combustion destroys the remaining insoluble organic compounds such as chloroform. However, combustion after scrubbing achieves little additional HAP emission reduction beyond scrubbing alone, due to the high efficiency of scrubbing for removing methanol, which is the predominant HAP. The cost effectiveness of Option 2 is thus unreasonable for the additional HAP emission reduction achieved, and EPA rejected this option from further consideration.

Although not presented as an option above, EPA also evaluated combustion followed by scrubbing of the combustion device exhaust. As with Option 2, little additional HAP emission reduction is achieved over scrubbing alone, due to the efficiency of scrubbing for removing the predominant HAP-methanol. In addition, combustion of vent streams prior to scrubbing introduces chlorinated organic compounds (e.g., hydrochloric acid and chlorine) that are highly corrosive and more expensive to incinerate in the combustion device. Thus, the cost effectiveness of combustion followed by scrubbing is unreasonable for the HAP emission reduction achieved, and this option was also rejected.

The Agency did not consider combustion of selected bleach plant vent streams followed by scrubbing of vent streams with high chlorine concentrations. Such an option would combust the vent streams with the greatest organic HAP emissions and would potentially be more cost effective than scrubbing and combusting all bleach plant vent streams. EPA requests comment on whether this would be a reasonable option, and on which vent streams would be included under such an option.

After considering the other technology options, EPA selected the floor as the basis for the proposed standards for existing sources. Options 1 and 2 are not selected as the basis for the proposed standard because in both cases the additional HAP emission reduction does not justify the high costs of control. The proposed existing source MACT standards based on the floor-level control technology are projected to result in a significant reduction in HAP emissions from the pulp and paper source category.

EPA requests data and solicits comments on several factors related to selection of the basis for the MACT standards for the bleaching component. Although data available prior to today's proposal showed combustion of bleaching plant vent streams (either before or after scrubbing) to have unreasonable cost effectiveness, the Agency believes that the costs of combusting bleaching component vent streams may be overestimated and emissions reductions may be underestimated. If methanol and chloroform concentrations have been underestimated or scrubber efficiencies for methanol overestimated, the cost effectiveness of combusting bleaching component vent streams would be more reasonable, and might be a viable option. EPA requests data and comments on methanol and chloroform concentrations in bleaching component vent streams and on the efficiency of scrubbing for removing methanol.

**F. Selection of Basis for Proposed Standards for New Sources**

1. Analyzing MACT Options

The MACT floor for new sources does not include control of certain emission points within the bleaching and process wastewater components:

- Scrubber off-gases in the bleaching component;
- All bleaching component process wastewater streams; and
- Pulping component process wastewater streams with low total HAP concentrations and flow rates.

As discussed in Section X.E.1, EPA considered but rejected control of the process wastewater streams listed above because analyses in support of previous regulations indicate that the costs of controlling these dilute streams is unreasonable. The low flow and episodic pulping and bleaching component vents that are not controlled at the floor for existing sources, as described in Section X.E.1, are also not controlled at the floor for new sources for the same reasons. Two MACT control options for new sources were evaluated—the floor and one option representing a control level more stringent than the floor, which includes the combustion of scrubber off-gases. Combustion before scrubbing was considered but rejected for the same reason discussed in the MACT option evaluation for existing sources. The MACT control options analyzed for new sources are shown in Table X–4.

To estimate impacts of the MACT options for new sources, EPA developed a model mill. The model mill is a 1,000 ton per day greenfield papergrade kraft mill pulping softwood. The process includes oxygen delignification, improved washing, and 100 percent substitution of chlorine dioxide for chlorine in the bleaching process.

TABLE X–4.—MACT CONTROL OPTIONS FOR NEW SOURCES

| Pulping component | Bleaching component | Wastewater component |
|---|---|---|
| Floor—Combust Emissions from: | Scrub: | Steam Strip: |
| Digester blow or NCG system | 1st C stage | Digester Condensates. |
| Digester relief or turpentine recovery system | All D stages | Evaporator Foul Condensates. |
| Evaporator noncondensible gases and evaporator hotwell gases | 1st and 2nd E stage | Turpentine Recovery Wastewaters. |
| Foam breaker tank or filtrate tank | 1st H-stage | |
| Weak black liquor | | |
| Knotter | | |
| Brownstock or pulp washer | | |
| Oxygen delignification unit (blow gas and washer) | | |

TABLE X-4.—MACT CONTROL OPTIONS FOR NEW SOURCES—Continued

| Pulping component | Bleaching component | Wastewater component |
|---|---|---|
| deckers/screens<br>Option 1—Same as floor | Same as floor, but add: combust scrubber off-gases | Same as floor. |

These process parameters were selected based on available information about new mills in the industry, and are consistent with the technology basis for the effluent guidelines limitations NSPS. The estimated impacts are calculated assuming that the mill will have to upgrade from a baseline level of control represented by the NSPS for emissions from kraft mills. Secondary impacts of the selected new source MACT option are summarized in Section XI of this document.

2. Selection of MACT Option for New Sources

The factors evaluated in selecting the existing source standards were also considered to select the standards for new sources. The non-air quality health and environmental impacts, as well as the energy impacts, of the two options were not significantly different. Therefore, cost-effectiveness, a function of emission reductions and associated costs, was used as the primary criterion for option selection.

The floor level of control reduces annual total HAP emissions by 384 Mg at an annual cost effectiveness of $6,600 per Mg for the model mill. Option 1 includes the floor level of control and control of bleaching process scrubber off-gases. The incremental cost effectiveness of this option is $90,000 per Mg.

Based on these factors, the control option selected as the basis for the proposed MACT standards for new sources is the floor. Option 1 was not selected as the control basis because the additional HAP emissions reduction is small and the incremental cost effectiveness is unreasonable.

EPA solicits comments and requests data on the selection of the basis of the new source MACT standards for the bleaching component, which are those mentioned for existing sources.

### *G. Selection of the Format for the Proposed Standards*

1. Statutory Requirements

Section 112 of the CAA requires that emission standards for control of HAPs be prescribed unless, in the judgment of the Administrator, it is not feasible to prescribe or enforce emission standards. Emission standards can be written in the form of a percent reduction, a concentration, or a mass emission limit. Section 112(h)(2) identifies two conditions under which it is not feasible to establish an emission standard. These conditions are: if the pollutants cannot be emitted through a conveyance designed and constructed to emit or capture the pollutant, or if the application of measurement technology to a particular class of sources is not practicable because of technological and economic limitations. If emission standards are not feasible to prescribe or enforce, EPA may instead establish design, equipment, work practice, or operational standards, or a combination thereof.

The standards proposed today are a combination of emission standards and equipment, design, work practice, and operational standards. Wherever feasible, emission standards have been proposed. However, in some cases, emission limitations would not adequately ensure that the maximum emission reductions required by these standards are achieved. In those cases, a combination of equipment, design, and work practice and operational standards are proposed. These alternative standards have been determined by EPA to be equivalent to the emission standards proposed today. In addition to ensuring that maximum emission reductions are achieved, they are included to offer the owner or operator of an affected source the maximum flexibility in complying with these standards. The specific formats for each of the components are discussed in the following sections. The selection of numerical values for each of the proposed formats is discussed in Section X.H of this notice.

2. Format of Standards for the Pulping Component

The standards for controlling air emissions from the pulping component are a combination of equipment, design, work practice, and emission standards. The standards include requirements for enclosures and closed vent systems, as well as for reduction of HAP emissions in the pulping component. The pulping component standards also include applicability levels to identify those pulping vents that are not required to be controlled. The rationale for choosing the format of the standards is discussed below.

a. *Applicability Levels.* As discussed in Section X.D., EPA identified certain low flow and episodic pulping vents that are not believed to be controlled at the floor. These points include unintentional pressure release points and sample line vents. These vents are small, intermittent sources with little emission potential. EPA did not have sufficient data to fully characterize these emission points or to make a floor determination. Based upon previous experience and engineering judgment, these vents are assumed to be uncontrolled at the floor. In addition, EPA decided not to require these sources to be controlled under the NESHAP. Since limited data are available, definition of these emission points is difficult. However, EPA can establish parameters that would be characteristic of the low flow and episodic emission points. These streams can be identified by volumetric flow rate, mass flow rate, or liquid phase HAP mass loading of the combined streams entering pulping component process equipment. EPA is therefore proposing that volumetric flow rate, mass flow rate, and HAP mass loading are appropriate formats to identify these points. EPA requests data and solicits comment on the types of pulping component emission points that are not controlled within the industry, and whether volumetric flow rate, mass flow rate, and HAP mass loading are in fact good parameters for identifying such emission points.

b. *Pulping Component Enclosures and Closed Vent Systems.* A combination of equipment and work practice standards is proposed for pulping component enclosures and closed vent systems. These standards are proposed to ensure that all open process equipment is enclosed such that a negative pressure drop is maintained at each enclosure opening and that all emissions from process equipment within the pulping component are transported to the control device via enclosed piping and duct work with no detectable leaks. Proper work practices are needed to ensure that the equipment will capture and convey the emissions to a control device. The proposed work practice includes periodic monitoring, inspections, and repair. An emissions standard was not a reasonable format for pulping component closed vent systems because it would require an enclosure to be used to capture and measure emissions from an already enclosed system.

c. *Reduction of HAP in the Pulping Component Emissions.* An emission standard and two equipment and design standards are proposed for control of HAP emissions from the pulping component of this source category. The proposed emission standard includes two alternatives—a weight percent reduction and an outlet concentration. A mass emission limit was not appropriate for pulping process emission points because variation within the industry, including capacity and processes, greatly affects emission rates; and data were not available to determine the mass limits that would address this variation. In general, a weight percent reduction format will ensure that the MACT is applied and the required emission reductions are realized. However, the technology that is the basis for MACT (combustion) cannot be demonstrated to achieve the selected percent reduction for streams with low organic HAP concentrations. Therefore, an alternative concentration limit that is achievable has been included. The combination of the weight percent reduction or concentration limit will ensure that the best technology is applied to all pulping process emission points, whether they have higher or lower concentrations.

Two equivalent standards—each of which is an equipment and design standard—are also proposed for pulping component emission control. These standards have been determined by EPA to be equivalent to the emission standards, and are proposed to provide maximum compliance flexibility. The selection of the numerical values for these standards is presented in Section X.H of this notice.

The first equipment and design standard is the requirement that gas streams from pulping component emission points be routed to a combustion device designed and operated at a minimum temperature and residence time. The second equipment and design standard requires that gas streams from pulping component emission points be routed to a boiler, lime kiln, or recovery furnace and introduced: (1) Into the flame zone or (2) with the primary fuel. Each of these alternative standards would achieve emission reductions equivalent to the proposed emission standard, as they are based on the performance of the MACT technology—i.e., combustion.

3. Format of the Standards for the Bleaching Component

The standards for controlling air emissions from the bleaching component are a combination of equipment, design, work practice, and emission standards. The standards include requirements for enclosures and closed vent systems, as well as for reduction of HAP emissions in the bleaching component. The bleaching component standards also include applicability levels to identify those bleaching vents that are not required to be controlled. The rationale for choosing the format of the standards is discussed below.

a. *Applicability Levels.* For the same reasons identified for the pulping component, EPA identified certain low flow and episodic bleaching vents that are not believed to be controlled at the floor. Available data indicate that these minor bleaching component emission points can also be identified by volumetric flow rate or mass flow rate. EPA requests data and solicits comment on the types of bleaching component emission points that are not controlled within the industry, and on whether volumetric flow rate and mass flow rate are in fact good indicators of such emission points. EPA is not proposing to identify these minor emission points with a liquid phase HAP mass loading of the combined streams entering the process equipment. Chemical reactions that occur within the equipment change the characteristics of the HAPs in the equipment, making an entering mass loading limit not representative of emission potential. EPA solicits comment and requests data on whether a HAP mass loading for streams entering the process equipment would be an appropriate format.

b. *Bleaching Component Enclosures and Closed Vent Systems.* A combination of equipment and work practice standards is proposed for bleaching component enclosures and closed vent systems. These standards are proposed to ensure that all open process equipment is enclosed such that a negative pressure drop is maintained at each enclosure opening and that all emissions from process equipment within the bleaching component are transported to the control device via a closed vent system with no detectable emissions. Proper work practices are needed to ensure that the equipment will capture and convey all emissions. The proposed work practice includes periodic monitoring, inspections, and repair. An emissions standard was not a reasonable format for bleaching component closed vent systems for the same reasons discussed in Section X.G.2.b for the pulping component.

c. *Reduction of HAP in the Bleaching Component Emissions.* An emission standard is proposed for the bleaching component emission points. The proposed emission standard is a weight percent reduction, which is based on the efficiency of the MACT technology (scrubbing). A mass emission limitation was not appropriate for bleaching component emission points because variation within the industry, including capacity and processes utilized, greatly affects emission rates; and data were not available to determine the mass limitations that would address this variation.

4. Format of the Standards for the Process Wastewater Component

EPA is proposing standards for process wastewater stream emissions within the process wastewater component of this source category. To ensure that emissions are captured and conveyed to a control device, the proposed standards include requirements for:

- An enclosed process wastewater collection and treatment system;
- Treatment to reduce the HAP concentration in the process wastewater streams; and
- Conveyance of emissions vented from the process wastewater treatment device and the enclosed process wastewater collection system in a closed vent system to a control device.

Applicability levels are included in the process wastewater component standards to identify those process wastewater streams that are not required to be controlled.

a. *Applicability Levels.* As discussed in Section X.D., EPA identified certain process wastewater streams that are not currently being controlled. These include all bleaching process wastewater streams, and some pulping process wastewater streams. However, defining the specific pulping process wastewater streams that are not required to be controlled is not proposed because mills define these streams differently. In reviewing the emissions test data and the API/NCASI voluntary survey data, EPA determined that mills do not control process wastewater streams with low concentrations and flows. Therefore, EPA is proposing concentration and flow rate parameters to identify pulping process wastewater streams that do not require control. EPA solicits data on the types of pulping process wastewaters that are currently steam stripped, the flow rates of these process wastewater streams, and the annual average HAP concentration of these process wastewater streams. EPA also solicits comment on whether it is better to name specific process wastewater streams to be controlled or to set a concentration and flow rate. EPA solicits information on defining these named process wastewater streams.

b. *Wastewater Collection and Treatment.* Two formats were considered in developing the proposed standards for enclosed process wastewater collection and treatment system equipment. These formats included a numerical emission standard and combination equipment and work practice standard.

Although considered first, it was determined that a numerical standard would not be feasible because it would be difficult to capture and measure emissions from this equipment for the purpose of evaluating compliance. Due to the number of openings and possible emission points, accurate measurement would require enclosure of the entire airspace around a piece of equipment. This approach would not be practical for numerous equipment components.

The format selected was an equipment and work practice standard. Because the intent of the standard is to capture all emissions from the process wastewater collection and treatment equipment, an equipment standard is appropriate. The standard requires the installation and proper maintenance of roofs, covers, lids, water seals, and enclosures on tanks, surface impoundments, containers, and individual drain systems. The work practices would be required to ensure proper operation and maintenance of the equipment. The proposed work practices include periodic monitoring, inspection, and repair.

The proposed standards would require that emissions from process wastewater collection and treatment system equipment be controlled from the point of generation of the process wastewater stream until: It enters the treatment device; or it reaches a controlled piece of equipment to which it is being recycled (e.g., a washer) that is subject to the standards for the pulping or bleaching components being proposed today.

c. *Reduction of HAP Concentration in the Process Wastewater Streams.* Three equivalent formats are proposed for reduction of process wastewater stream HAP concentration: a numerical format, an equipment design and operational format, and an equipment and work practice standard. Another format, a mass removal standard, is not proposed.

(1) Numerical Format. Two alternative numerical emission limitation formats are proposed to provide sources with a maximum degree of operational flexibility in complying with the standards. These emission limitation formats are: A mass percent reduction of HAP in the process wastewater stream or an effluent concentration limitation for HAP. The rationale for providing alternative emission limitations based on both a percent reduction and an effluent concentration is given below.

The percent reduction format is based on the organic HAP removal efficiency of a steam stripper; however, any treatment process that can achieve the proposed efficiency can be used to comply with the standard (e.g., biological treatment). Percent reduction was chosen because it is the best representation of control technology performance.

The effluent concentration limitations are also based on the performance of a steam stripper. Effluent concentration limitations are provided as alternatives to the percent reduction standard to allow compliance flexibility for facilities required to treat process wastewater streams having low organic HAP concentrations. Requiring a percent reduction standard alone for these process wastewater streams would not be reasonable. At very low concentrations, it is technically much more difficult and costly to achieve the same level of percent reduction.

(2) Equipment Design and Operational Format. Another regulatory format proposed for process wastewater stream treatment is an equipment design and operational format. The equipment standard consists of the installation of a steam stripper designed and operated at specified parametric levels. The specifications for the steam stripper were developed to provide a standard piece of equipment (with associated operating conditions) that can achieve either the mass percent HAP removal or the effluent concentration of HAP.

This equipment design and operational format was included to provide an alternative means of compliance that all sources would be able to use, while achieving the desired emission reduction.

(3) Equipment and Work Practice Format. A final equivalent standard proposed for controlling process wastewater emissions is an equipment and work practice standard. This format is based on the recycling of process wastewater in a closed collection system to a controlled piece of equipment. A controlled piece of equipment is defined as any unit requiring control under the proposed standards for pulping, such as a brownstock washer. When recycling is used, process wastewater emissions are controlled with equipment emissions, and the process wastewater is reused. This format is proposed to encourage chemical recovery and pollution prevention.

(4) Mass Removal. EPA is not proposing a required mass removal format as a standard for controlling emissions from process wastewaters. The Agency solicits comment on this approach, however, specifically on the HAP emission reductions that could be achieved and on whether a mass removal would be a preferable format to that of the standards proposed.

d. *Vent Collection and Vapor Recovery or Destruction Device.* HAPs are emitted from vents on process wastewater treatment devices such as steam strippers and from vents on covered process wastewater collection units such as clarifiers and junction boxes. The equipment and work practice standards for closed vent systems that are proposed for pulping component emission points are also proposed for vents on wastewater control devices. An emission standard is generally appropriate for vapor destruction devices used to control vapor streams containing HAP from transport, handling, and treatment equipment. The emission standard that is proposed for pulping component emissions is also proposed for controlling vent emissions from process wastewater control devices.

### *H. Selection of Numerical Values in Emission Standards*

This section discusses the rationale for the selection of the standards for the pulping, bleaching, and process wastewater components of the source category. The selection of applicability levels, numerical limitations for the emission standards, and design parameters is also included.

#### 1. Selection of Standards for the Pulping Component

The selection of applicability levels, emission limitations, and equivalent standards for the pulping component is discussed in this section.

a. *Applicability Levels.* As discussed in Section X.G., certain minor emission points within the pulping process are not required to be controlled by the proposed standards. The following applicability levels were established to identify those points that are not required to be controlled:

• Individual process emission points from enclosed process equipment that maintain either a volumetric flow rate less than 0.0050 standard cubic meters per minute (scmm), mass flow rates less than 0.230 kilograms of total HAP per hour (Kg/hr), or mass flow rates less than 0.0010 kilograms of total HAP per megagram of air dry pulp produced (Kg HAP/Mg ADP); or

• Process equipment with the sum of all pulp and process wastewater streams entering the process equipment maintaining a HAP mass loading of less than 0.050 kilograms of total HAP per megagram of ADP. Since MACT was determined to be the floor level of control, the numerical applicability levels are set to control emission points that are controlled at the floor. EPA requests comment on whether these numerical applicability levels are appropriate for identifying pulping component emission points that are not controlled.

b. *Emission Limitations for the Pulping Component.* Two alternatives that achieve equivalent emission reduction—a percent reduction and an outlet concentration— are proposed for the pulping component emission standards. A 98 percent reduction of HAP emissions was chosen based upon the efficiency achievable by the floor level control technology of combustion in an incinerator, boiler, lime kiln, or recovery furnace. A 20-ppmv HAP outlet concentration corrected to three percent oxygen was selected as an equivalent alternative to 98-percent reduction for incinerators. The percent control is based upon an EPA analysis of thermal incinerator performance for NSPS (used to support the SOCMI distillation reaction, and air oxidation NSPS) and of incinerator performance for VOC (See BID). Because most of the HAP from pulping component and process wastewater emissions is also VOC, the reduction efficiency for total HAP was determined to be the same as that for VOC. Incinerators combusting vent streams with concentrations less than 1,000 ppmv may not be able to demonstrate 98 percent control, but can achieve outlet concentrations of HAP less than 20 ppmv corrected to three percent oxygen.

c. *Design and Equipment Standard for Combustion Devices.* The minimum temperature of 1600° F and residence time of 0.75 seconds in an incinerator are required for the equivalent equipment standard. These values are based on the results of EPA analysis of incinerator efficiencies mentioned above. The minimum temperature and residence time ensure that HAP emissions are reduced to the level achieved by the emission limit standard.

Analyses also showed that when vent streams are: Introduced with the primary fuel to boilers, lime kilns, recovery furnaces; or introduced into the flame zone of such devices, over 98 percent reduction is achieved due to the high temperatures and residence times typical of such combustion devices. For this reason, an equivalent equipment and design standard is to route all emission gas streams with the primary fuel or into the flame zone of combustion devices.

d. *Equipment Standard for Enclosures and Closed Vent Systems.* All HAP emissions from pulping component emission points subject to control must be captured and transported in a closed vent system with no detectable leaks. These standards are proposed to ensure that all open process equipment is enclosed such that a negative pressure drop is maintained at each enclosure opening, and that all emissions from process equipment within the pulping component are transported to the control device via enclosed piping and duct work with no detectable leaks. No detectable leaks are determined by a portable hydrocarbon detector reading of less than 500 parts per million above background. Specifications for by-pass lines are also included to ensure that emission point gas streams are not diverted to the atmosphere.

2. Selection of Standards for the Bleaching Component

The selection of applicability levels, emission limits, and alternative standards for the bleaching component is discussed in this section.

*a. Applicability Levels.* As discussed in Section X.G., certain minor emission points within the bleaching component are not intended to be controlled by the proposed standards. The following applicability levels were established to identify those individual process emission points that are not required to be controlled—emission points maintaining either:

• Volumetric flow rate less than 0.0050 scmm;

• Mass flow rate less than 0.230 kilograms of total HAP per hour; or

• Mass flow rate less than 0.0010 kilograms of total HAP per megagram of air dry pulp produced. Since MACT was determined to be the floor level control, the numerical applicability levels are set to control emission points that are controlled at the floor. EPA requests comment on whether these numerical applicability levels are appropriate for identifying bleaching component emission points that are not controlled.

*b. Numerical Limitation.* A 99 percent reduction of the total HAP mass in the vent stream was chosen based upon the efficiency achievable by the floor level control technology, which is scrubbing. The efficiency was selected based upon data from NCASI Bulletin 616. According to the report, the best performing scrubbers are designed with a control efficiency of 99 percent for chlorine and chlorine dioxide. Engineering equations and models were used to determine the efficiency for other HAP compounds, including hydrochloric acid and methanol. Using scrubber design specifications, scrubber efficiencies for these compounds, which comprise the majority of total HAP emissions from the bleach plant, were estimated to be 99 percent. EPA requests comment on the removal efficiency of scrubbers—specifically for methanol, chloroform, chlorine, and any additional HAP compounds.

*c. Enclosures and Closed Vent Systems Standards.* Bleaching emission points subject to control are required to meet the same enclosure and closed vent system standards that are applicable for the pulping component.

3. Standards for the Process Wastewater Component

*a. Applicability Levels.* As discussed in Section X.G., EPA set applicability levels to identify those pulping process wastewater streams that are not controlled at the floor, and therefore would not be required to be controlled by today's proposed standards. As discussed in Section X.G., no bleaching process wastewater streams are required to be controlled. According to available data, pulping process wastewater streams that are steam stripped typically have an annual average concentration of at least 500 ppmw HAP or a flow rate of at least 1 ℓpm. Therefore, the process wastewater component of the floor is limited to the application of steam stripping for pulping process wastewater streams with either HAP concentrations greater than or equal to 500 ppmw or flow rates greater than or equal to 1 ℓpm. EPA's intent in establishing the 500 ppmw HAP and 1 ℓpm levels is to differentiate between process wastewater streams that are currently being controlled at the MACT floor and those that are not. During the development of today's proposal, EPA considered selecting 100 ppmw HAP as the threshold to differentiate between process wastewater streams that are controlled at the MACT floor and those that are not. The pulp and paper industry commented that 100 ppmw HAP and 1 ℓpm flow rate may require more process wastewater streams to be controlled than are currently controlled at the best sources. Upon further analysis of the process wastewater stream data presented in the BID, as well as information submitted by the industry, EPA determined that 500 ppmw is an appropriate threshold for identifying the floor. The industry has undertaken a program to collect additional process wastewater stream concentration data that may be useful in adjusting this concentration threshold, if necessary, for the final rule. EPA solicits comments and data on whether the 500 ppmw HAP concentration and 1 ℓpm flow rate identify those process wastewater streams not currently being controlled.

*b. Process Wastewater Collection System.* As discussed previously, effective control of process wastewater emissions requires control from the point of generation until treated to comply with the treatment standard, or until recycled to a controlled piece of equipment that is in compliance with the pulping process component standards (e.g., a washer). Today's proposed standards require that emissions be controlled during process wastewater collection and transport in piping or individual drain systems, and during handling and treatment in wastewater tanks, containers, surface impoundments, and treatment devices by using covers, lids, water seals, roofs, and enclosures designed to reduce emissions. Proper work practices, including periodic monitoring, inspection, and repair, are also required to ensure that the equipment will control emissions. Emissions from these process wastewater collection, transport, and handling systems are believed to be significant, thereby requiring the use of controls to effectively reduce air emissions. However, emissions are typically greatest from turbulent handling of process wastewater. In quiescent basins such as the clarifiers used at pulp and paper facilities upstream from biological treatment, emissions are much less significant. For this reason, EPA requests comments on the need to cover these quiescent process wastewater storage units.

*c. Process Wastewater Treatment.* Today's proposed regulation provides three equivalent formats for demonstrating compliance with the process wastewater treatment standards—two emission limitations and an equipment and design specification, as discussed in Section X.G.4. The first emission limitation is a 90 percent removal of HAP from the process wastewater. The 90 percent removal is based on the removal efficiency of the floor level control technology, which is a steam stripper using 0.18 kilopascals (kPa) of steam per liter of process wastewater treated. However, the 90 percent removal may be achieved through other control technologies. For example, another way to achieve the 90 percent removal is through biological treatment.

A second emission limitation that is provided as an equivalent format for demonstrating compliance with the process wastewater treatment standard is a total HAP concentration limit of 500 ppmw. This limitation is provided to allow additional flexibility for the owner in demonstrating compliance with the process wastewater treatment standard. In addition, because process wastewater streams less than 500 ppmw were determined to have a floor of no control, treatment of process wastewater streams to a concentration of less than 500 ppmw generates a process wastewater stream that would require no additional control from the point at which it exits the steam stripper.

As stated previously, the 90 percent removal is based on the average removal efficiency of those steam strippers using at least 0.18 kPa of steam per liter of process wastewater feed. EPA requests comment on the efficiency of these steam strippers for removing total HAP, and methanol specifically.

An equipment and design standard based on the use of a steam stripper is proposed as a third equivalent format for demonstrating compliance with the process wastewater treatment standard. If the owner or operator installs and operates a steam stripper in compliance with the following requirements, an equivalent emission reduction to that provided with the numerical emission limits is achieved. These design and operating parameters include:

- Counter current flow configuration with a minimum of 8 theoretical trays in the stripping section of the column,
- A minimum steam flow rate of 0.18 kPa of steam per liter of process wastewater feed with steam of at least 149 degrees Centigrade and 276 kilograms gauge pressure,
- Minimum process wastewater column feed temperature of 96 degrees Centigrade, and
- Maximum liquid loading of 44,600 liters per hour per square meter.

*d. Vent Collection of Vapor Recovery or Destruction.* HAPs are emitted from vents on enclosed or covered process wastewater collection and treatment system devices such as individual drain systems and steam strippers. These emissions are required to be vented through a closed vent system meeting the same requirements as those proposed for the pulping component emission points. The closed vent system must route these vapors to a vapor recovery or destruction device achieving at least a 98 percent destruction or recovery. This limitation is based on the efficiency of a combustion device, as discussed previously.

Because biological treatment units destroy the HAP in the process wastewater, a well-operated biological treatment unit is not required to be covered and vented to vapor recovery and destruction. Instead, today's proposed regulation requires an owner or operator electing to use a biological treatment unit to meet the 90 percent removal requirement by demonstrating that 90 percent of the HAP entering the biological treatment unit is being destroyed and not emitted.

*I. Selection of Continuous Monitoring Requirements*

Section 114(a)(3) of the CAA requires enhanced monitoring of control devices by all major stationary sources. Section 70.6 of the promulgated operating permit rule (57 FR 32250) requires the submission of "compliance certifications" to ensure continuous compliance from sources subject to the operating permit rule. In light of these requirements, EPA has considered how sources subject to this NESHAP would demonstrate continuous compliance with standards for the pulping, bleaching, and process wastewater components of the regulation.

EPA considered three monitoring options: The use of continuous emission monitors (CEMs) to measure total HAP, the use of CEMs for surrogate compounds such as methanol, chlorine, VOC, or total hydrocarbons (THCs) as surrogate for total HAP, or the continuous monitoring of control device operating parameters.

The first two options were determined to be unreasonable for this industry. Continuous emission monitors for total HAP are currently not available and it is technically not possible to monitor each individual HAP. It may be technically feasible to monitor VOC or THCs as a surrogate for total HAP through the use of a flame ionization analyzer (FIA). However, the FIA does not speciate compounds. At the outlet of a combustion device, it will measure the ionization potential of the uncombusted fuel and products of incomplete combustion in addition to the uncombusted components of the gas stream, thus biasing monitoring results. Additionally, FIAs do not respond equally to all VOC or HAPs, and a correlation of VOC or THC to HAP compounds present in pulp and bleach vent streams has not been established. Because an FIA or similar device would be an extra burden on the industry without increasing the accuracy of compliance demonstrations, this option was determined to be unreasonable.

The continuous monitoring of control device operating parameters, established during the performance test or specified through design, is used to determine whether continuous compliance is achieved. Failure to maintain the established values for these parameters would be an enforceable violation of the emission limits of today's proposed standards. Some of the process parameters are already monitored as part of normal operation. Therefore, continuous compliance is assured without imposing an additional, unnecessary burden on the facility. The specific parameters that need to be monitored for each component are discussed below.

1. Pulping Process Continuous Monitoring Requirements

In the proposed rule, owners or operators are required to enclose and vent emissions from the pulping process component into a closed vent system and control those emissions as specified in the regulation.

*a. Enclosure and Closed Vent System Monitoring Requirements.* The proposed rule establishes requirements to ensure that negative pressure is maintained on enclosures and that emissions are routed through a closed vent system with no detectable leaks. If the closed vent system contains bypass lines, the proposed standards require the owner or operator to ensure emissions are not bypassing the control device.

An initial performance test must be conducted to ensure that negative pressure is maintained on all openings of each enclosure and a monthly inspection must be performed to confirm that any enclosure openings that were closed during the performance test remain closed.

To ensure continuous compliance with the requirement of no detectable leaks from the enclosure and closed vent system, monitoring with a portable hydrocarbon detector is required to be performed initially and annually, along with a program of monthly visible inspections of the ductwork, piping, and connections to covers for evidence of visible defects. If visible defects in the closed vent system are observed, readings greater than 500 ppmv above background are measured, or enclosure openings do not have negative pressure, a first effort to repair the closed vent system must be made as soon as practicable and no later than 5 calendar days. The repair must be completed no later than 15 calendar days after identification.

To ensure the control device is not being bypassed if bypass lines are present, owners or operators must install, calibrate, maintain, and operate according to manufacturer's instructions a flow indicator that provides a record of emission point gas stream flow at least once every 15 minutes. As an alternative, the proposed rule allows bypass lines to be sealed in the closed position and visually inspected every month to ensure they are being maintained in the closed position. The use of flow indicators or seals on the bypass lines ensures that process vent streams are continuously being routed to the control device.

*b. Control Device Monitoring Requirements.* Owners or operators can demonstrate compliance with the requirements for pulping component emission points either by conducting an initial performance test to establish parameters that achieve 98 percent destruction or by meeting the design requirements. Owners or operators using an incinerator to comply with the pulping component requirements are required to install, calibrate, operate, and maintain according to manufacturers' instructions a temperature monitoring device measuring firebox temperature, and equipped with a continuous recorder. The continuous monitoring of temperature within the firebox ensures compliance with the required percent emission reduction or outlet concentration by measuring that the combustion temperature is sufficient to ensure good combustion of HAPs. Firebox temperature is typically monitored within the pulp and paper industry to ensure proper operation of the incinerator.

The continuous temperature monitoring requirement described above does not apply to vent streams introduced into recovery furnace with the primary fuel or into the flame zone. These devices operate at temperatures and residence times that EPA has concluded will ensure compliance with the emission limits (at least 98 percent reduction of total HAP). Therefore, if the vent stream is routed to the devices as described above and enters at the specified locations, continuous compliance is demonstrated.

The proposed rule requires continuous compliance and does not account for downtime associated with existing combustion devices such as the lime kiln and recovery furnace. Pulp mills are assumed to operate and vent emissions to these existing devices during pulping process operations, or vent emissions to a stand-alone incinerator. EPA requests comments concerning continuous compliance associated with utilizing existing combustion devices, such as data on downtimes and frequencies while pulping operations continue, capacity utilization, retrofit information, and current back-up operations.

2. Bleaching Process Continuous Monitoring Requirements

The owner or operator is required in the proposed rule to enclose and vent emissions from the bleaching component into a closed vent system and control those emissions as specified in the regulation.

*a. Enclosure and Closed Vent System Monitoring Requirements.* Monitoring requirements for bleaching component closed vent systems are the same as those described in Section X.I.1.a for the pulping process component.

*b. Control Device Monitoring Requirements.* Owners or operators using a gas scrubber to comply with the emission limits specified for the bleaching area are required to install, calibrate, operate, and maintain according to manufacturers' specifications continuous monitors with continuous recorders of:

- The pH of the gas scrubber effluent,
- The flow of the gas scrubber vent gas inlet, and
- The gas scrubber liquid influent flow rate. Monitoring the pH ensures sufficient excess caustic needed for total HAP removal. Monitoring the gas stream and liquid stream flows ensures the proper liquid-to-gas ratio needed for total HAP removal. All of these parameters are set during the initial performance test that demonstrates required total HAP reduction. Liquid and gas flow rates, as well as pH, are typically monitored under current industry practices to ensure continuous proper scrubber operation; therefore continuous compliance of the gas scrubber with the required control levels can be ensured without imposing additional burden. The Agency requests comment and data on the use of a design scrubber, specifically on the parameters that would ensure 90 percent reduction to allow facilities to avoid compliance testing, including flow rate and pH.

3. Process Wastewater Continuous Monitoring Requirements

The proposed standards include requirements for continuous monitoring to ensure that owners suppress and capture emissions from the process wastewater collection system, treat the process wastewater to reduce the HAP concentration, and convey emissions from the process wastewater collection and treatment to a control device as specified in the regulation.

*a. Process Wastewater Collection.* The standards require monitoring to ensure that the process wastewater collection system equipment—including tanks, surface impoundments, containers, and drain systems—is operated with no detectable leaks. The standards require owners or operators to demonstrate initially and annually that the system has no detectable leaks according to the procedures for pulping component enclosure and closed vent systems, as discussed in Section X.I.1.a. The standards also include a requirement for weekly inspection of the process wastewater collection system to detect and repair any leaks in the system.

*b. Process Wastewater Treatment.* The proposed regulation requires each owner or operator using a steam stripper to comply with the emission limit or design and equipment standards specified for process wastewaters to install, calibrate, operate, and maintain according to manufacturers' specifications continuous monitors with continuous recorders of:

- The mass rate of process wastewater fed to the stripper,
- The mass rate of steam fed to the stripper, and
- The process wastewater column feed temperature. These parameters are either established during an initial performance test or according to design specification in the regulation. They are typically monitored in the industry to ensure proper operation; therefore ensuring continuous compliance of a steam stripper with the specified requirements for HAP removal requires no additional monitoring burden.

Owners or operators using a biological treatment unit to achieve a 90 percent total HAP reduction across the unit are required to monthly measure the methanol or HAP concentration in the influent and effluent, and identify appropriate parameters to be monitored to ensure continuous compliance. These parameters must be determined during the initial performance test as demonstrated to the Administrator's satisfaction, and monitored accordingly. The NCASI is collecting information on the effectiveness of biological treatment units and monitoring techniques. One potential method they have suggested is the monitoring of inlet and outlet soluble BOD. EPA requests comments on applicable monitoring parameters for biological treatment units and supporting data on biorates and corresponding parameters for monitoring.

*c. Enclosure and Closed Vent System Monitoring Requirements.* Enclosure and closed vent system and vapor control monitoring requirements for combustion of the vent streams from process wastewater collection and treatment are identical to those discussed for the pulping process component monitoring requirements.

### *J. Selection of Reporting and Recordkeeping Requirements*

Under Section 114(a) of the CAA, the Administrator may require any owner or operator of an affected source to establish and maintain records; make reports; use and maintain monitoring equipment; use such audit procedures, or methods; and provide such other information as EPA may reasonably require. The general requirements for all affected sources are presented in the proposed NESHAP General Provisions in 40 CFR part 63, subpart A (58 FR 42760; August 11, 1993) hereafter referred to as the proposed General Provisions).

The proposed rule would specifically require sources to submit the following five types of reports:

- Initial Notification,
- Notification of Performance Tests,
- Notification of Compliance Status,
- Exceedance Reports, and
- Quarterly Summary Reports.

These reporting requirements are consistent with the proposed General Provisions. The purpose and contents of each of these reports are described in this section, and differences between today's proposed standards and the proposed General Provisions are noted. Reports are to be submitted to the Administrator of EPA, an EPA regional office, a State agency, or other authority that has been delegated the authority to implement this rule. In most cases, reports will be sent to State agencies. Addresses are provided in the proposed General Provisions.

The exceedance and summary reports are not required for emission points that are not required to be controlled under the standards for the pulping, bleaching, and process wastewater components.

Records of reported information and other information necessary to document compliance with the regulation are generally required by the proposed General Provisions to be kept for five years. A few records pertaining to equipment design would be kept for the life of the equipment.

#### 1. Initial Notification

The proposed rule would require owners or operators who are subject to the standards to submit an Initial Notification. This report will establish an early dialog between the source and the regulatory agency, allowing both to plan for compliance activities. The notice is due 45 days after the date of promulgation for existing sources. For new sources, it is due 180 days before commencement of construction or reconstruction, or 45 days after promulgation of today's proposed standards, whichever is later.

The notification must include the owner or operator's name and address, the source's location, a brief description of the processes at the source that are subject to the proposed standards, and which provisions may apply (e.g., pulping, bleaching, and/or wastewater component). A description of the source's compliance strategy, including a detailed identification of emission points, must be included in the Initial Notification. The Initial Notification must also include a statement of whether the source can achieve compliance by the specified compliance date. If a particular source anticipates a delay that is beyond its control, it will be important for the owner or operator to discuss the problem with the regulatory authority as early as possible. Pursuant to Section 112(d) of the CAA, the proposed rule has provisions for 1-year compliance extensions to be granted on a case-by-case basis.

#### 2. Notification of Performance Tests

The Notification of Performance Tests informs EPA of the owner or operator's intention to conduct performance tests of control equipment and performance evaluations of continuous monitoring systems. The notification must be submitted at least 75 calendar days before the performance tests are scheduled to begin to allow EPA to review and approve the site-specific test plans and to have an observer present during the tests.

#### 3. Notification of Compliance Status

The Notification of Compliance Status must be submitted by registered letter before the close of business on the 45th day following the completion of the relevant performance tests or other compliance demonstration activities. The notification contains the information necessary to demonstrate that compliance has been achieved, such as the methods used, control device performance test results, and continuous monitoring system performance evaluations. The methods that will be used to determine continuing compliance are also included in the notification, such as descriptions of the monitoring and reporting requirements and test methods.

Another type of information to be included in the Notification of Compliance Status is the specific range for each monitored parameter for each emission point, and the rationale for why this range demonstrates continuous compliance with the emission limit. As an example, for an emission point controlled by the incinerator, the notification would include the site-specific minimum firebox temperature that will ensure 98 percent emission reduction by the incinerator, and the data and rationale to support this minimum temperature.

4. Exceedance Reports

Exceedance Reports are required for any quarter where an exceedance of a monitored parameter is noted. This would include reporting when a process parameter does not meet compliance levels established in the compliance report, as well as any other operating procedures outlined in the standards that are not followed, including the monthly inspections of the closed vent system or enclosed wastewater system. These reports must contain the following information: The date and time of the monitoring parameter exceedances; the nature of any malfunction, start-up, or shut-down not completely consistent with the submitted plan and an explanation why; any corrective action taken; the total process operating time during the reporting period; and information concerning times when the continuous monitoring system is not operating properly. If an Exceedance Report is required, the summary report for that quarter must contain the Exceedance Report. A separate Exceedance Report is not required.

5. Quarterly Summary Reports

A quarterly Summary Report shall be submitted for each affected source. The report contains the following information: (1) The company name and address; (2) an identification of each HAP monitored at the affected source; (3) the beginning and ending dates of the reporting period; (4) a brief description of the process units; (5) the emission and operating parameter limitations specified in the standards; (6) the monitoring equipment manufacturer(s) and model number(s); (7) the date of the latest continuous monitoring system certification or audit; (8) the total operating time of the affected source during the reporting period; (9) a summary of excess emissions; (10) continuous monitoring system performance summary; (11) a description of any changes in processes, controls, or monitoring systems; and (12) the name, title, and signature of the responsible official certifying the accuracy of the report. The quarterly Summary Report will contain the quarterly Exceedance Report if an Exceedance Report is required, and a separate Exceedance Report will not be submitted. This report is consistent with the General Provisions.

6. Recordkeeping Requirements

The proposed rule requires sources to keep readily accessible records of monitored parameters. For those control devices that must be monitored continuously, records that include at least one monitored value for every 15 minutes of operation are considered sufficient. These monitoring records must be maintained for five years.

The proposed General Provisions require the submittal of a start-up, shut-down, and malfunction plan. Anytime an owner or operator is not consistent with the plan, accessible records explaining why must be kept.

*K. Selection of Test Methods and Procedures*

Test methods and procedures are required to ensure compliance with the standards proposed for the pulping, bleaching, and process wastewater components. These proposed standards include requirements for demonstrating that an emission point or process wastewater stream does not require control or that it is in compliance with the control requirements. Requirements to test for no detectable leaks from control devices, enclosure and closed vent systems, and process wastewater collection and treatment systems are also included.

1. Pulping Component

The proposed pulping component standards require the use of approved test methods and procedures to ensure consistent and verifiable results for demonstrating that a pulping component emission point does not require control, or for demonstrating that the allowed emission levels are achieved when controls are applied. Because the majority of all HAP emissions from the pulping component are methanol, the owner or operator has the option of measuring methanol concentration and methanol emissions as a surrogate for total HAP.

As described in Section X.H., all pulping component emission points (other than deckers and screens at existing sources) must be controlled for HAP emissions under today's proposed standards unless the owner or operator demonstrates that one of the following conditions exists:

- The vent is from an enclosed process, and has a gas flow rate less than 0.0050 scmm;
- The vent is from an enclosed process, and has a vent stream emission rate less than 0.230 Kg total HAP/hr;
- The vent is from an enclosed process, and has vent stream emissions less than 0.0010 Kg total HAP/Mg ADP; or
- The sum of all streams entering the piece of process equipment have a total liquid phase mass loading of 0.050 Kg HAP/Mg ADP.

Vent stream flow rates are measured directly using Method 2, 2A, 2C, or 2D of 40 CFR part 60, appendix A. Methods 3 and 4 of 40 CFR part 60, appendix A, are used to determine the oxygen and carbon dioxide concentrations and the moisture content in the vent stream, respectively. Another option for demonstrating process vent flow rate is to use engineering assessment, such as previous test data, bench/pilot-scale data, or a design analysis based on accepted chemical engineering principles. The alternatives allow sources to make use of existing information on flow that can be documented in an engineering assessment. The engineering assessment must include documentation of methodology and assumptions so that it can be reviewed by the enforcement agency. The decision not to require testing where sufficient information is available to demonstrate flow will reduce the testing cost and burden for industry.

If sufficient information is available, owners or operators may also use an engineer's assessment for determining the HAP mass emission rate in either kilograms per hour or kilograms per megagram of ADP pulp. If engineering assessment is not used, the owner or operator may measure methanol concentration (as a surrogate for total HAP) in the vent stream using proposed Method 308 of 40 CFR part 63, appendix A. The minimum sampling time for each of the three runs per method is one hour. Because no one method can be used to measure all HAPs, and the major contributors to total HAP emissions have specific methods, a method for measuring total HAP concentrations is not being proposed. At this time, there are no validated test methods or procedures for total HAP measurement. The regulation allows the use of methanol to demonstrate compliance with the standards. It is anticipated that most sources subject to the standard may opt to measure methanol instead of total HAP. EPA solicits comments on whether a method for total HAP is applicable, and if one is necessary.

The owner or operator may determine the liquid-phase HAP concentration (or the methanol concentration as a surrogate for total HAP) in each stream entering a piece of process equipment using knowledge of the process streams, bench scale or pilot scale test data, or physical measurements of methanol concentration. Again, the three methods have been provided to allow less expensive alternatives than actual measurement if the appropriate information is available. For physical measurement of total HAP or methanol concentration in a process liquid stream, Method 305 (corrected for the fraction of HAP or methanol measured by the method) shall be used.

In addition to the methods described above, the proposed standards also allow the use of any test method or test results validated according to the protocol in Method 301 of 40 CFR part 63, appendix A.

Initial performance tests are required in the proposed regulation for all pulping component control devices other than those meeting the equipment standards described in Section X.H.1.

Initial performance tests are required for all other pulping component control devices to: demonstrate that a control device can achieve the required control level; and establish operating parameters that ensure continuous compliance. Flow and concentration measurements are needed to demonstrate compliance with the pulping component provisions of 98 percent HAP reduction or an outlet concentration of 20 ppmv for combustion devices. Method 2, 2A, 2C, or 2D of 40 CFR part 60, appendix A may be used to measure vent stream volumetric flow. Method 3 and Method 4 of the 40 CFR part 60, appendix A may be used to determine the oxygen and carbon dioxide concentrations, and the moisture content of the vent system, respectively. Proposed Method 308 of 40 CFR part 63, appendix A can be used to measure the methanol concentration. Three runs with a minimum sampling time of one hour each must be conducted for each method utilized. As an alternative to these methods, any test method or test results validated according to the protocol in Method 301 of 40 CFR part 63, Appendix A can be used. The proposed regulation contains equations for calculating percent reduction from the flow and concentration measurements. Procedures for correcting the outlet concentration from combustion devices to three percent oxygen are also included in the proposed standards.

The proposed standards require the use of Method 21 of 40 CFR part 60, appendix A to test for no detectable leaks in an enclosure and closed vent system equipment. Method 21 incorporates the use of a portable hydrocarbon detector to measure the concentration of VOC. Method 21 is used to test compliance in several standards in 40 CFR parts 60, 61, and 63, and represents the best available method for detecting leaks from these sources. The organic compounds measured by the hydrocarbon detector are not necessarily HAP. However, if organic compounds are contained in the enclosure and closed vent system equipment being tested, Method 21 is the best procedure available for providing an indication of leaks in the system.

The standards require that an initial performance test be conducted to demonstrate that negative pressure exists at the openings on enclosures over process equipment. The standard allows the use of the following to demonstrate negative pressure:

- An anemometer,
- visual inspection to indicate negative pressure,
- A differential pressure monitor, or
- Calculation of average face velocity.

2. Bleaching Component

The proposed bleaching component standards require the use of approved test methods and procedures to ensure consistent and verifiable results for demonstration that a bleaching component emission point does not require control, or for demonstration that the allowed emission levels are achieved when controls are applied. For all bleaching component requirements, the owner or operator has the option of measuring methanol and chlorine concentration and emissions as a surrogate for total HAP.

As described in Section X.H., all bleaching component emission points must control HAP emissions under today's proposed standards, unless the owner or operator demonstrates that the emission point is from an enclosed process, and has:

- A gas flow rate less than 0.0050 scmm; or
- A vent stream emission rate less than 0.230 Kg of total HAP/hr; or
- A vent stream emission rate less than 0.0010 Kg of total HAP/Mg air dried pulp. The owner or operator may use the methods described in Section X.K.1 for determining the vent stream flow rate and HAP emission rates.

For determining the HAP mass emission rate, the owner or operator may determine the total HAP mass emissions or the methanol and chlorine mass emissions. Methanol mass emissions can be determined using the methods described earlier in Section X.K.1. The chlorine mass emissions may be determined using Method 26A of 40 CFR part 60, appendix A or any other test method or data that has been validated according to the protocols in Method 301 of 40 CFR part 63, appendix A. There must be three runs for each method. The minimum sampling time for each of the three runs is one hour.

Performance tests are required for bleaching component control devices to: Demonstrate that a control device can achieve the required control level and help establish operating parameters that ensure continuous compliance. To demonstrate compliance with the bleaching component requirements of 99 percent reduction of total HAP mass in the vent streams, Method 2, 2A, 2C, or 2D of 40 CFR part 60, appendix A may be used to measure vent stream volumetric flow. Method 3 and Method 4 of 40 CFR part 60, appendix A may be used to determine the oxygen and carbon dioxide concentrations, and the moisture content of the vent system, respectively. The method for determining methanol and chlorine concentrations is as described earlier in Section X.K.1.

The proposed standards require the use of Method 21 of 40 CFR part 60, appendix A to test for no detectable leaks in closed vent system equipment. The standards require that an initial performance test be conducted to demonstrate that negative pressure exists at the process equipment enclosure openings. The methods for demonstrating negative pressure are the same as those for the pulping component, which are described in Section X.K.1 and earlier in this section, respectively.

3. Process Wastewater Component

The proposed process wastewater component standards require the use of approved test methods and procedures to ensure consistent and verifiable results for demonstration that a process wastewater component stream does not require control, or for demonstration that the allowed emission levels are achieved when controls are applied. As for the pulping component emission points, the owner or operator has the option of measuring methanol concentrations and mass as a surrogate for total HAP.

As described in Section X.H., all process wastewater component streams from the pulping process must be controlled for HAP emissions per the requirements in today's proposed standards, unless the owner or operator demonstrates that one of the following conditions exist: the annual average process wastewater stream flow rate is less than 1.0 ℓpm; or the annual average

HAP concentration is less than 500 ppmw. Process wastewaters from the bleaching process are not required to be controlled by these proposed standards.

Several methods can be used to determine the annual average process wastewater stream flow rate. The owner or operator may estimate process wastewater flow rate using the maximum annual production capacity of the process equipment, knowledge of the process and mass balance. The owner or operator may also use measurements that are representative of average process wastewater generation rates. A third option is to select the highest flow rate of process wastewater from historical records. Knowledge-based methods are allowed to provide flexibility and to allow the use of less expensive alternatives than actual measurement if the appropriate information is available.

For quantifying the annual average HAP concentration of the process wastewater streams, three methods are available:

- Knowledge of the process wastewater streams,
- Bench scale or pilot scale test data, or
- Physical measurement. Again, the three methods have been allowed to provide flexibility. Because available data indicate that the majority of total HAP emissions are methanol, the methanol concentration is allowed as a surrogate for total HAP concentration.

If the actual concentration of methanol is measured, the proposed regulation requires that the sample be collected from the point of generation of the individual process wastewater stream, or if not feasible to be collected at the point of generation, to be corrected to the point-of-generation value. The sample is required to be collected using the sampling procedures specified in Method 305 of 40 CFR part 60, Appendix A, to prevent losses of methanol during sample collection. The sample may be analyzed using Method 305 or any test method or test data that has been validated according to the protocols in Method 301.

Initial performance tests are required for all treatment devices used to reduce the HAP concentrations in process wastewater streams with the exception of the design steam stripper. Installation of the specified equipment and operation at the specified parameter levels will achieve the required reduction in HAP concentrations.

The proposed rule includes treatment process performance test procedures for the effluent concentration and percent reduction. These test procedures involve direct measurements of methanol concentrations (as a surrogate for HAP concentration) in process wastewater and flow rate. The methods for these measurements are the same as the direct measurement methods used to determine streams that are not required to be controlled.

If an owner or operator elects to treat a process wastewater stream in a biological treatment unit, the owner or operator may use Method 304 to determine site-specific biodegradation rate constants for methanol, in conjunction with modelling using WATER7 (or another approved model), to predict the HAP reduction achieved in a biological treatment unit.

All process wastewater collection and treatment systems and associated closed vent systems used to control emissions from them are required to be evaluated for no detectable leaks using Method 21 of 40 CFR part 60, appendix A. Vent stream control device performance tests for vents from the process wastewater collection and treatment system use the same methods as for pulping component emission points.

### *L. Modifications, Reconstruction and New Additions*

Section 112 of the CAA, as amended in 1990, requires that many physical and operational changes at existing major sources meet MACT control requirements. Examples of these changes include modifications, reconstructions, and the addition of new equipment. EPA is engaged in several rulemakings that will more precisely define these requirements. Two of these are a rule to implement section 112(g) of the Act, and a rule known as the "General Provisions," which will set generic requirements for sources covered by any MACT standard. These two rules will determine the generic administrative and control-level requirements that apply to changes at all major sources, including pulp and paper mills.

EPA published the proposed NESHAP General Provisions for comment in the **Federal Register** on August 11, 1993 (58 FR 42760). EPA plans in the near future to publish and invite comment on a proposed rule to implement section 112(g). Section 112(g) requires MACT determinations for modification, reconstruction or construction of a major source of HAPs. These determinations are to be made on a case-by-case (facility specific) basis when EPA has not yet promulgated a NESHAP under section 112(d).

In today's pulp and paper rule, EPA is not attempting to resolve program-wide issues such as the interrelationship between sections 112(g) and 112(d), the control levels required by statute for different types of changes, or generic preconstruction review requirements. EPA encourages those interested in these issues to submit comments on the proposed rule to implement section 112(g) (A discussion of the relationship between sections 112(g), 112(d) and 112(j) is included in the **Federal Register** notice proposing a rule to implement section 112(j) of the Act. 58 FR 37778 (July 13, 1993). Section 112(j) establishes requirements for case-by-case regulation of major sources in the event EPA lags more than 18 months behind schedule in issuing a NESHAP for an industry).

Pulp and paper industry representatives have voiced concerns about the influence that today's proposed NESHAP could have on control requirements under § 112(d) applicable to changes to an existing mill. In today's proposed rule, EPA is recommending a broad definition of "source" to comprise all pulping, bleaching and process wastewater operations at a mill. This broad source definition alleviates concerns that a small change to an existing mill would trigger new source requirements under the NESHAP itself.

Industry representatives have voiced an additional concern that involves case-by-case MACT determinations required under CAA § 112(g) for changes to an existing mill. Specifically, their concern is that once a State permit system is effective, States will use today's proposed rule as the basis of case-by-case MACT requirements for mills that make modifications or construct a new unit that by itself could be considered a major source. Industry representatives consider this to be a problem because they believe that the NESHAP standards proposed today are too stringent, and that additional data they are collecting will confirm this view. EPA applauds the industry's efforts to collect additional data and is hopeful that such data will be useful in refining the rule prior to promulgation. However, EPA believes currently available data provides a strong basis for today's proposed rule. The NESHAP proposed today are based on the statutory minimum (referred to as the floor) level of control, based on current control practices in the industry.

In view of the industry's concern about case-by-case MACT determinations, EPA wishes to emphasize the following points. In making case-by-case MACT determinations for pulp and paper mills under section 112(g), permitting authorities should take into account available information. This information would include today's proposed rule and proposed MACT floor determination, supporting information, and information submitted to the permitting authority during the public comment period on a permit. EPA urges permitting authorities to weigh carefully the information provided by all parties commenting on a proposed case-by-case MACT determination, including any new information submitted by industry that might influence required levels of control at a mill. At the same time, permitting authorities must consider whether a statutory minimum (or floor) level of control exists and, if so, ensure that case-by-case MACT requirements are no less stringent.

*M. Emissions Averaging*

During the development of today's proposal, EPA considered including an emissions averaging approach. EPA did not include an emissions averaging approach because of data limitations and uncertainties regarding how emissions averaging would be applied to the pulp and paper industry. EPA would be interested in pursuing the development of an averaging alternative if such alternative would be protective of the environment and, as expected, lower the cost of achieving any particular emission reduction. A possible benefit of an averaging approach is that it may provide sources greater flexibility in achieving emissions reductions that may also translate into cost savings for the source. EPA is interested in receiving data and comments that could be used to develop an emissions averaging alternative in the final rule.

As discussed in Section X.C, EPA is defining the MACT "source" broadly to include all pulping process areas, bleaching process areas, and pulping and bleaching process wastewater streams as a whole. As explained in Section X.C, EPA could have defined the source more narrowly as either an individual emission point or as a process area. If EPA had defined the source based on process area, there would be three types of sources: pulping area source, bleaching area source, and wastewater source. Although EPA chose to define the source broadly, the MACT floor was determined based upon control technologies in use at individual emission points across the industry.

To facilitate emissions averaging, an alternative way to establish the MACT floor would be to identify a mass emission limit or a mass emission reduction percentage across the source as a whole. For the broad source definition in today's proposal, this would mean identifying the floor based upon a mass emission limit or a mass emission reduction percentage achieved at the best performing 12 percent of the process areas as a whole. For the more narrow definition of source by process area, this would mean identifying the floor based upon a mass emission limit or a mass emission reduction percentage at the best performing 12 percent of the process areas (e.g., the best performing 12 percent of the pulping area sources). However, EPA does not consider data currently available as sufficient to establish either a mass emission limit or a mass emission reduction percentage. In part as a result, EPA elected to establish the MACT floor on an emission point basis according to control technologies currently in use in the industry at individual emission points and knowledge of the performance capabilities of these control technologies.

EPA also considered whether the day-to-day variability of the pulp and paper processes would preclude establishing either a mass emission limit or a mass emission reduction percentage and whether an emissions averaging approach could be implemented for this industry given the potential process variability. Process variabilities that could affect air emissions include swings in production depending on wood species available and products being produced, as well as other variables associated with using a natural feedstock such as wood.

EPA solicits comments on the feasibility of emissions averaging in the pulp and paper industry and requests information and data that would be necessary to support development and implementation of an averaging approach. Details on specific comments and data requested are presented in Section XIII, "Solicitation of Comments."

For more information on emissions averaging, refer to the proposed National Emission Standards for Hazardous Air Pollutants for Source Categories: Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry (SOCMI) at 57 *FR* 62608. The final rule for the SOCMI, known as the hazardous organic NESHAP (HON), is currently being developed. In the interim since the HON proposal, EPA published a supplemental notice at 58 *FR* 53478 announcing reopening of the public comment period on an array of issues.

*N. Relationship to Operating Permit Program*

Under title V of the CAA, all HAP-emitting sources will be required to obtain an operating permit. Often, emission limits, monitoring, and reporting and recordkeeping requirements are scattered among numerous provisions of State Implementation Plans (SIPs) or Federal regulations. As discussed in the rule establishing the operating permit program published on July 21, 1992 (57 FR 32251), the operating permit program will include in a single document all of the requirements that pertain to a single source. All applicable requirements of the pulp and paper NESHAP will ultimately be included in the source's title V operating permit. The permit will contain federally enforceable conditions with which the source must comply.

State operating permit programs must be approved by EPA. Once a State's permit program has been approved, each pulp and paper mill within that State must apply for and obtain an operating permit. If the State where the facility is located does not have an approved permitting program, the owner or operator of a facility must submit the application to the EPA Regional Office under the proposed NESHAP General Provisions. The addresses for the Regional Offices and States are included in the proposed NESHAP General Provisions.

**XI. Impacts of Integrated Regulatory Alternative**

*A. Integrated Regulatory Alternative*

As discussed in Section VI, EPA chose an integrated regulatory alternative comprising the selected control technology bases for BAT, PSES, MACT, BPT, BCT and BMPs. Table XI.A–1 summarizes the integrated regulatory alternative. A summary of the impacts of the alternative is presented in Table XI.A–2. Impacts include the effluent and emission reductions and the total annualized costs.

TABLE XI.A–1.—INTEGRATED REGULATORY ALTERNATIVE

| Effluent toxic and priority pollutant control (BAT technology basis) by subcategory | | | | HAP emission control (MACT technology basis) by process area, all subcategories | | | Effluent conventional pollutant control (BPT technology basis), all subcategories | Best management practices, all subcategories |
|---|---|---|---|---|---|---|---|---|
| Papergrade kraft and soda | Papergrade sulfite | Dissolving sulfite | Dissolving kraft | Pulping component | Bleaching component | Process wastewater component | | |
| BAT Option 4 | BAT Option 2 | BAT Option 1 | BAT Option 2 | MACT Floor | MACT Floor | MACT Floor | | |
| Oxygen delignification or extended cooking and complete substitution 100% of chlorine with chlorine dioxide. | Totally chlorine free bleaching. | Oxygen delignification and complete substitution of chlorine with chlorine dioxide. | Oxygen delignification and 70% substitution of chlorine with chlorine dioxide. | Combustion of all vents (except deckers and screens). | Scrubbing at all vents. | Steam stripping of digester condensates, evaporator condensates, turpentine recovery wastewaters. | Wastewater treatment improvements to performance level of 50% of mills. | Pulping and black liquor spill prevention and control. |

TABLE XI.A–2.—SUMMARY OF IMPACTS OF PULP AND PAPER INTEGRATED REGULATORY ALTERNATIVE

| Effluent reductions (Mg/yr) | | | Emission reductions (Mg/yr) | | | Total annualized compliance cost ($ 1992 million) |
|---|---|---|---|---|---|---|
| Toxics | AOX | Conventional pollutants | Hazardous air pollutants | Volatile organic compounds | Total reduced sulfur | |
| 2,800 | 45,100 | 227,000 | 120,000 | 716,000 | 295,000 | $600 |

*B. Costs and Economic Impact Considerations*

1. Regulatory Compliance Costs

*a. Engineering Control Cost Estimates.* The cost of the integrated regulatory alternative can be expressed in several different ways. One way is an engineering control cost estimate, which is an estimate of the price paid by a facility to install equipment and perform procedures to meet an environmental standard. These costs are incremental to any existing regulatory compliance costs, and are specific to the proposed standards. These costs are comprised of a total capital investment (TCI) component and an annual operating and maintenance (O&M) component.

The BAT and PSES costs presented in Section IX.G consider only capital and O&M costs associated with process changes, best management practices, and COD control. The costs of the integrated regulatory alternatives, which are presented in this section, include both of these components (TCI and O&M) for both air and water pollution control. All costs in this section are expressed in 1992 dollars.

The TCI component is an estimate of the purchase price of capital equipment and installation services to meet the proposed standards. For the integrated alternative, the national estimate of TCI is $4.0 billion. The O&M component is an estimate of the cost to operate and maintain the capital equipment installed to meet the standard, the estimated cost of work practice requirements, and an estimate of the annual cost of overhead items associated with the capital equipment that includes the cost of insurance and local property taxes. The national estimate of annual O&M costs is $401 million.

The TCI can be annualized and added to the O&M component to result in a national estimate of the total annualized cost (TAC) of the proposed integrated regulatory alternative. The TCI is annualized by amortizing the TCI over the depreciable investment life of the installed equipment using a 10% discount rate. When calculated this way, the TAC of the integrated regulatory alternative is $921 million. Additional information about the development of engineering control costs is included in Sections IX.G and X.L of this preamble and in supporting documents (background information document and technical water development document).

*b. Mill-Specific Compliance Cost Calculations.* Another way to express the cost of the integrated regulatory alternative is to estimate the actual after-tax cost to an individual facility of installing equipment and performing procedures to meet an environmental standard. This cost estimate is often referred to as the private cost, because it estimates the cost of the regulatory alternative to private entities. This calculation is made for each facility by analyzing facility cash flows for pollution abatement activities over the depreciable life of the TCI. This calculation reduces the annual cost by the reduction in annual tax liability that facilities are able to realize as a result of increases in operating and depreciation expenses, and assumes the facility will be able to fully utilize the value of these reductions each year. The total annualized private cost—i.e., the sum of the annualized compliance cost for each affected facility—of the integrated regulatory alternative is estimated to be $600 million.

2. Economic Impact Analysis Methodology

The Agency's economic impact analysis of the integrated regulatory alternative addresses concerns about the economic achievability and potential market disruptions created by environmental regulation. The Agency has used the results of both a financial impact analysis and a market impact analysis to address these concerns. The economic impact analysis is presented in "Economic Impact and Regulatory Flexibility Analysis of Proposed Effluent Guidelines and NESHAP for the Pulp, Paper, and Paperboard Industry." This document details the use of regulatory compliance costs, the economic impact methodologies, and the projected economic effects of the proposed rule. A summary of the key economic impact results is presented in this section.

*a. Financial Impact Analysis.* The financial impact analysis estimates the incidence of mill closures, the potential employment, output, and export impacts associated with mill closures, and the change in key financial ratios attributable to the incremental compliance costs. To estimate potential mill closure, the analysis compares estimates of the discounted present value of future earnings to estimates of mill salvage value. The comparison is made to determine whether, after imposing regulatory compliance costs, the mill would be more valuable to the current owner if it were shut-down and liquidated rather than in continued operation. The analysis also estimates the changes in key financial ratios (a measure of financial health of mills) after imposing regulatory compliance costs, and compares the changes to fluctuations that have historically occurred in the business cycle.

*b. Market Impact Analysis.* The market impact analysis estimates mill supply responses and end-use demand responses to regulatory compliance costs for all market actors in 31 defined product markets. This analysis estimates the potential changes in pulp, paper, and paperboard product prices, individual and overall mill production and employment levels, foreign imports and domestic exports, and mill production costs and revenues. The analysis estimates mill closures by estimating the post-regulatory earnings before interest, depreciation and taxes (EBIDT). Negative earnings indicate potential closure.

3. Economic Impact Analysis Results

The Agency estimates that approximately 300 pulp, paper, and paperboard mills will incur direct costs to comply with the proposed regulation. Mill closure projections are based on quantitative estimates of several economic factors, but the decision to close an industrial facility depends on many judgments outside the scope of the Agency's analysis. Thus, the Agency's projections of potential closures are interpreted as an indication of the extent of plant impact rather than as a prediction of certain closure.

The Agency estimates that between 11 and 13 mills will face the possibility of closure as a result of the change in production costs due to the integrated regulatory alternative, and from 2,800 to 10,700 jobs could be lost. This range is created by differences in the assumptions used in the financial and the market models. The upper end of the ranges reflects more conservative assumptions.

Market prices for pulp, paper, and paperboard products are not expected to be significantly affected, with the largest price increase being 2.7 percent for uncoated free sheet (used to make copy paper, writing tablets, etc.). The estimated overall impact of the integrated regulatory alternative on the total value and quantity of foreign imports of pulp, paper, and paperboard products is minor— less than 1 percent. The most notable increases in import quantities for significant individual product groups are 1.4 percent for clay coated printing paper, 1.5 percent for recycled paperboard, and 6.1 percent for folding carton board.

The estimated overall impact on the total value and quantity of exports is also minor. However, individual product groups may experience significant declines in export value. The most notable declines in export value for significant individual product groups are 20.5 percent for uncoated free sheet, 7.6 percent for recycled paperboard, 6.5 percent for newsprint, and 3.8 percent for bleached sulfite pulp.

4. Regulatory Flexibility Analysis

Part of the Agency's task of complying with the Regulatory Flexibility Act (5 U.S.C. 601 et seq., Pub. L. 96–354) requires the Agency to examine the potential economic impact of regulatory actions on small entities. The Agency has estimated the economic impact of the integrated regulatory alternative on small mills and small companies involved in pulp, paper, and paperboard manufacturing, and has attempted to illustrate the potential disparate impacts between the groups of large and small manufacturers.

For purposes of this proposed rule, the Agency has considered several alternative definitions for small entities to capture the unique size and structure characteristics of this industry. The Agency considered three alternative definitions for small entities: (1) individual mills employing less than 750 workers, (2) individual mills employing less than 125 workers, and (3) independently owned and operated companies employing less than 750 workers. Under the last definition, small companies can be independently owned single-facility entities, or multi-facility companies that own more than one pulp and paper mill, or own multiple businesses in two or more SIC categories. The Agency used each of these definitions to characterize the impacts of the proposed standards on small entities.

The Agency estimates that 35 percent of the mills in the industry employ less than 125 workers and 84 percent employ less than 750 workers. Of the nearly 215 companies, about 70 percent meet the definition of small. The analyses indicate that between one and six estimated mill closures are mills employing less than 125 workers, and about 9 of the estimated closures are mills employing less than 750 workers. Also, roughly one-half of all estimated closures are mills owned by small companies.

The Agency examined the impact of the proposed rules on relevant financial ratios of both large and small facilities. The median results showed that facilities employing less than 125 workers experience less deterioration in financial health than larger facilities. The results were similar for facilities employing less than 750 employees. The company-level ratio analysis generally indicates less deterioration in financial health for small companies as well. The exceptions to this conclusion are the results for the net working capital-to-total assets ratio. Here, small companies experience larger declines than large companies, presumably due to the smaller baseline net working capital that smaller companies have.

The Agency also examined potential changes in facility earnings before interest, taxes, and depreciation (EBITD). The results indicate that, as a group, facilities employing less than 125 workers had a smaller decline in EBITD than large facilities. The same holds true for facilities employing less than 750 employees.

The Agency also employed the Altman Z-score method to estimate the likelihood of bankruptcy for companies, and assess potential differences between large and small company impacts of the proposed standards. This analysis indicates that small companies are not any more likely to face bankruptcy than large companies.

5. Regulatory Impact Assessment

The Agency has prepared a regulatory impact assessment (RIA) for the proposed integrated regulatory alternative. The RIA responds to the requirements in Executive Order 12866 to assess both the costs and benefits to society of significant regulatory actions. Significant regulatory actions are that impose an annual cost to the economy of $100 million or more, or have certain other regulatory, policy, or economic impacts. The RIA is detailed in, "Regulatory Impact Assessment of Proposed Effluent Guidelines and NESHAP for the Pulp, Paper, and Paperboard Industry," (see Section II for availability of this and other supporting documents). This RIA was submitted to OMB for review as required by Executive Order 12866 (and under Executive Order 12291 prior to the new executive order).

The RIA analyzes the effect of current discharges and air emissions and assesses benefits of proposed integrated regulations for the pulp, paper and paperboard industry. Three types of benefits are analyzed: non-quantified and non-monetized benefits, quantified and non-monetized benefits, and quantified and monetized benefits. The non-quantified, non-monetized benefits assessed in this RIA include improvements to recreational fishing, improved aesthetic quality of waters near the discharge outfalls, and benefits to the wildlife and to threatened or endangered species.

The quantified, non-monetized benefit assessment includes an assessment of the potential risk reduction benefits to human health and aquatic life from reduced air and water releases.

The monetized benefits analysis focuses on human health as applicable, and environmental benefits as related to reduced water and air releases. The health risk reduction benefits are associated with reduced human exposure to various carcinogenic and noncarcinogenic contaminants through inhalation and consumption of subsistence and recreationally-caught finfish.

Because benefits are often highly site-specific, the RIA also presents four case studies that compare costs and benefits of reducing pollutant releases in specific geographic areas. These case studies examine values associated with human health risk reductions, recreational uses, nonuse benefits, and benefits to Native American tribal members.

*a. Water Quality Benefits.* Pulp and paper mill effluents contain toxic and nonconventional chemical compounds, and conventional pollutants. Discharge of these pollutants into the freshwater, estuarine, and marine ecosystems may alter aquatic habitats, affect aquatic life, and adversely impact human health. Discharges from chlorine-bleaching mills are of particular concern. Many of the chlorinated organics in these effluents are either human carcinogens, human systemic toxicants, or aquatic life toxicants. In addition, many of these pollutants are persistent, resistant to biodegradation and bioaccumulate in aquatic organisms.

Two pollutants of particular concern are 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and 2,3,7,8-tetrachlorodibenzofuran (TCDF). TCDD and TCDF are extremely toxic to aquatic life, are listed as probable human carcinogens, and are known to have adverse effects on human reproduction and liver function. Furthermore, as of June 1993, states had issued 23 dioxin-related fish advisories and bans near 29 bleaching pulp and paper mills.

The Agency's analysis of these environmental and human health risk concerns and of the water-related benefits resulting from the proposed effluent guidelines is contained in "Water Quality Assessment of Proposed Effluent Guidelines for the Pulp, Paper, and Paperboard Industry," hereafter called the water quality assessment (see Section II for availability of this document). This assessment both qualitatively and quantitatively evaluates the potential human health benefits and water quality benefits of controlling the discharges from four bleaching subcategories (Dissolving Kraft, Bleached Papergrade Kraft, Dissolving Sulfite, and Papergrade Sulfite) in a mill-specific analysis of 26 pollutants. (see Section IX.C for a discussion of the pollutants). In addition, the environmental significance of discharges from the non-bleaching segment of the industry is also qualitatively examined.

(1) Qualitative Description of Water-Related Benefits. Water-related benefits to aquatic life include reduction of toxic, conventional, and nonconventional pollutants to levels below those considered to impact receiving water's biota. Such impacts include acute and chronic toxicity, sublethal effects on metabolic and reproductive functions, physical destruction of spawning and feeding habitats, and loss of prey organisms. Chemical contamination of aquatic biota may also directly or indirectly impact local terrestrial wildlife and birds.

The proposed BPT limitations and BMP controls are expected to significantly reduce environmental impacts by reducing discharges of such conventional pollutants as BOD and TSS. For example, habitat degradation can result from increased suspended particulate matter that reduces light penetration and, thus, primary productivity, or from an accumulation of fibers that alters benthic spawning grounds and feeding habitats.

(2) Quantitative Estimate of Water-Related Benefits. EPA has quantified human health and aquatic life benefits using a site-specific analysis for baseline conditions and for the conditions that could be achieved by BAT process changes. The largest benefit category under water-related benefits is the reduction in the number of potential cancer cases from the consumption of non-contaminated fish by recreational and subsistence anglers. The next largest category of benefits is derived from the lifting of 13–17 dioxin-related fish advisories. This will increase the number of recreational anglers substantially from the current levels—from an estimated 135,600 people who currently fish to between 161,400 and 162,400 anglers. Quantified but not monetized benefits include reductions in exceedances of health-based water quality toxic effects levels and aquatic life criteria.

Quantified human health benefits are projected by:

- Estimating potential reduction of carcinogenic risk and non-cancer hazards from fish consumption;
- Estimating the number of existing dioxin-related State fish advisories potentially lifted after implementation of BAT; and
- Comparing estimated in-stream concentrations to health-based water quality toxic effect levels. Quantified aquatic life benefits are estimated by comparing modelled in-stream concentrations to aquatic life water quality criteria or toxic effect values. The methodologies used in these analyses, including all assumptions and limitations, are explained in the water quality assessment.

(i) Cancer Risk and Non-Cancer Hazards and Benefits. Upper-bound individual cancer risk, aggregate risk, and non-cancer hazards from consuming contaminated fish are estimated for recreational and subsistence anglers. Concentrations of six carcinogenic and eleven systemic toxicants in fish are estimated for 100 mills located near 68 receiving streams using two site-specific water quality models (a Simple Dilution model and the Dioxin Reassessment Evaluation model). Modelled fish concentrations are used to estimate cancer risk and non-cancer hazards for recreational and subsistence fishing populations, and to project the effect of BAT on existing dioxin-related fish advisories.

Projected individual cancer risks vary with the water quality modelling approach and vary among the evaluated mills and between recreational and subsistence anglers. TCDD and TCDF contribute most of the estimated cancer risks. The totally chlorine free (TCF) BAT option for the Papergrade Sulfite subcategory is projected to eliminate all chlorinated organic chemical releases (including TCDD and TCDF). Consequently, the estimated baseline individual cancer risk will be eliminated over time. Proposed BAT options for the Papergrade Kraft and Soda, Dissolving Kraft, and Dissolving Sulfite subcategories are projected to reduce average baseline individual cancer risks by about one order of magnitude.

For combined recreational and subsistence angler populations, the proposed BAT for all four subcategories is also projected to eliminate approximately 5 to 35 annual cancer cases per year from a baseline of about 6 to 37 cases projected at the current discharge level; this is a reduction of between 86 percent and 93 percent. The range of values reflects the two different models used for the cancer risk and benefit assessment.

TCDD and TCDF also account for a majority of the projected non-cancer baseline hazard. Only two additional pollutants, 4-chlorophenol and 2,4,5-trichlorophenol are projected to exceed their non-cancer human health hazard levels (RfDs) at the current discharge levels. The proposed TCF BAT option is expected to eliminate all chlorinated organic chemical releases (including TCDD and TCDF). Consequently, projected baseline non-cancer hazards for the Papergrade Sulfite subcategory will be eliminated over time. Proposed BAT options for the Papergrade Kraft and Soda, Dissolving Kraft, and Dissolving Sulfite subcategories are projected to reduce the number of mills with projected non-cancer hazards from between 68–84 mills to 22–52 mills, or by 38 to 68 percent. As with the cancer risk, the range of values for non-cancer hazards reflects the two different modelling approaches.

(ii) Impact of BAT Controls on Dioxin-Related Fish Advisories. EPA estimates that as of June 1993, 23 dioxin-related fish consumption advisories were in-place downstream of bleaching pulp and paper mills. EPA analyzed 20 of these advisories by comparing modelled TCDD and TCDF fish concentrations for each BAT option (using two modelling approaches) to State-specific advisory action levels or site-specific risk levels. Data limitations for State advisory action levels and stream flow precluded benefits estimates for the remaining three advisories. Of the 20 fish advisories analyzed, three are related to PCBs and mercury—pollutants that are not being addressed in the proposed rule—and will remain in effect. In addition, due to low action levels used by some states, low receiving water stream flow rates, and uncertainties in the projected dioxin levels, up to four dioxin-related fish advisories will not be lifted. In total, 13 to 17 fish advisories could potentially be lifted after implementation of proposed BAT.

(iii) Exceedances of Health-Based Water Quality Toxic Effect Levels. EPA also compared the modelled in-stream pollutant concentrations to health-based toxic effect levels. Exceedances of the toxic effect levels indicate potential health-based water quality problems.

At current discharge levels, modelled receiving water pollutant concentrations for up to eight pollutants (of 13 pollutants with human health toxic effect levels) and for 97 mills are projected to exceed human health based toxic effect levels. The proposed TCF BAT option eliminates the projected baseline impacts of four pollutants and 9 mills in the Papergrade Sulfite subcategory. The proposed BAT for the Papergrade Kraft and Soda subcategory reduces the projected baseline impacts from eight pollutants and 80 mills to four pollutants and 71 mills. For the Dissolving Kraft subcategory, the proposed BAT reduces baseline impacts from seven pollutants and three mills to three pollutants and two mills. The proposed BAT for the Dissolving Sulfite Subcategory will not change projected baseline impacts for four pollutants and 5 mills.

(iv) Aquatic Life Benefits. EPA assessed the effects of toxic discharges on aquatic life by comparing modelled in-stream pollutant concentrations to the EPA aquatic life criteria or to toxic effect values. The water quality assessment is based on pollutants both regulated and removed incidentally. Exceedances of these pollutant values indicate potential impacts to aquatic life.

EPA modelling results show that receiving water pollutant concentrations for up to nine pollutants and 28 mills exceed aquatic life criteria or toxic effect levels at current (baseline) discharge levels. Proposed BAT options are projected to reduce these baseline impacts almost to zero. Only one pollutant, TCDD, is projected to exceed the chronic aquatic life toxic effect value at proposed BAT for one mill.

(3) Monetization of Water Quality Benefits. EPA has monetized the human health benefits that were quantified using the two site-specific water quality models. Under the Simple Dilution model, the benefits range between $70 million and $350 million. Under the Dioxin Reassessment Evaluation model, the benefits range between $10 million and $50 million. EPA has also estimated the benefit of lifting the fish advisories. Estimates of increased values of the fishery to anglers range from $5 million to $24 million annually. Additionally, annual benefits from avoided sludge disposal costs are estimated to be $56 million. Thus, the monetized water-related benefits range from $72 million to $430 million. These estimates, however, do not include the benefits that have been identified but not monetized, such as reduction in water quality criteria exceedances, etc.

(4) Limitations and Uncertainties Associated With Estimating Water Quality Benefits. Uncertainties specific to TCDD and TCDF notably affect the human health and aquatic life benefits because these two pollutants so significantly contribute to the benefits estimates. Important assumptions include: estimates of pollutant loadings when TCDD and TCDF were not detected in laboratory measurements; and use of bioconcentration factors, aquatic life toxic effect values, cancer slope factors, reference doses (RfDs), and toxic equivalency factors (TEFs) that may be updated based on EPA's dioxin reassessment.

Also, the methodology used to estimate fish advisory-related benefits assumes the bleaching pulp and paper mills are the only source of the dioxin in the stream segment; the methodology does not incorporate background contributions either from contaminated sediments due to previous discharge practices or other upstream sources. Furthermore, although the discharge of these contaminants may cease or be minimized, sediment contamination and subsequent accumulation of dioxin in aquatic organisms may continue for years. Actual improvements could only be determined by site-specific biological monitoring to assess the impact of eliminating fish consumption advisories.

*b. Air Quality Benefits.* The Agency also examined the air quality benefits that would result from implementation of the proposed integrated regulatory alternative. This regulatory alternative is expected to reduce emissions of a wide range of hazardous air pollutants (HAPs), volatile organic compounds (VOC), and total reduced sulfur (TRS). The air quality benefits expected to result from these emission reductions will be a decrease in adverse health effects associated with inhalation of the above pollutants, as well as improved welfare effects such as improved crop yields.

(1) Qualitative Description of Air Quality Benefits. The Agency examined the impact of the proposed integrated regulatory alternative on emissions of air pollutants regulated under the Clean Air Act. As shown in Table XI.A–2, VOC emissions are expected to greatly decrease. This reduction is expected to occur because most of the organic HAPs emitted by sources in this industry are also classified as VOC, and the MACT requirements for controlling these organic HAP emissions also control the VOC emissions.

Emissions of VOC are responsible for causing both health and welfare effects. Volatile organic compounds are precursors to the formation of ozone. Approximately 12 percent of the VOC emission reductions projected to result from today's proposal occur in areas out of attainment of the National Ambient Air Quality Standards for ozone.

The benefits of reducing VOC emissions are analyzed in terms of reduced ambient ozone levels. Human exposure to ozone primarily affects the lungs. Ozone's most perceptible effects on human health are acute respiratory symptoms such as coughing and painful deep breathing. Repeated exposure to ozone over a lifetime may result in permanent impairment of the lungs.

Elevated concentrations of ambient ozone are also associated with adverse welfare effects. The typical concentration level of ozone found in rural areas is thought to depress crop yields and cause visible damage to other plant life such as premature aging and leaf loss. Reduced ambient ozone levels are expected to result in decreased adverse health effects from ozone exposure as well as decreased adverse welfare effects such as crop damage.

An additional category of benefits expected to result from the implementation of the integrated regulatory alternative is the reduction of TRS emissions. Table XI.A–2 shows that the integrated regulatory alternative is expected to greatly decrease TRS emissions. As with the VOC emissions, total reduced sulfur compounds are emitted with the organic HAPs and the MACT requirement for controlling the organic HAP emissions also controls TSR emissions.

Total reduced sulfur emissions are responsible for the malodors often associated with pulp and paper production. The benefits of reducing total reduced sulfur emissions will be the alleviation of the malodor problem. Potential health benefits such as the alleviation of headaches and nasal irritation may also result.

Section 112 of the CAA requires EPA to regulate HAP emissions. The proposed regulation is expected to reduce emissions of a wide range of HAPs. Inhalation of HAPs can cause a variety of adverse health effects. Some are classified as known or suspected human carcinogens. Reducing the emissions of these pollutants will reduce the cancer risk of the exposed population. Other hazardous air pollutants have not been proven as human carcinogens, but have been shown to cause adverse health effects such as lesions or abnormal cell growth in animals. Health benchmark concentrations have been established for many of the pollutants in this category. The benefits of reducing the emissions of pollutants in this category will be through decreased human exposure to these pollutants below the benchmark concentrations.

Although the proposed regulation will reduce emissions of a wide range of pollutants, the integrated regulatory alternative is expected to slightly increase emissions of carbon monoxide, nitrogen oxide, sulfur dioxide, and particulate matter. These emission increases result from combustion controls that are the basis for the proposed MACT standards. Adverse health and welfare effects are associated with the emissions of these pollutants.

Exposure to carbon monoxide emissions may lead to aggravation of the cardiovascular, central nervous, or pulmonary systems. Like volatile organic compounds, nitrogen oxide emissions are precursors to ozone formation. Sulfur dioxide emissions can be transformed into acid rain, which has negative effects on crop yields and other plant life. However, it should be noted that the negative benefits associated with the emissions of these criteria pollutants are by far outweighed by the positive benefits resulting from decreases in the emissions of hazardous air pollutants, volatile organic compounds, and total reduced sulfur.

(2) Quantitative Assessment of Air Quality Benefits. Reductions in VOC emissions result in the largest category of benefits that has been both quantified and monetized. Reductions in TRS emissions address the odor problem and have been quantified but not monetized. Likewise increases in emissions of some criteria pollutants were quantified but not monetized. This assessment also found human health benefits associated with reductions in HAP emissions to be minimal.

The largest category of benefits expected to result from this regulation is the reduction of VOC emissions by approximately 716,000 Mg annually. The control of VOC emissions is important because the presence of these compounds is a precursor to ozone formation. Although data limitations prevent quantification of the amount of VOC emissions that are actually transformed into ozone, the approach for valuing the benefits of reducing VOC emissions will be derived from the monetized benefits of reducing ozone.

This regulatory alternative is also expected to reduce TRS emissions by approximately 295,000 Mg annually. Total reduced sulfur emissions are responsible for the rotten egg smell often associated with areas near pulp and paper mills. Surveys of odor pollution caused by pulp mills have supported a link between odor and health symptoms such as headaches, watery eyes, runny noses, and breathing difficulties. The above symptoms are not readily measured or verified objectively. Therefore, the benefits of reduced total reduced sulfur emissions are not further quantified.

The increase in emissions of carbon monoxide, nitrogen oxide, sulfur dioxide, and particulate matter will be presented as the negative benefits of the integrated regulatory alternative. Carbon monoxide emissions are expected to increase by approximately 300 Mg annually, nitrogen oxide emissions by 1,300 Mg annually, sulfur dioxide emissions by 168,200 Mg annually, and particulate matter emissions by 100 Mg annually. As shown, the increase in emissions of sulfur dioxide are larger than other criteria pollutant emission increases; however, they are estimated to be less than 15 percent of total sulfur dioxide emissions currently generated by the pulp and paper industry.

Sulfur dioxide emissions in the pulping component, estimated to be approximately 151,000 Mg/yr, are attributed to the formation of sulfur dioxide from combustion of TRS in the pulping vent streams. Sulfur dioxide emissions from the wastewater component, approximately 17,700 Mg/yr, are generated by the fuel used to make steam that is used in steam stripping. This estimate is based on several assumptions, including the assumption that large TRS sources, such as digester and evaporator vents, are continuously controlled at baseline. Another assumption is that criteria pollutants are released from recovery furnaces, power boilers, lime kilns, and smelt tanks according to the emission rate established in AP–42.

Due to lack of benefits data, the adverse health and welfare effects of increased emissions of sulfur dioxide and other criteria pollutants cannot be further quantified.

Although this source category emits a wide variety of hazardous air pollutants, only a small portion of the pollutants are emitted in sufficient quantities to pose a threat to human health and the environment. (See background information document for a complete list of the hazardous air pollutant emissions that will be affected by the integrated regulatory alternative.) A risk assessment of the carcinogenic hazardous air pollutants evaluated the cancer risk these pollutants pose to humans. (Refer to the Air Quality Assessment Document for a complete discussion of the cancer risk methodology.)

Of the HAPs that are known or suspected human carcinogens, acetaldehyde, carbon tetrachloride, chloroform, formaldehyde, and methylene chloride were evaluated because emissions data for the pulp and paper industry and toxicologic data indicated that these pollutants adversely affect human health. The results of the risk assessment of these five pollutants indicated that the integrated regulatory alternative would reduce annual cancer risk by 0.39 of a statistical life. A statistical life is defined to be the sum of reduction in cancer risk for the exposed population.

Non-carcinogenic HAPs were evaluated using an exposure assessment model. (See the Air Quality Assessment Document for a complete discussion of the exposure assessment methodology.) A dose-response expressed in terms of an inhalation reference concentration (RfC) was used to evaluate the adverse health effects of acrolein, acetaldehyde, toluene, 2-butanone, methanol, hydrochloric acid, and hexane. The baseline exposure analysis revealed that only two of the seven pollutants, acrolein and acetaldehyde, posed any adverse health threat to the exposed population. An analysis of emissions of these pollutants after the imposition of the integrated regulatory alternative revealed that an estimated 1,285,000 people would have their exposure reduced from being above the RfC health benchmark to being below the benchmark. The significance of the RfC benchmark is that exposures to levels below the RfC are considered "safe" because exposures to concentrations of the chemical at or below the RfC have not been linked with any observable health effects.

(3) Monetized Air Quality Benefits. The largest category of benefits expected to result from the regulation are the benefits from VOC emission reductions (and therefore, reduced ambient ozone levels). Valuation of the acute health and agricultural effects attributable to the VOC emission reductions (using average benefit per Megagram value) resulted in an estimated total annual benefit ranging from $88.1 million to $552.0 million.

It is important to note that the approach used to monetize the benefits of the VOC emission reductions only account for the acute health effects and agricultural benefits associated with reduced exposure levels. However, this approach ignores the chronic health effects associated with repeated exposure to ozone. This omission results in an underestimation of the total value of reduced ozone levels. This conclusion is based on the evidence (provided in the RIA) citing the possibility of reversing the adverse health effects due to acute ozone exposure versus the permanent adverse health effects due to chronic ozone exposure.

Another large category of benefits, the benefits of reducing total reduced sulfur emissions, was not monetized because health and welfare benefits associated with undesirable odors are not readily quantified.

An increase in emissions of carbon monoxide, nitrogen oxide, sulfur dioxide, and particulate matter are expected to result in negative benefits. Lack of benefits data associated with these criteria pollutant emissions prevent the negative benefits of these emission increases from being monetized.

The risk analysis showed that the regulation will decrease annual cancer risk by 0.39 of a statistical life. A range of estimates for valuing reduced risk were used to monetize this benefit category. The total annual benefit of the above cancer risk reduction is estimated to range from $0.8 million to $4.2 million. The results of the exposure assessment could not be monetized because information on valuing reduced exposure to hazardous air pollutants was not available.

Net monetized air related benefits, summed for all benefit categories, range between $89 million and $556 million. The monetized benefits presented above are believed to underestimate the total air quality benefits expected to result from the regulation. This underestimation is due to a lack of benefits data that prevents all categories of benefits from being fully quantified and monetized. Furthermore, the positive but non-monetized benefits of reducing exposure to non-carcinogenic hazardous air pollutants, reducing some categories of adverse health effects from ozone exposure, and reducing odor (and potentially health) problems caused by total reduced sulfur emissions are expected to outweigh the negative but non-monetized benefits of increasing emissions of carbon monoxide, nitrogen oxide, sulfur dioxide, and particulate matter.

(4) Limitations Associated with Estimating Air Benefits. Lack of information for several benefit categories precludes a complete quantification of all benefit categories. The benefits assessment was limited to analyzing the pollutants for which emissions information, including toxicity data, was available. Similarly, data limitations precluded quantified estimates of the amount of VOC that is actually transformed into ozone. The benefits of reducing total reduced sulfur (TRS) emission have not been monetized because odor problems and their link to health symptoms were not readily quantified.

*c. Summary of Air and Water Benefits.* The combined range of national-level air and water benefits from the proposed regulation are shown in Table XI.B–1. Air-related benefits incorporate both human health risk reductions and air quality improvements. The total benefits from the regulation are estimated to range from $160 million to $987 million.

TABLE XI.B–1.—POTENTIAL NATION-WIDE AIR- AND WATER-RELATED MONETIZED BENEFITS OF THE PROPOSED PULP AND PAPER REGULATION

| Benefit category | Millions of 1992 dollars per year |
|---|---|
| Air: | |
| • Human Health | $0.8–$4.2 |
| • Air Quality | $88.1–$552.0 |
| Air benefits range | $88.9–$556.2 |
| Water: | |
| • Human Health | $10.0–$430.4 |
| • Recreational Angling | $5.2–$24.1 |
| • Avoided Sludge Disposal Costs | $56.3 |
| Water benefits range | $71.5–$430.4 |
| Combined air and water benefits range | $160.4–$986.6 |

Note: Does not include benefits that could not be quantified, or that could be quantified but not monetized. These may be considerable. See discussion above.

*d. Costs To Society.* The social costs of regulatory actions are the opportunity costs to our society of employing our scarce resources in pollution control activity. The social costs of regulation include both monetary and non-monetary outlays made by society. Monetary outlays include private-sector compliance costs, government administrative costs, and other adjustment costs, like the cost of reallocating displaced workers. Non-monetary outlays, many of which can be assigned monetary values, include losses in consumers' and producers' surpluses in affected product markets, discomfort or inconvenience, loss of time, and a slowdown in the rate of innovation. The Agency used the results of the market impact model to approximate the social cost of the proposed standards. The annual social cost estimate for the integrated regulatory proposed alternative is $948 million.

Included in this cost are estimates of the losses in both consumer and producer surplus in affected markets ($920 million), estimates of worker displacement costs ($25 million), and estimates of private and government administrative costs for the NESHAP ($3 million). In some instances, EPA believes that compliance with the proposed regulation will result in increases in productivity, enhanced product quality, and improved plant equipment throughout the chemical pulping and bleaching segments of the industry. These considerations, which have a positive social value, have not been included in estimates of the social cost of the rule. However, comment on these considerations is being solicited in section XIII.B of this preamble. These social cost estimates also do not include the private and government administrative costs associated with the effluent guidelines.

*e. Benefit-Cost Comparison.* Because not all of the benefits resulting from the integrated regulatory alternative can be valued in terms of dollars, a complete cost-benefit comparison cannot be performed. The social cost of the alternatives considered in the proposed rule, discussed in the preceding section, is estimated to be $948 million. The sum total of benefits that can be valued in dollar terms ranges from $160 to $987 million.

As shown in Table XI.B–2, the range of total social cost and combined air and water benefits overlap each other considerably. If all of the benefits that were identified could be quantified and monetized, the overlap between these ranges would be even greater.

TABLE XI.B–2.—COMPARISON OF NATIONAL ANNUAL BENEFITS TO COSTS FOR THE PULP AND PAPER RULEMAKING

| Benefits | Millions of 1992 dollars per year |
|---|---|
| Air benefits | $88.9–$556.2 |
| Water benefits | $71.5–$430.4 |
| Combined air and water benefits | $160.4–$986.6 |
| Total social cost | $948.0 |
| Industry compliance cost for the proposed integrated alternative | $600.0 |

**Note:** The calculation of monetized air-related benefits includes benefits from reductions in annual cancer incidences as well as acute health and agricultural benefits attributable to VOC emission reductions. Refer to Section XI.5.b.(3) of this preamble for a complete list of benefit categories that were not monetized due to lack of data.

*f. Benefit-Cost Comparison Using Case Studies.* Because benefits are often highly site-specific, EPA also estimated both costs and benefits at four sites using a case study approach. The case studies include segments of: (1) The Wisconsin River, located in central Wisconsin; (2) the lower Columbia River in Washington State; (3) the Penobscot River in Maine; and (4) the Leaf River in Mississippi. The case studies were selected to provide geographic representation of the impacts of the proposed regulation, taking data availability into consideration.

(1) The Penobscot River Case Study. The Penobscot River is the site of a sensitive Atlantic Salmon run and the State's most active salmon sport fishery. The river now accounts for about 83 percent of the total salmon catch (kept and released) in Maine. It is also important to the Penobscot Indian Nation, whose territory includes 146 islands located in the river. Dioxins were first detected in fish tissue samples in 1983, and a fish consumption advisory was issued for the 1988 fishing season for a section of the river.

The Penobscot receives discharges from 5 pulp and paper mills and 10 major municipal sources over its entire length of 103 miles. Two of these mills are bleached kraft facilities. The proposed regulation may result in lower concentrations of dioxin in fish tissue and may lead to lifting of the fish advisory. As a result, human health risk would be reduced and both subsistence and recreational angler populations would benefit; fishing on the river may increase; and finally, ecological benefits would accrue, notably for piscivorous birds and mammals. These benefits are quantified and monetized and total in the range of $0.6 to $2.5 million per year.

For this case study area, the acute health and agricultural benefits associated with reduced air emissions are estimated to be in the range of $0.4 to $2.3 million per year. The combined range of benefits is $1.0 to $4.8 million. In comparison, the estimated annualized compliance costs to the two mills affected by the proposed regulation are somewhat higher than the range of benefits shown above. For confidentiality reasons, cost estimates cannot be presented for this case study.

(2) The Wisconsin River Case Study. The Wisconsin River provides both important recreational opportunities as well as habitat for wildlife, including important endangered species. The use and nonuse values are currently limited by environmental quality, with significant impacts from dioxin contamination as evidenced by a number of fish advisories.

Demand for water-related recreation in this case study area is high. The primary uses of the river and river parks are passive day-use, swimming, fishing, picnicking, boating, waterskiing, camping and hunting. This is also the third most popular fishing region in the state. Fish found in this section of the river include walleye, northern pike, bass, largemouth bass, bluegill and muskie. The monetized benefits of the proposed requirements are in the range of $0.5 and $3.4 million.

For this case study area, the acute health and agricultural benefits associated with reduced air emissions are estimated to be in the range of $0.9 to $5.4 million. The combined range of benefits is $1.4 to $8.8 million. In comparison, the five affected mills incur an estimated $15.4 million in annualized costs to meet the proposed requirements. The estimated social cost of regulating the mills in the study are $24.9 million.

(3) Lower Columbia River Case Study. The Columbia River and its tributaries comprise the dominant water system in the northwestern United States. The Columbia River basin is rich in natural resources that provide for the needs and services of both people and the environment. In addition to supporting a myriad of industries, the river also supports a substantial fishery that provides recreation to thousands of anglers annually. Popular species caught in the lower Columbia include shad, walleye, steelhead, sturgeon, and several species of salmon. In addition, a valuable commercial fishery thrives on the river and contributes to Washington state's economy.

Estimates of the total value of benefits associated with the proposed reduction in dioxin and other contaminants to the lower Columbia river are a sum of the values from four categories: human health, recreational fishing, commercial fishing, and non-consumptive use. The total annual benefits are in the range of $1.8 million and $12.5 million.

For this case study area, acute health and agricultural benefits associated with reduced air emissions are estimated to be in the range of $4.2 to $26.5 million. The combined benefits are in the range of $6.0 to $39.0 million. In comparison, the total annualized compliance costs for the affected facilities are $46.0 million. The estimated social costs for the six mills in this study are $67.5 million.

(4) Leaf River Case Study. This case study provides a retrospective look at how process changes may impact environmental conditions at a site. This study documents the effects of changes in the discharges of dioxin and other contaminants from a chlorine-bleaching paper mill in Mississippi.

High levels of dioxin were detected in the plant's effluent and in fish tissue samples downstream of the mill in 1987. A fish advisory was issued in 1989. Process changes began in 1989 to reduce the formation and discharge of dioxin in the mill effluent. Subsequent sampling showed that dioxin in fish declined from 24 ppt in 1989 to 8 ppt in 1990, further declining to 3.6 ppt in 1992.

The downward trend of dioxin detected in fish tissue samples near the mill corresponds with the process changes that were adapted between 1989 and 1991. These changes also correspond to the relaxing of the fish consumption advisory for the river. These types of measurable ecosystem improvements at other sites might be expected from the proposed regulation, with reductions in fish tissue concentrations, and potential elimination of fish advisories.

(5) Summary of Case Studies. Benefits and costs for the case studies are summarized and compared in Table XI.B–3. The case study results indicate that although monetized benefits are less than both social and private costs than at the national level, they are of the same order of magnitude. Case study benefits comprise slightly less than five percent of total national benefits, while case study costs comprise approximately ten percent of total national costs. Thus, the case studies tend to underrepresent potential benefits and overrepresent potential costs. At the national level, water-related benefits are monetized for human health risk reductions and recreational anglers only. The case study analyses also include water quality-related benefits associated with recreational angling, non-consumptive recreation, and ecologic/non-use values.

TABLE XI.B–3.—COMPARISON OF POTENTIAL ANNUAL AIR- AND WATER-RELATED BENEFITS TO THE POTENTIAL COSTS OF THE PULP AND PAPER REGULATION FOR THE CASE STUDY SITES

[Millions of 1992 dollars per year]

| Benefits | Penobscot River | Wisconsin River | Columbia River |
|---|---|---|---|
| Water related benefits | $0.61–$2.45 | $0.49–$3.43 | $1.79–$12.51 |
| Air related[1] benefits | $0.37–$2.30 | $0.86–$5.40 | $4.22–$26.47 |
| Total benefits | $0.98–$4.75 | $1.35–$8.83 | $6.01–$38.98 |
| Total Compliance Costs[2,3] | A | $15.46 | $46.02 |
| Estimated social costs[1] | A | $24.9 | $67.5 |

A Confidentiality agreements preclude disclosure of total costs for this site.
[1] Source: U.S. EPA/OAQPS.
[2] Total annualized cost of compliance with both air and water controls for the selected regulatory option, using mill specific interest rates.
[3] Source: ERG, 1993.

The case study results shown above compared potential costs and benefits. Another case study, Leaf River, monitored the downward trend in dioxin in fish tissue samples and correlated dioxin measurements to the process changes at the plant from 1989 through 1991. These changes also correspond to the relaxing of the fish consumption advisory for the river.

*g. Restoration Costs.* One approach to assessing the benefits of reducing dioxin discharges is to consider the potential cost savings associated with restoration efforts to clean water bodies impacted by dioxin or other pollutants.

The remediation costs for the EPA selected alternative in the case studies ranges from $79 to $1,353 per cubic yard. These remediation estimates indicate the potential magnitude of costs associated with addressing problems associated with dioxins (and other persistent toxic compounds) that are found in sediment. Current loadings of dioxin from pulp and paper mills are not expected, in and of themselves, to result in dioxin concentrations in sediments that lead to these types of remedial actions. Nonetheless, current loadings contribute to sediment contamination and, hence, some fraction of the illustrative remediation costs may be interpreted as reflecting societal value associated with reduced loadings.

6. Cost-Effectiveness. Cost-Effectiveness is a Calculation of the Efficiency of Control Technologies for Removing Pollutants.

Cost-effectiveness is calculated as the dollars spent to remove a pollutant divided by the amount (mass) of the pollutant removed. Cost-effectiveness can be calculated incrementally between options or by comparing the total costs and removals for any one technology option to the baseline. The pollutant removals can be expressed as a total mass of a group of pollutants (e.g., tons of total HAPs removed) or as a summation of individually toxic-weighted compounds (e.g., pound-equivalent of a toxic pollutant, such as chloroform). Cost-effectiveness results have different purposes in establishing regulatory control levels in the Clean Water Act and in the Clean Air Act and thus, are discussed separately for effluent limitations and air emission standards.

a. *Cost-Effectiveness of Effluent Limitations.* EPA's cost-effectiveness analysis for BAT and PSES compares the incremental pounds cost of a control option to the pounds of pollutants removed by the control option, where those pounds are weighted by their relative toxicity. The costs used in this analysis reflect only those technology components that would be necessary to comply with effluent limitations, not the total costs associated with the integrated regulatory alternative. Similarly, the pollutant removals reflect only the reduced discharges of toxic and nonconventional pollutants discharged in wastewater, not the total reduction of environmental emissions. The cost effectiveness ratios for the BAT and PSES limitations in today's proposed rule are $53 per pound equivalent and $89 per pound-equivalent, respectively.

The cost-effectiveness ratios for each subcategory for BAT are $254 per pound-equivalent for the Dissolving Kraft subcatgory, $13 per pound-equivalent for the Dissolving Sulfite subcategory, $80 per pound-equivalent for the Bleached Papergrade Kraft and Soda subcategory, and $27 per pound-equivalent for the Papergrade Sulfite subcategory. The cost-effectiveness ratios, by subcategory, for PSES are $99 per pound-equivalent for the Bleached Papergrade Kraft and Soda subcategory and $45 per pound-equivalent for the Papergrade Sulfite subcategory.

Additional descriptions of the cost-effectiveness methodology and more detailed results are found in "Cost-Effectiveness Analysis of Proposed Effluent Limitations Guidelines for the Pulp, Paper, and Paperboard Industry," which is included in the Record and is available as one of the background documents supporting the proposed rule.

b. *Cost-Effectiveness of Air Emission Standards.* The cost-effectiveness of MACT controls is calculated based on the total mass of hazardous air pollutants (HAP) removed by a regulatory alternative. The cost-effectiveness of the MACT floor level of control is estimated at $2,060 per megagram. The integrated regulatory alternative with the next most stringent level of MACT control has an incremental cost-effectiveness of over $91,000 per megagram.

In addition to calculating the cost-effectiveness of MACT controls relative to HAP emissions, the Agency also conducted an incremental cost-effectiveness analysis of MACT controls relative to VOC emission reductions.

As explained in Section XI.B.5.b of this preamble, the largest category of benefits expected to result from the implementation of the integrated rule are the benefits from VOC emission reductions. However, data limitations prevent a complete quantification of all categories of benefits attributable to VOC emission reductions. Since lack of data prevent all VOC benefit categories from being monetized, a direct comparison of benefits to costs may not be helpful in determining the desirable regulatory alternative. However, an assessment of the incremental cost-effectiveness of VOC emission controls and a comparison of these estimates to a policy-established benchmark may be useful. The VOC cost-effectiveness analysis will represent the cost of the air emission controls relative to the expected VOC emission reductions attributable to the controls.

Although the costs used in this analysis accurately represent the cost of MACT requirements, the use of a VOC cost-effectiveness analysis may underestimate the benefits of these requirements. In particular, the VOC cost-effectiveness analysis ignores the benefit of HAP emission reductions and BOD effluent reductions that these controls will also achieve. The result of the "jointness" of the benefits of the MACT requirements is that the VOC cost-effectiveness values presented in this analysis will be overestimated.

It is difficult to estimate the magnitude of the VOC cost-effectiveness overestimation. The Agency has estimated a range of monetized values for the benefits of reduced annual cancer risk attributable to reduced carcinogenic HAP emissions. The total annual benefits of the annual cancer risk reductions has been estimated to range from $0.78 million to $4.5 million (1991 dollars) depending on the regulatory alternative examined. If the VOC cost-effectiveness calculation were to account for this benefit category, the magnitude of the VOC cost-effectiveness overestimation could be characterized as being relatively small. However, the Agency has also estimated the reductions in exposure attributable to reductions in emissions of non-carcinogenic HAPs. Unfortunately, lack of data prevent these health benefits from being monetized. The effect of this lack of valuation prevents a conclusion from being drawn regarding the magnitude of the benefits attributable to non-carcinogenic HAP emission reductions. Therefore, the Agency cannot confidently characterize the magnitude of the VOC cost-effectiveness overestimation.

The incremental VOC cost-effectiveness analysis begins with regulatory alternative 23, which includes the MACT floor level of control. The incremental cost-effectiveness of the MACT floor requirements, averaged across multiple emission points, above the baseline level of control is approximately $350/Mg. In other words, the average cost of reducing each Mg of VOC emissions at the MACT floor level of control is $350.

The most stringent level of control that was identified was regulatory alternative 24. The incremental VOC cost-effectiveness of going from regulatory alternative 23 to regulatory alternative 24 is approximately $1,650/Mg.

The last regulatory alternative that was identified was regulatory alternative 25. The incremental VOC cost-effectiveness of implementing regulatory alternative 25 is approximately $74,040/Mg.

One approach for analyzing the significance of these incremental cost-effectiveness values is to compare these values to a policy-based cost-effectiveness guidance developed by the Agency in 1985. The policy-based VOC cost-effectiveness value for new source performance standards (intended to address VOV emissions nationally) was established at $1,570/Mg (1991$). If the majority of the benefits of the MACT requirements are expected to be derived from VOC emission reductions, using policy-based VOC cost-effectiveness value to determine the desirable regulatory alternative to implement may be a reasonable approach.

This incremental VOC cost-effectiveness analysis reveals that regulatory alternative 23 can be justified as a desirable option since the incremental VOC cost-effectiveness of implementing regulatory alternative 23 is much less than the policy-based benchmark value. This analysis also indicates that regulatory alternative 25 is a clearly undesirable option since the incremental cost-effectiveness of this regulatory alternative is much greater than the established benchmark value. The conclusion about the desirability of implementing regulatory alternative 24 is less clear. The incremental cost-effectiveness of implementing regulatory alternative 23 is approximately $1,650/Mg. This value is slightly greater than the $1,570/Mg benchmark value. However, as noted earlier, this VOC cost-effectiveness value ignores the additional benefits of HAP and BOD control. If we take into account the overestimation of the VOC cost-effectiveness value due to the omission of the HAP and BOD benefits, the conclusion of the incremental cost-effectiveness analysis may be that regulatory alternative 24 may be a desirable regulatory alternative.

Although the incremental VOC cost-effectiveness of regulatory alternative 23 is significantly less than the established benchmark, the Agency has little data to draw conclusions regarding the net benefits of the MACT portion of any of the regulatory alternatives presented in this analysis. The purpose of this incremental VOC cost-effectiveness analysis is to provide the Agency with an additional method for evaluating the relative merits of the various regulatory alternatives.

*C. Sludge, Energy, and Other Environmental Impacts*

1. Impact of Integrated Rule on Sludge

*a. Types of Impacts.* The technology basis for BAT in the integrated regulatory alternative for dissolving sulfite, dissolving kraft, papergrade sulfite, and papergrade kraft subcategories includes process changes. The impact of BAT on these subcategories was examined from a multi-media perspective, including the impacts on sludge. With respect to sludge, the Agency focused on pollution prevention as a basis for reducing the mass and concentration of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) and 2,3,7,8-tetrachlorodibenzofuran (TCDF).

Reductions in the mass loadings and concentrations of TCDD and TCDF will impact the paper industry and society as a whole in several ways. Reductions in TCDD and TCDF will improve sludge quality and make disposal. An Agency analysis shows that land application is generally the least expensive method for disposing sludge. Greater use of land application will enable mills in these subcategories to achieve cost savings in sludge management. For more details, see "Regulatory Impact Assessment for Land Application of Bleached Pulp and Paper Mill Wastewater Treatment Sludges."

*b. Calculation of Sludge Quality Impacts.* To estimate the effect of the integrated regulatory alternative on sludge quality in terms of TCDD and TCDF mass loadings and concentrations, the Agency first estimated baseline levels of TCDD and TCDF for all mills subject to BAT for bleach plant effluent. Next, these baseline levels were compared to estimates of the levels of TCDD and TCDF in sludge following the implementation of BAT, with the difference representing the pollutant reduction. For a description of the methodology used to calculate reductions, see "Economic Analysis of Impacts of Integrated Air/Water Regulations for the Pulp and Paper Industry on Disposal of Wastewater Sludge."

For each facility, with few exceptions, the most recent data from any of the four data sources (the 104 Mill Study, the Short-term Study, the Long-term Study, and Self Monitoring Data as reported on the 1990 Census of Pulp, Paper, and Paperboard Manufacturing Facilities) were used to describe a particular facility's baseline TCDD and TCDF concentration levels. The data bases cover the period from January 1, 1989 through December 31, 1992. Mass loadings were calculated using production-normalized loading factors. In some cases, data were transferred from facilities with similar technology and fiber furnish.

To estimate attainable TCDD and TCDF loadings and concentrations under various integrated regulatory alternatives, the Agency first identified the existing facility or group of facilities and data sources that were judged to be representative of the achievable levels under each of the various integrated regulatory alternatives. Pollutant concentrations and load factors from these representative facilities were used to calculate the average TCDD/TCDF concentrations and loadings for each facility.

Overall, for each of the listed subcategories, the proposed integrated regulatory alternative is estimated to reduce average loadings of TCDD and TCDF as follows: for papergrade kraft, 111.1 and 602.6 grams/year, for papergrade sulfite, 2.0 and 23.4 grams/year, for dissolving kraft, 0.1 and 0.9 grams/year, and for dissolving sulfite, 1.6 and 3.5 grams/year, respectively. Many of the assumptions used in the water quality assessment (section XI.B) were also used here. Sensitivity analyses to test several of these assumptions indicate that the loading and concentration results for sludge were not appreciably different when the assumptions regarding non-detected data are varied.

*c. Economic Benefits of TCDD and TCDF Reduction in Sludge.* The Agency considered the benefits associated with reductions of TCDD and TCDF levels in sludge with respect to cost savings to mills for sludge management, cost savings to mills from avoiding potential future rulemakings, and from the reduction in risk to wildlife from reduced exposure to TCDD and TCDF in land applied sludges.

(1) Estimation of Cost Savings from Land Application. Currently, a small percentage of mills subject to BAT land apply their sludges; however, the potential for higher levels of participation exists. Comments on the proposed rule for land application of sludge indicated that permitting and siting of landfills, an alternative sludge management technique, is quite difficult in some regions. Additionally, land application is generally less expensive than alternative disposal methods, and mills appear interested in making beneficial use of sludge.

Barriers to land application that currently exist include state regulatory requirements pertaining to TCDD and TCDF levels and public resistance to using dioxin-contaminated sludge. By reducing TCDD and TCDF levels in sludge, the integrated regulatory alternative will overcome some of these barriers and mills will be able to take advantage of cost savings offered by this disposal option.

The methodology for estimating cost savings from land application due to BAT process changes is described in the document entitled "Economic Analysis of Impacts of Integrated Air/Water Regulations for the Pulp and Paper Industry on Disposal of Wastewater Sludge". In general, the analysis focuses on 76 of the BAT mills that currently dispose of sludge in landfills or surface impoundments. Under several scenarios, the Agency assumed that land application becomes a viable disposal option when TCDD levels become 25 ppt, 10 ppt, 3 ppt, and 1 ppt. Therefore, under a regulatory option that is predicted to lower TCDD concentrations to that level, it is assumed that mills are able to take advantage of disposal cost savings from land application. Mills that are currently land applying or disposing of their sludge through incineration are assumed to continue.

In the analysis, mills that currently utilize landfills and surface impoundments will do so until they reach their existing capacity. Mills are then assumed to use land application to dispose their sludge. The sludge diverted to land application is assumed to be distributed among the various types of land application according to the current share of land-applied sludge (based upon the 1990 National Census). Cost savings associated with switching from sludge disposal to land application is calculated using the difference in average per-ton costs between land application and the appropriate disposal methods. Utilizing this approach, the estimated annualized sum of the present value savings ranges from $6 to $53 million depending upon which TCDD level land application is expected to occur. Under the proposed rule for land application of sludge, 10 ppt was considered to be the permissible level for land application to occur. At this level, the estimated annualized cost savings is $53 million.

(2) Estimation of Cost Savings Associated with Avoided Potential Rulemakings. Reductions in TCDD and TCDF levels may affect potential future regulatory activities under the Resource Conservation and Recovery Act (RCRA) and the Toxic Substances Control Act (TSCA). EPA believes that it will be more efficient and less costly to the regulated community to address

concerns regarding TCDD and TCDF levels in the sludge through this integrated rule as opposed to several separate rulemakings.

Under the proposed consent decree, EDF v. Reilly, No. 89–0598, the Agency may be required to make a listing determination for pulp and paper sludge. Should the listing determination lead to a hazardous waste finding, then generators, disposers, and transporters of pulp sludge would become subject to a wide range of regulatory requirements. If the integrated rulemaking reduces TCDD and TCDF concentrations to levels where a hazardous waste finding would not be made, the potential regulatory costs will be reduced or avoided.

If the Agency did not implement the integrated rule, and if current levels of TCDD and TCDF in the sludge are high enough to result in a hazardous waste finding, the Agency would be required to set treatment standards for the waste to ensure protection of human health and the environment. These standards, including compliance with the land disposal restriction program, could result in requirements for reductions of TCDD and TCDF in the waste that would most likely be at least as expensive as the BAT and MACT standards required in the integrated rule. Currently thermal destruction is the only RCRA approved technology for treatment of dioxin wastes. The final Regulatory Impact Analysis of Land Disposal Restrictions for newly-listed wastes (1992) indicated that typical costs for thermal destruction were cited as $2,300 per ton. Depending upon the amount of sludge that will be subject to RCRA listing, these costs could be substantial.

In addition, if process changes are not sufficient to reduce TCDD and TCDF levels and if mills choose on-site management and RCRA permitting, a hazardous waste listing could expose mills to the corrective action provisions of RCRA. Based on prediction of corrective action costs, the average reported costs of RCRA facility-wide corrective action is $7.2 million per facility. For more details, see "Draft Regulatory Impact Analysis for the Final Rulemaking on Corrective Action for Solid Waste Management Units," March 1993. If costs of corrective action would be similar for pulp and paper mills, and only 10% of the mills subject to BAT required corrective action, potential costs could be $72 million. If 50% of the existing landfills and surface impoundments required corrective action, these costs could be $374 million, and if 100% of landfills and surface impoundments were subject to corrective action, the costs could be $749 million.

In addition to costs associated with potential RCRA rulemakings, industry may also be subject to costs associated with potential TSCA rulemakings. The Agency will revisit its proposed rule on the land application of pulp and paper sludge (56 FR 21802, May 10, 1991) following the promulgation of the integrated rule. At that time the Agency will consider the impacts of the integrated rulemaking on the TCDD and TCDF levels in sludge when land applied, and may determine to proceed with a final rule.

The regulatory impact analysis for the proposed rule on land application of pulp and paper mill sludge estimated the costs of that rulemaking to be $5.4 million per year. In the absence of sufficient improvements in the TCDD and TCDF concentrations in sludge, these costs could be incurred as a consequence of a final TSCA ruling.

The cost savings associated with sludge management and with avoiding potential RCRA and TSCA rulemakings have not been subtracted directly from the compliance costs of the regulations proposed in this notice, however, the Agency will consider doing so with further refinement of the estimates. EPA invites comments on its estimate of potential comments, including supporting data.

2. Energy Impacts

According to the Department of Energy, the pulp and paper industry is the fourth largest industrial user of energy, accounting for 9.9 percent of total U.S. industrial energy consumption (2.4 quadrillion BTUs in 1990). Much of the energy used by the industry is produced on-site in power and recovery boilers. In 1990, the sources of energy used by the industry included cooking liquor fuel (40.2 percent), fossil fuels (37.1 percent), bark and wood fuel (15.5 percent), and purchased electricity (7.2 percent). The fossil fuels used include natural gas, fuel oil, and coal.

Compliance with the proposed regulations is anticipated to increase the industry's energy usage by less than one percent (17.6 trillion BTUs/yr). Among the reasons for this increase are the energy requirements for process equipment upgrades for compliance with BAT and PSES, treatment system upgrades for compliance with BPT, and equipment upgrades for compliance with MACT. However, compliance with BMP and BAT is anticipated to partially offset the increase in energy usage industry-wide because of the energy value of recovered cooking liquor solids.

Table XI.C–1 summarizes the estimated change in the use of energy associated with the proposed integrated rule. For more details, see the water development document and the background information document.

TABLE XI.C–1.—CHANGES IN ENERGY CONSUMPTION

| Regulation | Source of energy use | Energy use change (trillion BTU/yr) |
|---|---|---|
| BAT and PSES. | Pulping and bleaching process modifications. | 4.1 |
| | Recovery of cooking liquor solids. | −7.8 |
| BPT ....... | Wastewater treatment system upgrades. | 1.0 |
| BMP ...... | Recovery of cooking liquor solids. | −0.3 |
| MACT .... | Equipment upgrades, increased steam generation and auxiliary fuels. | 20.6 |
| Total | ................................... | 17.6 |

Additional energy requirements for process equipment upgrades for BAT and PSES mainly result from expansion of chlorine dioxide generator capacity and additional pumps for application of oxygen and/or hydrogen peroxide in the bleach plant. Additional energy requirements for process equipment for compliance with BPT mainly result from increased aeration in the treatment system. Additional energy requirements for equipment upgrades for MACT result from the electricity needed to power fans and blowers to transport vent streams, natural gas needed to generate additional steam for steam stripping of pulping wastewaters, and natural gas as an auxiliary fuel for incinerators for bleach plant vent streams.

Implementing BMP and complying with BAT will increase the recovery of cooking liquor solids. The energy value of cooking liquor, recovered from fewer spills and from extended oxygen delignification and/or extended cooking, largely offsets the increased energy demand of the additional process equipment.

3. Other Secondary Impacts

There are several secondary impacts associated with the proposed integrated rule that have not been discussed in previous sections of this preamble. Among the most important of these are changes in the volume of water discharged and the mass of wastewater treatment sludge generated, and changes in the quantities of chemicals used at bleaching mills.

Compliance with BPT is anticipated to require a reduction in the volume of wastewater discharged at many facilities. This reduction will likely come from a combination of in-process modifications resulting in less wastewater generated as well as installation of flow control equipment at some mills. The estimated reduction in water usage for the industry is 1.21 billion liters per year. Compliance with BPT/BCT is anticipated to increase the mass of wastewater treatment sludge generated by 52,000 metric tons/yr, mostly because of increased solids removal at facilities with activated sludge wastewater treatment systems.

Compliance with BAT will also affect the quantity of bleaching chemicals used in the industry. Quantities of hypochlorite, chlorine, and sodium hydroxide are expected to decrease while quantities of chlorine dioxide, oxygen, hydrogen peroxide, sodium hydroxide, and ozone are expected to increase. However, overall chemical usage in the industry will decline resulting in cost savings.

**XII. Administrative Requirements**

*A. Changes in Format and Name*

Today, EPA is proposing to incorporate part 431, the builders' paper and board mills point source category, into part 430, the pulp, paper, and paperboard point source category. The builders' paper and board mills point source category consists of only one subpart, subpart A, in part 431 in the current subcategorization scheme. The Agency is proposing to move this subpart and include it in subpart J of part 430 in the proposed subcategorization scheme (which is discussed in section IX.A).

EPA is also proposing to consolidate the titles of the two point source categories into a new title for part 430. The title is proposed to be changed from "pulp, paper, and paperboard and the builders' paper and board mills point source categories" to "pulp, paper, and paperboard point source category."

*B. Docket and Public Record*

The Record for this rulemaking is available for public review at EPA Headquarters, 401 M Street SW, Washington, DC 20460. The Record supporting the effluent limitations guidelines in part 430 is located in the Office of Water Docket, room L102 (in the basement of Waterside Mall). The Docket is staffed by an EPA contractor, Labat-Anderson, Inc., and interested parties are encouraged to call for an appointment. The telephone number for the Water Docket is (202) 260–3027.

EPA notes that many documents in the record supporting these proposed rules have been claimed as confidential business information and, therefore, are not included in the record that is available to the public in the Air and Water Dockets. To support the rulemaking, EPA is presenting certain information in aggregated form or is masking mill identities to preserve confidentiality claims. Further, the Agency has withheld from disclosure some data not claimed as confidential business information because release of this information could indirectly reveal information claimed to be confidential.

The Record supporting the national emission standards for hazardous air pollutants in part 63 is located in Room M1500 at the same address, telephone number (202) 260–7548. The EPA information regulation (40 CFR part 2) provides that a reasonable fee may be charged for photocopying.

*C. Clean Water Act Procedural Requirements*

As required by the Clean Water Act, EPA will conduct a public hearing on the pretreatment standards portion of the proposed rule. The location and time of this public hearing will be announced in a future notice.

*D. Clean Air Act Procedural Requirements*

In accordance with Section 117 of the CAA, publication of this proposal was preceded by consultation with appropriate advisory committees, independent experts, and Federal departments and agencies. The Administrator will welcome comments on all aspects of the proposed regulation, including health, economic, and technological issues, as well as on the proposed test Method 308.

This regulation will be reviewed eight years from the date of promulgation. This review will include an assessment of such factors as an evaluation of the residual health risks, any overlap with other programs, the existence of alternative methods, enforceability, improvements in emission control technology and health data, and the recordkeeping and reporting requirements.

*E. Executive Order 12866*

Executive Order 12866 requires EPA and other agencies to assess the potential costs and benefits of all significant regulatory actions. Significant regulatory actions are those that impose a cost on the economy of $100 million or more annually or have certain other regulatory, policy, or economic impacts. Today's rule meets the criteria of a significant regulatory action as set forth in section 3(f) of the Executive Order. The regulatory analysis for this proposed rule is presented in "Regulatory Impact Assessment of Proposed Effluent Guidelines and NESHAP for the Pulp, Paper, and Paperboard Industry." This analysis (referred to as the RIA) is summarized in section XI.B. Today's proposed rule and the RIA were submitted to the Office of Management and Budget for review.

Briefly, the RIA assesses both the costs and benefits to society of the proposed rules. The RIA analyzes the effect of current discharges and emissions and the benefits associated with reducing those environmental releases as a result of compliance with the proposed rules. Three classes of benefits are analyzed: non-quantified and non-monetized benefits, quantified and non-monetized benefits, and quantified and monetized benefits. The non-quantified, non-monetized benefits include improvements in recreational fishing, improved aesthetic quality of waters, and benefits to wildlife and to threatened or endangered species. The quantified, non-monetized benefits include potential benefits to human health such as the avoidance of potential cancer cases and benefits to aquatic life such as a reduced number of exceedances of water quality criteria. The monetized benefits also focus on human health and aquatic life impacts. The Agency estimates that the benefits of today's proposed rules range from $160 million to $987 million.

The social costs of the proposed regulation include both monetary and non-monetary outlays made by society. Monetary outlays include private sector compliance costs, government administrative costs, and the costs of reallocating displaced workers. Non-monetary outlays include losses in consumers' and producers' surpluses, discomfort or inconvenience, loss of time, and a slowdown in the rate of innovation. The Agency's estimate of social costs includes values for consumer and producer surplus losses, government administrative costs and worker dislocation costs, and is $948 million.

*F. Regulatory Flexibility Act*

The Regulatory Flexibility Act, 5 U.S.C. 601 et. seq., requires EPA and other agencies to prepare an initial regulatory flexibility analysis for regulations that have a significant impact on a substantial number of small entities. EPA projects that today's proposed rule, if promulgated, could affect small businesses. The initial regulatory flexibility analysis for these proposed rules is incorporated into the economic impact analysis and is discussed in section XI.B. Briefly, the small entity analysis estimates the economic impacts of the new requirements on small mills and small companies and describes the potential disparate impacts between the groups of large and small manufacturers. The analysis also presents the Agency's consideration of alternatives that might minimize the impacts on small entities.

The reasons why EPA is proposing this rule are presented in sections IV and V. The legal basis for today's rule is presented in section III. The number of small entities and the approach for defining small entities are summarized in section XI.B and detailed in the economic impact analysis report for this rulemaking. In short, the Agency does not have evidence that small businesses are disproportionately impacted by the proposed rule. Reporting and other compliance requirements are summarized in sections IX.I and X.J and detailed in the technical water development document and the background information document. While the Agency has not identified any duplicative, overlapping, or conflicting Federal rules, a discussion of other related rulemakings is presented in sections V.C and XI.C.

The Agency solicits comment on the definition of small entity used in this analysis, the analytical procedures for assessing impacts on small entities, and the opportunities to minimize the impacts on small entities.

*G. Paperwork Reduction Act*

The proposed effluent guidelines and standards contain no information collection activities and, therefore, no information collection request (ICR) has been submitted to the Office of Management and Budget (OMB) for review and approval under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*

OMB has approved the existing information collection requirements associated with NPDES discharge permit applications under the provisions of the Paperwork Reduction Act and has assigned OMB control number 2040–0086.

The collection of information required for NPDES discharge permit applications has an estimated reporting burden averaging 12 hours per response and an estimated annual recordkeeping burden averaging two hours per respondent. These estimates include time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The information collection requirements for the proposed NESHAP have been submitted for approval to the Office of Management and Budget (OMB) under the *Paperwork Reduction Act*, 44 U.S.C 3501 *et seq.* An Information Collection Request (ICR) document has been prepared by EPA (ICR No. 1657.01) and a copy may be obtained from Sandy Farmer, Information Policy Branch (2136); U.S. Environmental Protection Agency; 401 M St., S.W.; Washington, DC 20460 or by calling (202) 260–2740.

The public recordkeeping and reporting burden for this collection of information is estimated to average 1,461 hours (or to vary from 923 to 1,797 hours) the first year. This recordkeeping and reporting burden is estimated to average 362 hours (or to vary from 338 to 439 hours) annually, thereafter. This includes time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Chief, Information Policy Branch (2136); U.S. Environmental Protection Agency; 401 M St., SW.; Washington, DC 20460; and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503, marked "Attention: Desk Officer for EPA." The final rule will respond to any OMB or public comments on the information collection requirements contained in this proposal.

## XIII. Solicitation of Data and Comments

*A. Introduction and General Solicitation*

EPA invites and encourages public participation in this rulemaking. The Agency asks that comments address any perceived deficiencies in the record of this proposal and that suggested revisions or corrections be supported by data.

The Agency invites all parties to coordinate their data collection activities with EPA to facilitate mutually beneficial and cost-effective data submissions. EPA is interested in participating in study plans, data collection and documentation. Please refer to the "For Further Information" section at the beginning of this preamble for technical contacts at EPA.

*B. Specific Data and Comment Solicitations*

EPA has solicited comments and data on many individual topics throughout this preamble. The Agency incorporates each and every such solicitation here, and reiterates its interest in receiving data and comments on the issues addressed by those solicitations. In addition, EPA particularly requests comments and data on the following issues:

1. Technology Basis for BAT Limits for Bleached Papergrade Kraft and Soda Subcategory

The Agency is proposing BAT effluent limitations for the bleached papergrade kraft and soda subcategory based on oxygen delignification and complete (100 percent) substitution of chlorine dioxide for elemental chlorine. The Agency solicits comments and data on all aspects of all options considered for the bleached papergrade kraft and soda subcategory, as well as on any options not considered.

During the development of these proposed regulations, industry representatives commented that the costs associated with installing oxygen delignification are not justified by the corresponding effluent reduction benefits, and recommended the use of high levels of substitution without oxygen delignification. The Agency particularly solicits comments and relevant data on the process and product quality improvements, operating costs (and cost savings), and effluent reduction benefits attributable to oxygen delignification.

2. Technology Basis for BAT Limits for Dissolving Kraft Subcategory

EPA is proposing BAT effluent limitations for the dissolving kraft subcategory based on transfer of technology from the bleached papergrade kraft subcategory. The technology basis includes elimination of hypochlorite, oxygen delignification, and 70 percent substitution of chlorine dioxide for elemental chlorine. The Agency solicits comments and data on all aspects of all options considered for the dissolving kraft subcategory, as well as on any options not considered.

During the development of these proposed rules, EPA received comments that none of the three mills in this subcategory currently use this technology, that use of hypochlorite is required to achieve the product quality requirements of customers for these dissolving kraft pulp products, and that certain components of the technology (e.g., extended cooking) are not applicable in producing the dissolving kraft products. EPA solicits additional trial data from individual mills demonstrating that products can (or cannot) be made with oxygen delignification.

Trials to date for hypochlorite substitutes have not been successful in maintaining stringent quality specifications (e.g., degree of polymerization, intrinsic viscosity, etc.) for certain products as required in customer contracts. Limited and preliminary trial data have been received by EPA indicating substantial reductions in use of hypochlorite while maintaining product quality, and reductions in pollutant parameters of concern such as chloroform. Further qualification trials with customers of any changed dissolving pulp characteristics were reported to be required and take from one to three years to successfully complete through revised product specifications in contracts. The Agency solicits additional trial data of any scale (i. e., bench, pilot, or mill-scale trials with data for product quality parameters, wastewater parameter and pollutant data for process filtrates, air emissions data) for alternative processes beyond existing technology to demonstrate reduced use of hypochlorite and the use of other process technologies (e.g., oxygen delignification), and the reductions that can be achieved in pollutants of concern.

3. Technology Basis for BAT Limits for Dissolving Sulfite Subcategory

EPA is proposing effluent limits for the dissolving sulfite subcategory based on oxygen delignification followed by complete substitution of elemental chlorine with chlorine-dioxide. The Agency solicits comments and data on all aspects of all options considered for the dissolving sulfite subcategory, as well as on any options not considered.

EPA has received comments and limited trial data from individual mills on the feasibility of TCF processes and the dissolving grade products which can and cannot be made by these processes. Commenters have asserted that the European mill on which EPA's option 2 is based is not representative of U.S. mills, because the mill uses a beech furnish rather than those furnishes typical of U.S. sulfite mills. Industry representatives also claim that the European mill uses a different process than that used by U.S. mills, does not produce the full range of products, including high quality acetate grade dissolving pulps, and transfers its dissolving pulp to an on-site rayon plant that is asserted not to have the same stringent product quality requirements of customers served by U.S. mills. The Agency solicits additional data from individual mills regarding those dissolving grade sulfite products demonstrating unacceptable product quality, with associated wastewater and air emissions data. The Agency solicits additional data from individual mills on those products that can be made by TCF processes. For those products that cannot be made by TCF processes, the Agency solicits additional trial data of any scale (i. e., bench, pilot, or mill-scale trials with data for product quality parameters, wastewater parameter and individual pollutant data for process filtrates, hazardous air pollutant emissions data) for alternative processes beyond existing technology, including reductions in hypochlorite use, to demonstrate the reductions that *can* be achieved in air and wastewater pollutants of concern.

4. Technology Basis for BAT Limits for Papergrade Sulfite Subcategory

EPA is proposing BAT effluent limitations for the papergrade sulfite subcategory on TCF technology. The Agency solicits comment and data on all aspects of all options considered for the papergrade sulfite subcategory, as well as on any options not considered.

During the development of these proposed rules, the Agency received comments and some trial data from individual mills concerning the feasibility of TCF processes and the papergrade products that can and cannot be made by these processes. Commenters asserted that certain processes (e.g., ammonium-based) yielding specific products and specifications, and certain specialty papers and pulps (e.g., photographic papers and plastic molding pulps) have not yet been made by the TCF processes with quality parameters acceptable to mill customers. Many of the assertions made by individual companies have yet to be supported with mill trial and wastewater analytical data for pollutants of concern. The Agency solicits that supporting data; without it, the assertions cannot be evaluated.

The Agency also solicits additional data regarding papergrade products that can be made by TCF, including:

- Trial data of any scale (i.e., bench, pilot, or mill-scale trials);
- Process descriptions (e.g., bleaching sequence, chemical application rates, etc.);
- Pulp flow rates;
- Product quality parameters (e.g., brightness, alpha cellulose content, etc.);
- Wastewater parameter and pollutant data (with analytical methods specified, and QA/QC); and
- Hazardous air pollutants in process filtrates and air emissions. The Agency solicits comments and data on those options considered and not selected for the papergrade sulfite subcategory, and on any options the Agency did not consider.

5. TCF Bleaching—Request for Analytical Data for TCF Processes

The Agency currently has limited data on the performance of TCF processes (see section IX.E.3, subcategories D and E). The industry trade association and specific companies have made assertions that TCF technologies are not being used domestically, and are also not capable of making many products made by U.S. mills. However, environmental groups have argued that EPA should propose BAT effluent limitations based on TCF technology. In light of the foregoing, the Agency solicits TCF process technology performance data and process details for all pollutants of concern, including metals and other organic pollutants, in all media (air, wastewater, sludge). These data are critical to meaningful evaluation of TCF technologies. The Agency solicits comments on the proposal not to base BAT effluent limitations on TCF technology for bleached papergrade kraft, dissolving sulfite and dissolving kraft mills at this time.

6. Alternative Limits for TCF Processes

The Agency also solicits comments on the proposed alternative limits for TCF mills in the papergrade kraft, dissolving sulfite and dissolving kraft subcategories. EPA solicits comments on data on whether these alternative limits provide meaningful incentives, whether such incentives are appropriate, and recommendations for any additional or different incentives.

7. Subcategorization

*a. EPA's Proposed Consolidation of Subcategories.* EPA today proposes to consolidate some of the subcategories for the effluent guidelines covering this industry. During development of these proposed regulations, representatives commented that mills within each of EPA's proposed consolidated subcategories show different raw waste loads, wastewater treatment costs, and achievability of end-of-pipe effluent limitations for conventional pollutants. Three examples of specific subcategorization concerns are: (1) Industry representatives have commented that the bleached papergrade kraft and soda subcategory should be divided to distinguish between bleached papergrade kraft and soda mills; (2) Industry representatives have requested that the dissolving sulfite pulp subcategory be further subdivided to distinguish between different grades of dissolving sulfite pulp; and (3) The Agency has proposed to divide the production of paper and paperboard from purchased pulp into two subcategories: (i) Fine and Lightweight Papers from Purchased Pulp, and (ii) Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp even though the processes used by these two subcategories are similar and the production normalized $BOD_5$ effluent loadings are similar. The Agency solicits detailed comments and data, including cost and equipment design data, on each of the foregoing concerns. In addition, the Agency solicits comments and data on whether any subcategories proposed today should be divided into smaller subcategories, and whether any subcategories proposed today should be combined to form larger subcategories.

*b. Alternative Approaches to Subcategorization.* During development of these proposed regulations, representatives of environmental groups suggested that EPA subcategorize the industry based upon the types of furnishes used at individual mills. Such an approach might provide greater protection of the environment, since mills using hardwood furnishes would in general be able to meet more stringent effluent limitations than these using softwood furnishes. However, such an approach might be difficult to administer, since many mills use both hardwood and softwood furnishes and vary the amounts of these furnishes over time. Furthermore, EPA lacks complete data concerning the limits that could be achieved by mills using exclusively hardwoods or softwoods, and on the mix of these furnishes used at many mills. EPA solicits comments on whether the subcategorization in the final rule should be based upon the type of furnish used at a mill, as well as data to support such comments.

In addition, during the development of the proposed rules, EPA received suggestions that subcategorization based on product type might be appropriate, in particular in those subcategories where producers have expressed concern about their ability to make some but not all products with EPA's proposed BAT technology bases. EPA solicits comments and data on whether the subcategorization in the final rule should be based on products.

8. In-Plant Limitations on Pollutants in Wastewaters

EPA is today proposing in-plant limitations on certain pollutants (e.g., dioxin, furan, certain chlorinated phenolics) found at the end-of-pipe at levels below the current analytical limits of detection. The Agency is also proposing in-plant monitoring of these and other pollutants. The Agency traditionally has set technology-based performance standards at the point of discharge to waters of the United States or the sewer system. However, application of the process technologies that serve as the basis for BAT limitations result in measurements for certain pollutants near the limits of detection even in internal, smaller-volume bleach plant wastewaters. Therefore, measurement at the end-of-pipe, after dilution of the bleach plant wastewaters, does not provide meaningful analytical data on the performance of these process technologies.

During development of these proposed regulations, industry representatives asserted that limitations on internal streams may reduce their flexibility in compliance and require installation of specific process technologies. Based upon available data, the Agency believes that mills will retain considerable flexibility in choosing specific compliance strategies that may be implemented at individual mills, including available process technologies. EPA solicits comments and data on whether end-of-pipe limits could practically or feasibly be used to measure the performance of process technologies that form the basis of EPA's proposed BAT, PSES, NSPS and PSNS regulations. The Agency further solicits comments and specific supporting data on all aspects of the proposal to set limitations on internal bleach plant streams.

9. BAT for Secondary Fiber Deink Mills and Other Bleaching Pulp Mills for Which BAT Effluent Limits Are Not Proposed Today

A number of mills that do not chemically pulp or that do not use a virgin wood furnish do bleach their pulp with chlorine or chlorine-derivatives. Data received from secondary fiber deink mills, secondary fiber non-deink mills, and non-wood chemical pulp mills indicate the discharge of dioxins, PCBs, and chloroform. The Agency solicits additional data on individual mills on current bleaching practices and sequences, chemical application rates, wastewater discharges, and air emissions from these mills. The Agency solicits comments and trial data on the feasibility of eliminating chlorine and chlorine derivatives from the bleaching process at these mills.

10. PCB Data

As part of the Agency's review of subcategories for which BAT is not being proposed at this time, the Agency found that several secondary fiber mills were discharging PCBs at levels ranging from less than 0.1 ppb to more than 60 ppb during the period 1985–1990. Most of the higher values were recorded during the earlier part of this period. The Agency also has effluent data for one secondary fiber deink mill showing PCB concentrations consistently not detected. The Agency is considering whether to establish effluent limitations guidelines and standards for PCBs for this industry as part of its section 304(m) planning process (see section IX.E.3.a), and solicits comment on this approach and on PCB data from 1990 to the present from mills in all subcategories, and specifically secondary fiber deink and non-deink mills.

11. Non-Wood Furnish Mills

A small number of mills produce pulp from furnishes other than wood, such as cotton, hemp, or bagasse. The Agency solicits data on discharges from these mills, particularly wastewater from bleach plants, and on the feasibility of eliminating chlorine and chlorine derivatives from the bleaching processes at these mills.

The Agency also requests information and data on the feasibility of implementing BMPs in non-wood chemical pulp mills, as well as COD data for these mills and any relationship these data may bear to the non-chlorinated constituents generated in pulping operations and contained in pulping liquor spills.

12. Limitations Based Upon Softwood Furnish vs. Hardwood Furnish

Softwood fibers contain substantially greater quantities of lignin than hardwood fibers. In general, this means that discharges of pollutants derived from lignin are higher for mills that pulp and subsequently bleach softwood furnishes than those that use hardwood furnishes. In today's proposed regulations, EPA based most of the BAT effluent limitations on the use of softwood furnishes, since mills that pulp and subsequently bleach hardwood furnishes should be able to meet those limitations. One exception in the long-term study noted by the Agency is the generation and discharge of trichlorosyringol at mills pulping hardwoods. For this pollutant, the Agency has established the proposed effluent limitations based upon the hardwood data rather than the softwood data, which showed non-detects. The Agency solicits comments on this approach.

13. Validity of Volatiles Samples and Laboratory Contamination

Methylene chloride analyses were highly variable during the long-term sampling program. Industry representatives believe that this variability is due to field and laboratory contamination of the samples, that the data is unrepresentative and, therefore, that effluent limitations for this pollutant should not be established. The Agency determined that while there were data sets that demonstrated contamination (these data sets were excluded from the data base), the patterns of variability for remaining samples do not solely reflect laboratory contamination. There is concern that if the levels of these pollutants cannot be accurately determined during regulatory development, the pollutant would not be appropriately regulated and, as a result, it may be difficult for mills to demonstrate compliance. The Agency requests comments on this concern.

14. Scientific Validity of Analytic Method for AOX/Right-Censored Data

During the first phase of the long-term study, analysis for AOX was performed using disposable carbon columns. The majority of the data that resulted was qualified as being greater than the value recorded. During the second phase of the long-term study, analysis for AOX was performed using hand-packed columns. Most of the resulting values did not have to be qualified as "greater than." The Agency has used most of the data for both phases, except when there was sufficient reason to exclude it based on method performance criteria. In developing the limitations, EPA used a statistical procedure that modelled the censoring in the data as well as measurements associated with "exact" values. The Agency solicits comments on the use of right-censored data, and on the analytical method for AOX (Method 1650) and its method performance criteria.

15. Role of Market Demand and Government Procurement Practices

On October 20, 1993, President Clinton issued Executive Order 12873, which directs federal government agencies to purchase paper made using environmentally-friendly technologies. Revisions in the brightness specifications and standards for federal goverment paper purchases, which are discussed in the Executive Order, may likely provide additional incentives for producing paper using TCF technologies. The Agency solicits comments on the roles that market demand and federal government procurement practices (e.g., paper specifications and uses) may play both in the evolution of TCF and other process technologies.

16. Zero Discharge as Basis for Secondary Fiber Subcategory NSPS

The Agency believes that some non-deink secondary fiber mills can operate without discharging effluent if they are designed to do so initially. (This is based upon current industry practices as reflected by responses to the 1990 Census). However, EPA's information is incomplete concerning the ability of mills in this subcategory other than those making paperboard, roofing paper or builders felt to achieve zero discharge. Furthermore, information available to the Agency suggests that existing mills cannot alter discharging practices to operate under zero discharge conditions without incurring excessive costs and, therefore, BAT limitations based on zero discharge of wastewater may not be economically achievable. As a result, the Agency is proposing NSPS based on zero discharge for only a portion of this subcategory, and is not proposing BAT limits for this subcategory at this time. The Agency solicits comments and data on the foregoing, as well as on the technical feasibility and cost implications of zero discharge for new and existing mills in this subcategory, the impact on sludge generation and disposal costs, and whether disposal of dilute sludges or periodic wastewater discharges, infrequent though they may be, are necessary to maintain a complete recycle system at these mills.

17. Revision of BPT

The Clean Water Act defines BPT as the best practicable control technology currently available. The Agency is proposing to revise BPT effluent limitations for mills in this industry, based in most cases on the average of the best 50 percent of the mills in each effluent guideline subcategory. EPA invites comment on whether the Agency should revise the current BPT effluent limitations for this industry. During the development of these proposed regulations, industry representatives argued that EPA lacks the authority to revise promulgated BPT effluent limitations guidelines and that the current BPT effluent limitations, which were promulgated in three phases in 1974, 1977, and 1982, should remain forever fixed. Representatives of environmental groups offered a different view—that EPA is required to revise BPT and other guidelines where new data indicate that existing limits are out of date. EPA solicits comment on whether the Agency is either legally proscribed from, or legally required to, revise BPT effluent limitations guidelines. EPA further solicits comment on the merits of revising BPT. EPA solicits data on costs, effluent reduction benefits, water quality benefits and any other factors that may be related to the proposed BPT and BCT revisions.

18. Cost of Oxygen Delignification

During development of these proposed regulations, industry representatives submitted estimates of the cost of retrofitting existing mills with oxygen delignification equipment that far exceeded EPA's estimates. One of the primary differences in the cost analyses by the industry and EPA appears to be industry's assumption that replacement of recovery boilers and related recovery cycle equipment would be required at a significant number of mills. The Agency believes that upgrades of existing recovery boiler capacity will be sufficient to accommodate the marginal increases in solids loadings from oxygen delignification and other technologies that are part of BAT. The costs of these upgrades have been included in EPA's cost estimate. Decisions for installing additional recovery boiler capacity beyond these upgrades are production-based, and these costs are therefore unnecessary to comply with the proposed regulations. The Agency solicits comments and detailed costing assumptions and data concerning the cost of oxygen delignification.

19. Solicitation of Toxics Data

A small number of mills in subcategories where BAT is being proposed did not submit toxic pollutant effluent data in response to the 1990 Census. For those mills, data from the "104-mill Study" was used to set mill-specific dioxin baselines, and other values for toxic pollutants were transferred from similar mills. The Agency solicits data on toxic pollutants from mills that meet this description.

20. Whether To Regulate Color, AOX, and COD

The Agency solicits comment on its proposal to control AOX, COD, and color with BAT effluent limitations.

Color, AOX, and COD are each bulk parameters, meaning that they do not represent a single compound, but a number of them. All three parameters have been receiving attention from various regulatory authorities as alternatives for controlling individual compounds. Color, in particular, has received state-level attention because it is a parameter visible to the average person. AOX has received international attention as an alternative parameter for chlorinated organic compounds. COD has received attention as a potential parameter for controlling low-molecular weight non-chlorinated compounds that have displayed toxicity in Canadian studies. Industry representatives challenge the Agency's intent to set limitations on these parameters, stating that they do not bear a direct relationship to any environmental effects related to particular pollutants of concern. Although direct statistical relationships are not clearly demonstrated, the Agency believes these parameters have a general relationship to a variety of compounds of concern, many of which have not yet been analyzed or identified. These bulk parameters can often be measured when specific pollutants cannot be measured using existing analytic methods. The Agency also believes that these parameters are useful measures of the performance of process and end-of-pipe technologies. The Agency requests comments on the utility of these parameters, as measures of the performance of process and end-of-pipe technologies and otherwise. The Agency solicits data relevant to the foregoing.

21. Data To Better Define Technology Variability

Initial statistical analysis indicates that for parameters that typically are monitored very frequently (e.g., as often as daily), such as AOX, individual measurements may be autocorrelated. The Agency requests the submission of treatment system influent and final effluent data for these parameters in order to better define the performance and variability of the process technologies (including closed screen rooms), BMP's, and secondary biological treatment system at any mills that use these and related technologies.

22. Upgrading Certain POTWs as an Alternative to POTW Limits

As set forth in section IX.E.5, EPA believes that controls equivalent to some PSES limits proposed today might be achieved more cost-effectively if the POTW receiving pulp and paper mill effluent were to upgrade its treatment facilities (instead of relying on the mill to meet PSES limits). EPA solicits comments and data on approaches for achieving the most cost-effective controls in this area, consistent with the Agency's legal obligations.

At 32 POTWs, pulp and paper mill wastewaters make up more than 50 percent of either total flow, $BOD_5$ loading, or TSS loading. The Agency solicits comments and data on:

- The specific design and operating parameters of these POTWs;
- Their performance in removing $BOD_5$, TSS, AOX, and COD;
- The utility of co-permitting the mills in the POTW's NPDES permit;
- Any alternative strategies in addition to those presented in this proposal that would achieve the same effluent quality from the POTW (based upon the proposed BAT production-based mass AOX, COD, and color limitations) if the proposed PSES applicable to mills discharging into some of these POTWs is not appropriate; and
- The costs developed by the Agency for upgrading the biological treatment systems at each of the affected POTWs.

23. BMPs, Limits on COD and Data for Control of Pulping Liquors

The Agency today proposes to require best management practices (BMPs) including pulping liquor spill prevention, containment, and control measures. These practices are known to reduce the amount of pulping liquor (especially "black liquor" at kraft mills) discharged to wastewater treatment systems, and reduce the cost of process operation through increased chemical recovery. These BMPs would include certain mandatory practices, such as developing and updating spill prevention plans, training, and related activities. These BMPs would also include other practices chosen from a "menu" of practices that are applicable to individual mills, such as secondary containment diking, covered storage tanks, and tank level alarms.

The Agency solicits comments on the utility and implementation of BMPs for pulping liquors as they contribute to reducing chemical costs and discharges of non-chlorinated compounds to the environment. The Agency also solicits comment on whether some practices should be mandatory for all mills, while other practices should be selected and applied as appropriate to individual mills. The Agency further solicits comment on the applicability of BMPs to mills in the following effluent guideline subcategories: Dissolving kraft; Bleached kraft and soda—papergrade; Unbleached kraft; Dissolving sulfite; Papergrade sulfite; Semi-chemical, and Non-wood chemical pulp.

Pulping liquors have been identified as a likely source of non-chlorinated organic compounds that exhibit aquatic toxicity. These liquors may contain specific toxic pollutants as provided by Sections 307(a) and 311(3). Naturally occurring phenolic compounds are known from the literature to be present in these liquors, including phenol. A broad range of other compounds also have been identified in the literature, but additional specific compounds among those on the lists of 307(a) and 311(e) compounds have not been identified by the Agency's wastewater sampling program to date. The Agency solicits data on the specific non-chlorinated compounds (e.g., phenol(s), others) that apparently are generated from within the pulp mill and recovery cycle portions of integrated mills (e.g., "black liquors," "red liquors").

The Agency also requests comments on its proposal to control chemical oxygen demand (COD) as a "bulk" parameter to reflect effective implementation of BMPs, as well as closed screen rooms and well-designed and operated biological treatment systems.

The Agency specifically solicits comments on the proposed COD limitations, and the methodology with which they were derived. The Agency intends to continue to collect additional COD and color data in each of the six subcategories applicable, including the dissolving sulfite subcategory for which applicable data are not available. Limitations may be derived in the future from such data for these subcategories, using the rationale presented in Section IX of this preamble and in the technical Development Document.

24. Toxic Weighting Factor for AOX

As explained in section XI.B., the Agency calculated a cost-effectiveness ratio for the BAT and PSES options. In the cost-effectiveness analysis, each pound of pollutant removed by a control technology is multiplied by a pollutant-specific toxic weighting factor to express the removal in units of pound-equivalent. The cost-effectiveness ratio is calculated as the incremental cost of an option divided by the incremental pounds-equivalent removed. In the development of BAT, the Agency projects removals of the bulk parameter AOX, and as a nonconventional pollutant, the Agency is interested in including AOX in cost-effectiveness calculations. Because AOX is not comprised of a unique set of compounds in the same proportion at all times, a sound analytical procedure for calculating a toxic weighting factor for AOX was a difficult exercise. The cost-effectiveness ratios presented in this notice do not include toxic weighted pounds of AOX. The toxic weighting factor methodology for AOX (and other pollutants) is described in the Record for today's rulemaking. The Agency solicits comment on the methodology for estimating a toxic weighting factor for AOX and also on alternative procedures for including AOX in the cost-effectiveness analysis.

25. Pollution Prevention Opportunities

Today's proposal incorporates pollution prevention practices into the proposed effluent limitations and emission standards for the pulp and paper industry. The Agency requests information on other pollution prevention opportunities that may be available to mills covered by this proposal. The Agency is aware that many of the additives that may be used in the pulping or papermaking process, such as surfactant, are not specifically addressed by effluent limitations in this proposal. Also, biocides are commonly used in the industry to prevent biofouling and may not be specifically addressed by effluent limitations in this proposal. Such compounds may pose an environmental risk in some instances and may be candidates for pollution prevention practices such as source reduction or substitution. For example, the Agency has limited information that indicates that certain surfactants used in the pulping process (e.g., nonylphenol ethoxylates), or their degradation products, may be toxic or persistent in the environment. Yet opportunities exist to use less of the surfactant or an alternative surfactant which does not pose a similar risk. Similarly, the Agency is aware of recent information that one biocide (dodecylguanidine), which is used extensively in the paper industry and has been proposed for use as a molluscicide for zebra mussel control, has been found to be very persistent and highly toxic. Efforts are underway by the vendors to find a replacement biocide that is known to degrade and whose toxicity can be reduced or eliminated before discharge.

The Agency requests data that might help to identify specific process additives or biocides that might pose environmental risks and information regarding pollution prevention opportunities that may exist for such substances. EPA also requests comment on whether the final rule should require the implementation of specific pollution prevention practices addressing process additives or biocides.

26. Definition of Process Wastewater and Prohibited Discharges

The Agency proposed a definition of process wastewater for the effluent limitations guidelines regulation that expands upon the definition of process wastewater set out at 40 CFR 122.2. The definition specifically includes certain non-process wastewaters (boiler blowdown, cooling tower blowdown, storm water from immediate process areas) as process wastewater. The Agency believes these non-process wastewaters are typically co-treated with process wastewaters at many mills, and that the treated effluent data reported by the industry and used by the Agency to develop many of the proposed effluent limitations guidelines and standards were generated from co-treatment of these non-process wastewaters with process wastewaters. Accordingly, the Agency believes that those non-process wastewaters should be included in the definition of process wastewaters for this industry. The Agency is proposing to exclude groundwaters from groundwater remediation projects from the definition of process wastewaters. Because the quantity and quality of such groundwaters are likely to be highly variable on a site-specific basis, the Agency believes that the discharge of such groundwaters to surface waters should be regulated separately, or in addition to, process wastewaters on a case-by-case basis.

The Agency also proposes to exclude a number of process materials from the definition of process wastewaters and to expressly prohibit the discharge of such materials to publicly owned treatment works or waters of the United States, without an NPDES permit or individual control mechanism authorizing such discharge. The Agency believes that discharge and loss of these materials is inappropriate from the standpoints of productivity loss, pollution prevention, adverse impacts on wastewater treatment, and increased air emissions. The Agency believes that most responsible mill operators operate in a manner to prohibit such losses, but that there are other mill operators that operate with significant losses of such materials. The Agency believes it has accounted for much of the cost of complying with the proposed prohibitions in the estimated costs to comply with the BMP provisions of the regulation and the effluent limitations guidelines for COD and that the remaining costs are not significant in the context of the overall costs of the regulation.

The Agency solicits comments on the following:

- The expanded definition of process wastewaters and the proposed exclusion of groundwaters from the definition of process wastewaters;
- The specific proposed list of excluded and prohibited process materials and the potential costs of complying with the proposed prohibition of the discharge of process materials.

27. Costs of the Regulation

For purposes of proposal, EPA assigned the costs for process changes in full to the regulation. EPA believes, however, that in addition to significant effluent reduction benefits, compliance with the proposed regulation will result in increases in productivity, enhanced product quality, and improved plant and equipment use throughout the chemical pulping and bleaching segment of the industry. EPA believes that some portion, and perhaps a substantial portion, of the costs of compliance should be assigned or allocated to productivity, product quality and plant and equipment benefits the industry will derive. If EPA adopted this position, the portion of costs so assigned or allocated might not be considered as compliance costs in the economic impact analysis for the final regulation.

EPA specifically requests comments on what specific productivity, product quality and plant and equipment benefits the industry will derive from compliance with the regulation; how the Agency should estimate such benefits; and, whether, or to what extent the Agency should consider those benefits in the context of economic achievability determinations.

28. Limitations Based on Minimum Levels

EPA has proposed some BAT, PSES, PSNS, and NSPS limitations for the Bleached Papergrade Kraft and Dissolving Kraft subcategories based upon the current minimum levels of the analytical methods. The data characterizing the technology basis of these limitations were all reported as being below detection limits ("non-detect"). Based on these data, EPA believes that the BAT technologies for these subcategories are capable of reducing discharges of these pollutants to the current minimum levels specified in the analytical methods.

EPA considered applying variability factors to the minimum levels to allow for variability in the measurements. However, EPA believes that the data demonstrates that the technology is always capable of achieving concentrations below the minimum level of the analytical method. Because all data for the pollutants for which limitations are based on the minimum level were "non detect", the variability in the measurements occurs below the minimum level and no additional allowance above the minimum level is therefore necessary. EPA also believes that providing additional allowance for variability beyond the minimum level is unnecessary, does not represent the capability of the technology, and would not be as protective of the environment as possible.

EPA acknowledges that some of the sample-specific detection limits reported with the non-detect data are higher than the minimum levels specified in the analytical methods. However, EPA believes that when the methods are used correctly that the minimum level is attainable. The achievability of the minimum levels has been demonstrated by a number of laboratories involved in the development and implementation of the methods.

EPA realizes that the analytical methods are likely to change as they are refined and the minimum levels may be set equal to lower levels. With these revised minimum levels, the data that were previously reported to be "non-detect" may be detected in concentrations less than the previous minimum level. EPA believes that all such measurements will be reported as below the previous minimum level. EPA is proposing these limitations on a concentration-basis instead of mass-based limitations as proposed for the pollutants for which there were detected measurements.

EPA solicits comments on these limitations that have been set equal to the minimum level of the analytical methods. EPA requests comments as to whether it is appropriate to determine limitations based upon current minimum levels, whether these limitations can be achieved, and whether other methods of estimating limitations based on all non-detect data would be more appropriate.

29. Multimedia Filtration as a BCT Technology

EPA evaluated multimedia filtration as a candidate BCT technology for today's proposed rulemaking. EPA found that multimedia filtration passed the BCT cost test in one subcategory (Mechanical Pulp) and failed the BCT cost test in all remaining subcategories. At present, EPA lacks adequate data with which to develop limits that mills within the Mechanical Pulp subcategory could meet using multimedia filtration. EPA solicits data and comments with which to develop such limits. In addition, EPA solicits comments and data on (i) the costs and pollutant removals associated with multimedia filtration, in all subcategories, and (ii) any candidate BCT technologies other than multimedia filtration that EPA should evaluate in developing BCT limits for the industry.

30. Definition of "Source" for Air Emission Standards

EPA is today proposing to define "source" broadly for purposes of this NESHAP, to include all pulping areas, bleaching areas and wastewater treatment areas within a mill. As discussed in section X.C, the reason for this proposal is that the CAA and the CWA differ regarding applicability requirements and compliance deadlines for new sources. The result of these differences is that mills planning to construct or reconstruct a source of HAPs between proposal and promulgation of the integrated regulations could find it necessary to plan for compliance with the NESHAP without knowing the requirements for the effluent standards.

One possible solution to this problem is to define "source" broadly for the NESHAP, to include all pulping and bleaching processes and associated process wastewater streams. With this definition there will be fewer instances in which a source will be constructed or reconstructed between proposal and promulgation than if source is defined to be an individual piece of equipment. With the broad definition, a piece of equipment that is added will not constitute a "new source", in most situations, but instead will be a change to an existing source.

Two options considered other than this broad definition of source were to define each piece of equipment as a source, or to define three kinds of sources: the pulping process, the bleaching process, and all associated process wastewater streams.

EPA solicits comments on the definition of "source" that would be most appropriate for the NESHAP. In particular, EPA solicits comments on whether the broad definition of "source" in today's proposal that defines a single source to comprise all pulping processes, bleaching processes, and process wastewaters will in fact promote integrated compliance planning, either during the period between proposal and promulgation or once the rule is promulgated. EPA also solicits comment on the impact of adopting either of the two alternative approaches considered, but not selected, in defining the source for today's proposal.

31. Impacts of Section 112(g) on Today's Proposed NESHAP

Industry representatives have voiced a concern that involves case-by-case MACT determinations required under CAA section 112(g) for changes for an existing mill. Specifically, their concern is that once a State permit system is effective, States will use today's rule as the basis of case-by-case MACT determinations for mills that make modifications or construct a new unit that by itself could be considered a major source. Industry representatives consider this to be a problem because they believe that the NESHAP proposed today are too stringent, and that additional data they are collecting will confirm this view. In making case-by-case MACT determinations for pulp and paper mills under Section 112(g), permitting authorities should take all available information into account. This information would include today's proposed rule and MACT floor determination, supporting information, and information submitted to the permitting authority during the public comment period on a permit. At the same time, permitting authorities must consider whether a statutory minimum (or floor) level of control exists and, if so, ensure that case-by-case MACT requirements are no less stringent.

EPA requests comments on the impact that today's proposed NESHAP may have on CAA section 112(g) case-by-case MACT determinations. EPA does not solicit general comments not specific to today's rulemaking, such as the interrelationship between sections 112(d), 112(g) and 112(j), the control levels required by statute for different sorts of changes, and generic preconstruction review requirements.

32. MACT Floor

There are several issues discussed under the development of the MACT floor on which EPA solicits comments and data. The three main topics are: interpretation of statutory language, definition of emission points controlled at the floor, and the control technology basis used to develop the floor.

*a. Interpretation of Statutory Language.* In Section X.D, EPA solicits comment on its methodology for determining the MACT floor—specifically on its interpretation of "the average emission limitation achieved by the best performing 12 percent of the existing sources" (CAA Section 112(d)(3)(A)). EPA solicits comments on two main areas of discussion: (1) the interpretation of the statutory phrase as it refers to "average emission limitation" of the best performing 12 percent compared to "average emission limitation" that is achieved by all of the best performing 12 percent, and (2) the interpretation of the term "average."

*b. Definition of emission points controlled at the floor.* EPA identified certain low flow and episodic pulping and bleaching vent emission points that are not believed to be controlled at the floor. Available data indicate that these minor emission points can be identified by volumetric or mass flow rates, or concentrations. EPA also identified certain low concentration or low flow process wastewater streams that are not controlled at the floor. EPA solicits comments and data on the HAP concentration of these streams, specifically on the acid and caustic sewer streams and evaporator clean condensate streams.

There are a few mills currently using oxygen delignification units within their pulping process. In section X.D, EPA solicits comments and requests data on the use of such units within the industry. In addition, EPA specifically solicits comments on the inclusion of oxygen delignification units as controlled emission points in the MACT floor with other pulping component emission points.

*c. Control technology basis.* In sections X.D and X.E, EPA solicits comments and data on information related to the development of the bleaching component of the MACT floor. In section X.H, EPA solicits comment and data on the efficiency of steam stripping as the basis for the process wastewater component of the MACT floor.

Comment is solicited on the efficiency of gas scrubbers for removal of methanol, chloroform, chlorine and other HAP compounds from bleaching component emission points, the effect of process changes on HAP emissions from bleaching component emission points, and whether emission limitations should be set for chloroform emissions from bleaching component emission points. Comment is also requested on the use of gas scrubbers in combination with process changes; and on whether process changes, scrubbing, or the combination of both should be the MACT floor for bleaching component emission points.

EPA also solicits comment on whether the combustion of selected bleaching component vent streams followed by scrubbing of vent streams with high chlorine concentrations would be a reasonable option beyond the floor, and on which vent streams would be included under such an option.

For process wastewater component emission points, EPA solicits comments and requests data on the efficiency of steam strippers for removal of total HAP and methanol.

33. Emissions Averaging

During the development of today's proposal, EPA considered including an emissions averaging approach. EPA solicits comments on the merits and feasibility of emissions averaging in the pulp and paper industry and requests information and data that would be necessary to support development and implementation of an averaging approach.

EPA solicits comments on the approaches discussed in section X.M for establishing the MACT floor based upon the mass emission limit or mass emission reduction percentage achieved across either the process areas as a whole or each process area individually (see section X.C for descriptions of these source definitions). Specifically, EPA requests comments on the types and amount of data necessary to develop either a mass emission limit or a mass emission reduction percentage that would be associated with this type of MACT floor determination. EPA solicits comments on whether a mass emission limit or a mass emission reduction percentage could be established using a model plant and emission factor approach. EPA solicits comments on whether the current model plants and emission factors presented in the Background Information Document are sufficient to develop these values and solicits information and data that would be necessary to improve the model plants and emission factors for this purpose.

EPA solicits data on process variabilities at a mill and how these variabilities affect air emissions. EPA solicits comment on how such variability could be accounted for in establishing either a mass emission limit or a mass emission reduction percentage.

EPA solicits comment on how an averaging approach would be implemented for this industry. Specifically, EPA solicits comments on how a mill could demonstrate continuous compliance, as required by the CAA, including any additional monitoring, recordkeeping, or reporting that would be necessary if an averaging scheme was implemented. EPA solicits comment on the length of the averaging period.

34. Format of Air Emission Standards

EPA solicits comments and data on:

- Whether the applicability level for pulping and bleaching process vent streams should be based upon specifically named vents or upon a flow rate or concentration level,
- Whether an additional applicability level should be added for the bleaching component vent emissions based upon liquid-phase mass loading rates to the process equipment,
- Whether the applicability levels for process wastewater streams should be based upon named wastewaters or upon a flow rate and concentration level, and
- Whether a mass removal format for the process wastewater component should be an additional format for demonstrating compliance with the standards proposed today.

Applicability levels are proposed for pulping and bleaching component emission points in section X.H, to establish those emission points that are not required to be controlled. These applicability levels are based upon flow rates and concentration from process vents. The Agency solicits comments and data on whether these numerical applicability levels are appropriate for identifying pulping and bleaching component emission points that are not currently being controlled.

Although a liquid-phase HAP mass loading applicability level is provided for open pulping component process equipment based on the sum of all liquid streams entering the piece of process equipment, no such option is provided for the bleaching component because of the chemical reactions occurring in the bleaching process equipment. EPA solicits comments and data on whether a liquid-phase HAP mass loading for streams entering the process equipment would be an appropriate format for identification of bleaching component equipment not being controlled at the floor.

Applicability levels are also proposed for process wastewater emission points in section X.H, to establish those emission points that are not required to be controlled. These applicability levels are based upon concentration and flow rates from process wastewater streams. The Agency solicits comments and data on whether these numerical applicability levels are appropriate for identifying process wastewater component emission points that are not currently being controlled.

35. Subcategorization

Subcategorization may be appropriate if segments of the industry have significantly different characteristics, such as applicable control technologies or costs for implementation of the control technology. EPA determined that the control technologies considered in the development of today's proposed standards were applicable to all segments of the industry, regardless of pulping process, end product, or wood species.

EPA is aware that scrubbing, rather than venting to a combustion device, is utilized in sulfite mills to control pulping process emissions. EPA solicits comments and data regarding: The efficiency of gas scrubbers for controlling HAP emissions from pulping process vents at sulfite mills, and whether standards for sulfite mill pulping processes should be based upon the use of scrubbing.

EPA is also aware the soda mills do not have gas collection systems in place for pulping process vents, because soda mills do not use sulfur-containing chemicals to digest the wood. EPA believes that gas collection and incineration is a feasible control technology to reduce total HAP emissions from soda mills. Representatives from these mills, however, urged EPA to create a separate subcategory for soda mills, due in part to the extra expense soda mills may incur when installing gas collection systems. EPA solicits comments on the HAP content of soda mill pulping process vent streams, the capacity of existing combustion devices, the costs of collecting and routing these vent streams to a combustion device, and whether there should be a separate subcategory for soda mills.

36. Time Extension for Totally Chlorine-Free

The CAA requires that sources come into compliance with a NESHAP as soon as practical, but no later than three years after promulgation of a rule. However, the CAA also provides for one additional year to come into compliance if equipment changes are required. The Agency solicits comment on automatically granting mills this one additional year for compliance on the condition that they adopt a totally chlorine-free technology.

37. Model Plants and Emission Estimates

EPA used emission models to predict air emissions of HAPs from the process wastewater collection and treatment system. EPA solicits comments and requests data on the emission estimates made for emissions and on flows and HAP concentrations in the pulping, bleaching, and process wastewater models used to develop today's proposed standards. Specifically, data is requested on process wastewater characteristics, EPA's wastewater model plant documented in the air docket, and emissions of HAPs especially methanol.

EPA also solicits comments and data on the models for wastewater, pulping, and bleaching component emission points; specifically on flowrates and concentrations of total HAP and individual HAP compounds.

38. Monitoring Issues

EPA requests comments on the monitoring of control device operating parameters to determine compliance with the proposed NESHAP. Specifically, EPA requests comment on whether it is reasonable to monitor actual emissions from certain control devices; and on the applicability of the proposed parameters for determining compliance.

In Section X.I, EPA requests comments concerning continuous compliance associated with utilizing existing combustion devices for pulping component emission points, including:

- Data on duration and frequency of combustor downtimes while pulping operations continue,
- Combustor capacity utilization,
- Retrofit information, and
- Current back-up operations for the pulping component.

In Section X.I, EPA requests comments on applicable monitoring parameters when biological treatment units are used to comply with the process wastewater standards. These include supporting data on biorates and corresponding parameters for monitoring. Specifically, EPA requests comments on the monitoring of soluble BOD in the biological treatment unit effluent as a parameter for determining compliance.

39. Recordkeeping and Reporting

EPA solicits comments on the reporting time requirement of 45 days for the Initial Notification for all sources. EPA also solicits comments on the content and reporting time requirements for any of the other required reports.

40. Modification Issue

EPA solicits comment on the impact of this specific rulemaking on modifications to affected sources under the NESHAP. We do not solicit comments on this rulemaking regarding CAA Section 112(g) in general.

*C. Solicitation of Comment on an Industry Proposal*

Section V.F of this preamble describes the public meetings that EPA sponsored during development of the proposed rules. One of the advantages of exchanging preliminary regulatory information prior to proposal is the opportunity for first-hand experience and reaction from the regulated community. By participating in a dialogue with representatives of industry and other concerned parties throughout regulatory development, the Agency was better able to characterize and document the technical feasibility of control options.

Many ideas and suggestions were presented in the public meetings and in other meetings with individual companies. Some of those ideas are the source of specific data requests described above in this section. For example, industry representatives suggested that EPA change the proposed subcategorization, and Item 6 above specifically solicits the information that EPA needs to adequately analyze the suggestion and then, possibly to incorporate the suggestion into the final regulations.

In addition to the suggestions and comments provided during public meetings, the industry trade association, the American Forest & Paper Association (AFPA), submitted a specific set of comments and suggestions concerning the Clean Water Act effluent guidelines and the Clean Air Act NESHAP. The set of AFPA suggestions is hereafter referred to as the AFPA Proposal (as it was also labelled by AFPA).

The AFPA Proposal was presented to the Administrator at a meeting on July 19, 1993. An outline of the AFPA presentation and the AFPA Proposal are included in the Record for today's proposed rulemaking. A summary of the AFPA Proposal is included here as a means to invite comment.

EPA incorporates the AFPA Proposal into this notice as an alternative to the proposed effluent limitations guidelines. EPA invites comment on any and all aspects of the AFPA Proposal as an alternative to the technology basis described in this preamble and to the effluent limitations presented in part 430, in whole or in part. EPA requests data and information to support comments on any aspect of the AFPA proposal. Specifically, EPA requests information on the technology basis that will achieve the numeric (or other) effluent limitations included in the AFPA Proposal. Similarly, EPA requests information, such as treatment effectiveness data, to develop effluent limitations for the technology basis suggestions in the AFPA Proposal.

EPA emphasizes that, for purposes of notice-and-comment, if any aspect of the AFPA Proposal is supported with adequate documentation to demonstrate technical feasibility, economic achievability, or other statutory factors, EPA may revise the technology basis and corresponding effluent limitations for promulgation of these rules.

The following summary of the AFPA Proposal for effluent guidelines includes key provisions of the technology basis and effluent standards. EPA does not intend to interpret or otherwise react to the AFPA Proposal at this time, but instead to summarize the submission provided to the Administrator. Interested parties are encouraged to review the complete AFPA submission, which is included in the docket.

For mills in the Bleached Papergrade Kraft and Soda, Papergrade Sulfite, Dissolving Kraft, and Dissolving Sulfite subcategories, the AFPA Proposal includes an effluent limitation for TCDD of nondetect at 10 ppq measured at the point of discharge. For the same four subcategories, the AFPA Proposal includes effluent limitations for BOD and TSS (based on BCT) equivalent to the average BOD and TSS discharges of the best 90 percent of mills in the relevant subcategory. For the same four subcategories, the AFPA Proposal includes the adoption of mill-specific BMP programs for spill control to address color and COD (no effluent limits for color and COD are identified in the AFPA Proposal).

For mills in the Bleached Papergrade Kraft subcategory, the AFPA Proposal includes effluent limitations for AOX measured at the point of discharge using EPA Method 1650 of 1.0 Kg/ton (annual average of 0.8 Kg/ton) on October 31, 1998; and 1.2 Kg/ton (annual average of 1.0 Kg/ton) on October 31, 1996, for a minimum of 90 percent of mills in the subcategory. For new sources in this subcategory, the AFPA Proposal includes a 30-day average effluent limitation for AOX measured at a point of discharge using EPA Method 1650 of 0.6 Kg/ton (annual average of 0.48 Kg/ton) for new sources that commence construction after October 31, 1994.

In addition to the effluent limitations shown above for the Bleached Papergrade Kraft subcategory, the AFPA Proposal includes a study of a mutually-agreed upon list of chlorinated phenolic compounds to determine whether the amount and toxicity of these compounds pose a residual risk to human health and the environment that justifies national regulations after compliance with the AOX limitations cited in the preceding paragraph. One goal of this study would be for EPA to use the study's results to determine whether there is a need to establish effluent limitations for individual compounds.

For mills in the Papergrade Sulfite, Dissolving Sulfite, and Dissolving Kraft subcategories, the AFPA Proposal includes two suggestions. First, at the time the rules are promulgated, totally chlorine free technologies will not be the technology basis due to product specifications for customers of papergrade sulfite and dissolving sulfite mills. Second, at the time the rules are promulgated, the use of hypochlorite in dissolving kraft mills will be allowed because that chemical's use is necessary to continued manufacture of products to customer specifications.

The AFPA Proposal for the NESHAP focuses on an industry-funded study of HAP emissions and a deferral of proposed NESHAP pending receipt of that study's results. Because today's proposed rules include NESHAP in part 63, the Agency cannot sensibly present this provision of the AFPA Proposal as an alternative. The reasons for the suggested deferral, as described in the AFPA Proposal, are that the NESHAP should be based on sound, scientific data and engineering practices. The industry's study to characterize and quantify emissions of HAP from pulp and paper industry sources is intended to establish the necessary basis for the rules. The AFPA Proposal indicates that the Agency is currently lacking credible data. The Agency invites comment on the adequacy of the data supporting today's proposed rules and on the AFPA Proposal's indication of the absence of credible data. The Agency also invites comment on the use of the industry's study to establish NESHAP for the final rules.

### *D. Solicitation of Comment on an Environmental Group Petition*

In September 1993, the Natural Resources Defense Council and the Natural Resources Council of Maine, on behalf of 57 environmental, Native American and citizen organizations, and individuals, filed a petition with EPA to prohibit the discharge of 2,3,7,8-tetrachlorodibenzo-p-dioxin by pulp and paper mills (hereafter referred to as the "NRDC Petition"). While this petition is not an alternative "proposal" for the effluent guidelines and NESHAP, the petition addresses many of the issues that today's proposed rules address. Hence, the Agency invites comment on the petition and its supporting documentation. The NRDC Petition is summarized here, and the complete submission that EPA received is included in the public record supporting the proposed rules.

By discussing the NRDC petition in this notice, EPA is not indicating any response to the petition. Specifically, EPA is not "publish[ing] in the **Federal Register** a proposed effluent standard" under CWA section 307(a)(2) with respect to dioxin or any other pollutant. EPA is instead inviting comment on the issues raised in the petition.

The NRDC Petition asks the Administrator to issue a prohibition on the discharge of all dioxin from pulp and paper mills. The petitioners ask that the prohibition be accomplished by requiring that the use of chlorine and chlorine-containing compounds as inputs in the manufacturing process be prohibited. The petitioners believe that the prohibitions are warranted by the dangers to human health and the environment posed by dioxin. The NRDC Petition points to sec. 307(a)(2) of the CWA for the authority for such a prohibition.

EPA invites comment on all aspects of the NRDC Petition including its scientific and legal authorities.

### List of Subjects

*40 CFR Part 63*

Environmental protection Air pollution control, Hazardous substances, Reporting and recordkeeping requirements.

*40 CFR Part 430*

Air pollution control, Pulp, paper, or paperboard manufacturing, Pollution prevention, Sludge disposal, Wastewater treatment, Water pollution control.

Dated: October 29, 1993.

Carol M. Browner,

*Administrator.*

For the reasons set out in the preamble, title 40, Chapter I of the Code of Federal Regulations is proposed to be amended as follows:

## PART 63—NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR SOURCE CATEGORIES

1. The authority citation for part 63 continues to read as follows:

Authority: 42 U.S.C. 7401, *et seq.*

2. It is proposed that part 63 be amended by adding Subpart S to read as follows:

## Subpart S—National Emission Standards for Hazardous Air Pollutants From the Pulp and Paper Industry

Sec.

63.440 Applicability.
63.441 Definitions.

Sec.
63.442 [Reserved]
63.443 [Reserved]
63.444 Standards for pulping component.
63.445 Standards for bleaching component.
63.446 Standards for process wastewater component.
63.447 [Reserved]
63.448 [Reserved]
63.449 [Reserved]
63.450 Standards for enclosures and closed vent systems.
63.451 Test methods and procedures.
63.452 [Reserved]
63.453 Continuous monitoring.
63.454 Recordkeeping.
63.455 Reporting.
63.456 Delegation of authority.
63.457 [Reserved]
63.458 [Reserved]
63.459 [Reserved]

## Subpart S—National Emission Standards for Hazardous Air Pollutants From the Pulp and Paper Industry

### § 63.440 Applicability.

(a) The provisions of this subpart apply to the owners or operators of any pulping component, bleaching component or process wastewater component associated with the production of chemical pulp from wood, including kraft, soda, sulfite, or semi-chemical processes. For purposes of this subpart, a source shall be comprised of all pulping components, bleaching components and process wastewater components at a mill, in combination.

(b) Each source that commenced construction or reconstruction before December 17, 1993 shall achieve compliance with the provisions of the subpart as expeditiously as practical after the date of promulgation of this subpart, but in no event later than 3 years after such date.

(c) Each source that commences construction or reconstruction on or after December 17, 1993 shall achieve compliance with the provisions of this subpart immediately upon startup or the date of promulgation of this subpart, whichever is later.

(d) This subpart is not applicable to sources for which the owner or operator has demonstrated to the Administrator's satisfaction that the facility is not a major source as defined in Section 112(a)(1) of the Clean Air Act.

### § 63.441 Definitions.

All terms used in this subpart shall have the meaning given them in the Act, in subpart A of this part, and in this section as follows:

*Air dried pulp (ADP)* means a pulp sample with a moisture content of less than or equal to 10 percent by weight. Pulp samples for the pulping component shall be unbleached pulp and for the bleaching component shall be bleached pulp.

*Bleaching* Brightening and delignification of pulp by the addition of oxidizing chemicals.

*Bleaching component* means all process equipment beginning with the first application of chlorine or chlorine-containing compound up to and including the final bleaching stage. Treatment with ozonation, oxygen, peroxide may occur before or after the addition of chlorine. If treatment occurs before this chlorine addition, then these stages are included in the pulping component; if treatment occurs after the addition of chlorine, then these bleaching stages are included in the bleaching component.

*Boiler* means any enclosed combustion device that extracts useful energy in the form of steam. Boilers are not considered incinerators.

*Chemical recovery* means the process by which pulping chemicals in the spent cooking liquor are extracted or recovered after the multiple effect evaporator system.

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

*Combustion device* means an individual unit of equipment, including but not limited to, an incinerator, lime kiln, recovery furnace, process heater, or boiler, used for the thermal oxidation of organic hazardous air pollutant vapors.

*Container* means any portable unit in which wastewater or HAP removed from wastewater is stored, transported, treated, or otherwise handled. Examples of containers are drums, barrels, tank trucks, barges, dumpsters, tank cars, dump trucks, and ships.

*Decker* means a piece of equipment used to thicken or reduce the water content of the pulp slurry after the pulp washer system.

*Digester system* means each continuous digester or each set of batch digesters used for the chemical treatment of wood, including associated flash tank(s), blow tank(s), chip steamer(s), condenser(s), and pre-hydrolysis unit(s).

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

*Flow indicator* means a device which indicates whether gas flow is present in a closed vent system.

*Incinerator* means an enclosed combustion device that is used for destroying organic compounds. Auxiliary fuel may be used to heat waste gas to combustion temperatures. Any energy recovery section present is not physically formed into one manufactured or assembled unit with the combustion section; rather, the energy recovery section is a separate section following the combustion section and the two are joined by ducts or connections carrying flue gas.

*Individual drain system* means the system used to convey process wastewater streams from the pulping or bleaching process equipment or tank or process wastewater collection and treatment system unit to a receiving process wastewater collection and treatment system unit. The term includes all process drains and junction boxes, together with their associated sewer lines and other junction boxes, manholes, sumps, and lift stations, down to the receiving process wastewater treatment system. The individual drain system shall be designed to segregate the vapors within the system from other drain systems. A segregated stormwater sewer system, which is a drain and collection system designed and operated for the sole purpose of collecting rainfall-runoff at a facility, and which is segregated from all other individual drain systems, is excluded from this definition.

*Junction box* means a manhole access point to a wastewater sewer system line or a lift station.

*Knotter* means a piece of equipment where knots or pieces of uncooked wood are removed from the pulp slurry after the digester system and prior to the pulp washer system. Equipment used to remove oversized particles from pulp following the pulp washer are considered screens.

*Kraft pulping* means a chemical pulping process that uses a mixture of sodium hydroxide and sodium sulfide as the cooking liquor.

*Lime kiln* means an enclosed combustion device used to calcine lime mud, which consists primarily of calcium carbonate, into calcium oxide.

*Multiple-effect evaporator system* means a series of evaporators operated at different pressures such that the vapor from one evaporator body becomes the steam supply for the next evaporator, and associated condenser(s) and hotwell(s) used to concentrate the spent cooking liquid that is separated from the pulp.

*Operating parameter value* means a minimum or maximum value established for a control device or process parameter if achieved by itself, or in combination with one or more other operating parameter values; determines that an owner or operator has complied with an applicable emission limitation or standard.

*Point of generation* means the location where the process wastewater stream exits the pulping or bleaching process equipment or tank prior to mixing with other process wastewater streams or prior to handling or treatment in a piece of equipment that is not an integral part of the pulping or bleaching process equipment. A piece of equipment is an integral part of the process if it is essential to the operation of the process (i.e., removal of the equipment would result in the process being shut down).

*Primary fuel* means the fuel that provides the principle heat input to the combustion device. To be considered primary, the fuel must be able to sustain operation of the combustion device without the addition of other fuels.

*Process emission point* means a gas stream that contains hazardous air pollutants discharged during operation of process equipment including, but not limited to digesters, evaporators, pulp washer systems, bleaching towers, bleaching stage washers, and associated filtrate tanks. Process emission points include gas streams that are discharged directly to the atmosphere, discharged to the atmosphere via vents or open process equipment, or after diversion through a product recovery device.

*Process wastewater collection system* means a piece of equipment, structure, or transport mechanism used in conveying or storing a process wastewater stream. Examples of process wastewater collection system equipment include individual drain systems, wastewater tanks, surface impoundments, or containers.

*Process wastewater component* means air emissions from all process wastewater streams produced from the pulping and bleaching processes.

*Process wastewater stream* means any HAP-containing liquid that results from either direct or indirect contact of water with organic compounds. Examples of a process wastewater stream include, but are not limited to, digester condensates, evaporator condensates, and non-condensible gas system (NCG) condensates.

*Process wastewater treatment system* means a process or specific technique that removes or destroys the organics or any HAP in a process wastewater stream. Examples include, but are not limited to, a stream stripping unit, wastewater incinerator, or biological treatment unit.

*Pulping component* means all process equipment, beginning with the digester system, and up to and including the last piece of pulp conditioning equipment prior to the bleaching component, including treatment with ozone, oxygen, or peroxide before the first application of chlorine or chlorine-containing compounds.

*Pulp washer system* means pulp or brown stock washers and associated vacuum pumps, filtrate tanks, and foam breakers or tanks used to wash the pulp to separate spent cooking chemicals following the digestion system and prior to the bleaching component.

*Recovery device* means an individual unit of equipment, such as an absorber or a condenser, capable of and used for the purpose of recovering chemicals for use, reuse, or sale.

*Recovery furnace* means an enclosed combustion device where concentrated spent liquor is burned to recover sodium and sulfur, produce steam, and dispose of unwanted dissolved wood components in the liquor.

*Relief valve* means a valve used only to release an unplanned, nonroutine discharge. A relief valve discharge can result from an operator error, a malfunction such as a power failure or equipment failure, or other unexpected cause that requires immediate venting of gas from process equipment to avoid safety hazards or equipment damage.

*Screen* means a piece of process equipment where pieces of oversized particles are removed from the pulp slurry after the pulp washer system and prior to the papermaking equipment. Equipment used to remove uncooked wood prior to the pulp washer system are considered knotters.

*Semi-chemical pulping* means a pulping process that combines both chemical and mechanical pulping processes.

*Sewer line* means a lateral, trunk line, branch line, or other conduit including, but not limited to, grates, and trenches used to convey process wastewater streams or any HAP removed from process wastewater streams to a downstream unit in the process wastewater collection and treatment system.

*Soda pulping* means a chemical pulping process that uses sodium hydroxide as the active chemical in the cooking liquor.

*Spent liquor* means cooking liquor from a digestion or pulp-washer process, containing dissolved organic wood materials and residual cooking compounds.

*Stripper system* means a column, and associated condensers or heat exchangers, used to strip compounds from wastewater, using air or steam.

*Sulfite pulping* means a chemical pulping process that uses a mixture of sulfurous acid and bisulfite ion as the cooking liquor.

*Surface impoundment* means a unit which is a natural topographic depression, manmade excavation, or diked area formed primarily of earthen materials (although it may be lined with manmade materials), which is used for the purpose of treating, storing, or disposing of wastewater and is not an injection well. Examples of surface impoundments are equalization, settling, and aeration pits, ponds, and lagoons.

*Temperature monitoring device* means a piece of equipment used to monitor temperature and having an accuracy of ±1 percent of the temperature being monitored expressed in degrees Celsius or ±0.5 degrees Celsius (°C), whichever is greater.

**§ 63.442 [Reserved]**

**§ 63.443 [Reserved]**

**§ 63.444 Standards for pulping component.**

(a) The owner or operator of a new or existing source subject to the requirements of this subpart shall enclose and vent all emission points into a closed vent system as specified in § 63.450 and control all pulping component emission points as specified by paragraph (b) of this section, except:

(1) Decker(s) and screen(s) at existing sources; or

(2) Individual process emission points from enclosed process equipment which maintain either:

(i) A volumetric flow rate less than 0.0050 standard cubic meters per minute; or

(ii) A mass flow rate less than 0.230 kilograms of total HAP per hour; or

(iii) A mass flow rate less than 0.0010 kilograms of total HAP per megagram of ADP; or

(3) Process equipment at which the sum of all pulp and process wastewater streams entering the process equipment maintains a HAP mass loading of less than 0.050 kilograms of total HAP per megagram of ADP.

(b) For each pulping component emission point, the owner or operator shall comply with either (b)(1), (b)(2), or (b)(3) of this section.

(1) Reduce total HAP emissions by at least 98 percent by weight or, if an incinerator is used, reduce total HAP emissions by at least 98 percent by weight or meet an outlet concentration of 20 parts per million by volume of total HAP; or

(2) Route all emission point gas streams to an incinerator designed and

operated at a minimum temperature of 1600 °F and a minimum residence time of 0.75 seconds; or

(3) Route all emission point gas streams to a boiler, lime kiln, or recovery furnace which introduces all emission point gas streams with the primary fuel or into the flame zone.

**§ 63.445 Standards for the bleaching component.**

(a) The owner or operator of a new or existing source subject to the requirements of this subpart shall enclose and vent all emission points into a closed vent system as specified in § 63.450 and control all bleaching component emission points as specified by paragraph (b) of this section, except individual process emission points from enclosed process equipment maintaining either:

(1) A volumetric flow rate less than 0.0050 standard cubic feet per minute; or

(2) A mass flow rate less than 0.230 kilograms of total HAP per hour; or

(3) A mass flow rate less than 0.0010 kilograms of total HAP per megagram of ADP.

(b) For bleaching component emission points, the owner or operator shall reduce the total HAP mass in the vent stream entering the treatment device by 99 percent.

**§ 63.446 Standards for process wastewater component.**

(a) The owner or operator of a new or existing source subject to the requirements of this Subpart shall control all process wastewater streams as specified in paragraphs (b) through (e) of this section until treated to meet the requirements of paragraph (f) and (g) of this section, except:

(1) Bleaching caustic or acid sewer streams; or

(2) Process wastewater streams with annual average flow rates less than 1.0 liters per minute at the point of generation; or

(3) Process wastewater streams with an annual average total HAP concentration less than 500 parts per million by weight at the point of generation.

(b) For each wastewater tank that receives, manages, or treats either a process wastewater stream or any HAP removed from a process wastewater stream and that is prior to treatment of the wastewater stream to meet paragraph (f) of this section, the owner or operator shall operate and maintain a fixed roof and route all HAP vapors vented from the wastewater tank into a closed vent system as specified in § 63.450 and control all HAP vapors as specified in § 63.444(b). The fixed roof and closed vent system shall meet the following requirements:

(1) The fixed roof and all openings (e.g., access hatches, sampling ports, gauge wells) shall be designed for and operated with no detectable leaks as indicated by an instrument reading of less than 500 parts per million above background.

(2) Each opening shall be maintained in a closed, sealed position (e.g., covered by a lid that is gasketed and latched) at all times that the wastewater tank contains a wastewater stream or any HAP removed from a process wastewater stream except when it is necessary to use the opening for process wastewater sampling, removal, or for equipment inspection, maintenance, or repair.

(c) For each surface impoundment that receives, manages, or treats a process wastewater stream and that is prior to treatment of the wastewater stream to meet paragraph (f) of this section, the owner or operator shall maintain on each surface impoundment a cover (e.g., air-supported structure or rigid cover) and operate a closed-vent system as specified in § 63.450 and control all HAP vapors as specified in § 63.444(b).

(1) The cover and all openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed and operated with no detectable leaks as indicated by an instrument reading of less than 500 parts per million above background.

(2) Each opening shall be maintained in a closed, sealed position (e.g., covered by a lid that is gasketed and latched) at all times that a process wastewater stream is in the surface impoundment except when it is necessary to use the opening for sampling, removal, or for equipment inspections, maintenance, or repair.

(3) The cover shall be used at all times that a process wastewater stream is in the surface impoundment except during removal of any HAP in accordance with 40 CFR 268.4 or closure of the surface impoundment in accordance with 40 CFR 264.228.

(d) For each container that receives, manages, or treats either a process wastewater stream or any HAP removed from a process wastwater stream and that is prior to treatment of the wastewater stream to meet paragraph (f) of this section, the owner or operator shall comply with the requirements of paragraphs (d)(1) through (d)(3) of this section.

(1) The owner or operator shall operate and maintain a cover on each container used to handle, transfer, or store a process wastewater stream or any HAP removed from a process wastewater stream in accordance with the following requirements:

(i) The cover and all openings (e.g., hatches, sampling ports, and pressure relief devices) shall be designed and operated with no detectable leaks as indicated by an instrument reading of less than 500 parts per million above background, except for pressure relief events related to safety considerations.

(ii) The cover and all openings shall be maintained in a closed, sealed position (e.g., covered by a lid that is gasketed and latched) at all times that a process wastewater stream or any HAP removed from a process wastewater stream is in the container except when it is necessary to use the opening for filling, removal, inspection, sampling, or pressure relief events related to safety considerations.

(2) A submerged fill pipe shall be used when a container is being filled with a process wastewater stream or any HAP removed from a process wastewater stream.

(i) The submerged fill pipe outlet shall extend to within two fill pipe diameters of the bottom of the container while the container is being filled.

(ii) The cover shall remain in place and all openings shall be maintained in a closed, sealed position except for those openings required for the submerged fill pipe and for venting of the container to prevent physical damage or permanent deformation of the container or cover.

(3) During treatment of a process wastewater stream or any HAP removed from a process wastewater stream, including aeration, loading operations, thermal or other treatment which generates vapors, in a container, whenever it is necessary for the container to be open, the container shall be located within an enclosure with a close-vent system as specified in § 63.450 and that routes the HAP vapors vented from the container to be controlled, and controls of all HAP vapors as specified in § 63.444(b) device. The enclosure and all openings (e.g., doors, hatches) shall be designed and operated with no detectable leaks as indicated by an instrument reading of less than 500 parts per million above background.

(e) For each individual drain system that receives or manages either a process wastewater stream or any HAP removed from a process wastewater stream and that is prior to treatment of the wastewater stream to meet paragraph (f) of this section, the owner or operator shall comply with the requirements of paragraph (e)(1) or (e)(2) of this section.

(1) If the owner or operator elects to comply with this paragraph, the owner or operator shall operate and maintain on each opening in the individual drain system a cover and closed-vent system as specified in § 63.450 and control all HAP as specified in § 63.444(b) and the owner or operator shall comply with the requirements of paragraph (e)(1)(i) through (e)(1)(iii) of this section.

(i) The cover and all openings (e.g., access hatches, sampling ports) shall be designed and operated with no detectable leaks as indicated by an instrument reading of less than 500 parts per million above background.

(ii) The cover and all openings shall be maintained in a closed, sealed position (e.g., covered by a lid that is gasketed and latched) at all times that a process wastewater stream or any HAP removed from a process wastewater stream is in the drain system except when it is necessary to use the opening for sampling or removal, or for equipment inspection, maintenance, or repair.

(2) If the owner or operator elects to comply with this paragraph, the owner or operator shall comply with the requirements in paragraphs (e)(2)(i) through (e)(2)(iv) of this section:

(i) Each drain shall be equipped with water seal controls, such as a p-trap or s-trap, or a tightly sealed cap or plug. For each drain using a p-trap or s-trap, the owner or operator shall ensure that water is maintained in the p-trap or s-trap.

(ii) Each junction box shall be equipped with a cover and, if vented, shall have a vent pipe. Any vent pipe shall be at least 90 centimeters in length and shall not exceed 10.2 centimeters in diameter. Junction box covers shall have a tight seal around the edge and shall be kept in place at all times, except during inspection and maintenance.

(iii) One of the following methods shall be used to control emissions from the junction box vent pipe to the atmosphere:

(A) Equip the junction box or lift station with a system to prevent the flow of HAP vapors from the vent pipe to the atmosphere during normal operation. An example of such a system includes use of water seal controls on the wastewater pipes entering the junction box.

(B) Connect the vent pipe to a closed-vent system and control device that is designed, operated, and inspected in accordance with the requirements of § 63.450 of this Subpart and control on HAP vapors as specified in § 63.444(b).

(iv) Each sewer line shall not be open to the atmosphere and shall be covered or enclosed in a manner so as to have no visible gaps or cracks in joints, seals, or other emission interfaces.

(f) For each process wastewater stream, the owner or operator shall meet one of the following treatment requirements:

(1) Recycle the process wastewater streams to a process unit meeting the requirements of § 63.444(b); or

(2) Treat the process wastewater streams to reduce the total HAP concentration to a level less than 500 parts per million by weight. The intentional or unintentional reduction in total HAP concentration of a process wastewater stream by dilution with other process wastewater streams or materials containing less than 100 parts per million of total HAP by weight is not allowed for the purposes of complying with this requirement; or

(3) Treat the process wastewater streams to reduce or destroy the total HAP by at least 90 percent by weight; or

(4) Treat the process wastewater streams using a steam stripper meeting the following design and operating specifications in paragraphs (f)(4)(i) through (iv) of this section:

(i) Countercurrent flow configuration with a minimum of 8 theoretical trays in the stripping section of the column, and

(ii) Minimum steam flow rate of 0.18 kilopascals of steam per liter of process wastewater feed with steam of at least 149 degrees centigrade and 276 kilograms gauge pressure,

(iii) Minimum process wastewater column feed temperature of 96 degrees Centigrade, and

(iv) Maximum liquid loading of 44,600 liters per hour per square meter.

(g) For any HAP removed from the process wastewater during treatment and handling under paragraphs (f)(2), (f)(3), or (f)(4) of this section, the owner or operator shall:

(1) Recycle any HAP containing condensate streams as specified in paragraph (f)(1) of this section; and

(2) Control any HAP containing gas streams as specified in § 63.444(b).

(h) The owner or operator of a new or existing source subject to the requirements of this subpart shall evaluate all process wastewater streams as specified in § 63.451 (f) or (g) initially and whenever a process change occurs that has the potential to impact process wastewater flow or HAP concentration of streams initially exempt from control and cause a wastewater stream to become subject to the standards of this Subpart.

**§ 63.447 [Reserved]**

**§ 63.448 [Reserved]**

**§ 63.449 [Reserved]**

**§ 63.450 Standards for enclosures and closed vent systems.**

(a) For each emission point subject to § 63.444(b) and § 43.445(b), the owner or operator shall install an enclosure to capture and contain all HAP emissions and transport for control all HAP emissions in a closed vent system. The enclosure and closed vent system shall meet the following requirements:

(1) The enclosure shall capture all HAP emissions from process equipment by maintaining negative pressure at each enclosure opening. Each enclosure opening that was closed during the performance test specified in § 63.451(l) shall be secured in the closed position with a car-seal or a lock-and-key type configuration; and

(2) The closed vent system shall be designed for and operated with no detectable leaks as indicated by an instrument reading of less than 500 parts per million above background.

(b) Bypass lines that could divert an emission point gas stream away from the control device to the atmosphere shall comply with the requirements of paragraph (b)(1) or (b)(2) of this section.

(1) Install, calibrate, maintain, and operate according to manufacturer's specification a flow indicator that provides a record of emission point gas stream flow at least once every 15 minutes. The flow indicator shall be installed at the entrance to any bypass line; or

(2) Secure the bypass line valve in the closed position with a car-seal or a lock-and-key type configuration. A visual inspection of the seal or closure mechanism shall be performed at least once every 30 days to ensure the valve is maintained in the closed position and the emission point gas stream is not diverted through the bypass line.

**§ 63.451 Test methods and procedures.**

(a) An initial performance test is required for all emission points except the following:

(1) A combustion device designed and operated as specified in § 63.444 (b)(2) or (b)(3); or

(2) A steam stripper designed and operated as specified in § 63.446(f)(4).

(b) An owner or operator may use engineering assessment to evaluate the exemption from control limits for the pulping and bleaching component specified in § 63.444(a) and § 63.445(a) if information and documentation is provided to the satisfaction of the Administrator. Engineering assessment may be used to determine enclosed vent stream flow rate and individual or total HAP emission rates for the representative operating conditions. Engineering assessment includes, but is not limited to, the following:

(1) New and previous test results provided the tests are representative of current operating practices at the process unit.

(2) Bench-scale or pilot-scale test data representative of the process under representative operating conditions.

(3) Maximum flow rate, methanol emission rate, chlorine emission rate, or total HAP emission rate specified within an applicable permit limit.

(4) Design analysis based upon accepted chemical engineering principles, measurable process parameters, or physical or chemical laws or properties. Examples of analytical methods include, but are not limited to:

(i) Use of material balances based upon process stoichiometry to estimate maximum total HAP concentrations,

(ii) Estimation of maximum flow rate based on physical equipment design such as pump or blower capacities,

(iii) Estimate of methanol, chlorine, or total HAP concentrations based upon saturation conditions.

(5) All data, assumptions, and procedures used in the engineering assessment shall be documented.

(c) For purposes of determining sampling location and vent stream flow rates for emission point flow rate, mass, or vent stream concentration required in § 63.444 and § 63.445, as specified under paragraph (c)(2), (d), or (e) of this section, the owner or operator shall comply with the following:

(1) Method 1 or 1A of Part 60, Appendix A, as appropriate, shall be used for selection of the sampling site.

(i) For determining a process emission point flow rate as specified in § 63.444(a)(2) and § 63.445(a)(1), or for determining a process emission point mass emission as specified in § 63.444(a)(3) and (4); and § 63.445(a) (2) and (3), the sampling site shall be located prior to dilution of the emission point gas stream and prior to release to the atmosphere.

(ii) For determining the HAP mass loading rate in liquid streams entering a piece of equipment in the pulping component, as specified in § 63.444(a)(5), the sampling site shall be located as close as practical to where the pulp stream enters the process equipment.

(iii) For determination of compliance with the percent reduction requirements of § 63.444(b)(1) and § 63.445(b), sampling sites shall be located after the final recovery device outlet and prior to the inlet of the control device and at the outlet of the control device.

(iv) For determination of compliance with the parts per million by volume concentration limit in § 63.444(b)(1), the sampling site shall be located at the outlet of the control device.

(2) The gas volumetric flow rate shall be determined using Method 2, 2A, 2C, or 2D of Part 60, Appendix A, as appropriate.

(3) No traverse site selection method is needed for vents smaller than 0.10 meter in diameter.

(d) The owner or operator shall use the following procedures to determine the mass emission rate of an emission point as specified in § 63.444 and § 63.445:

(1) For the mass limit requirements in § 63.444(a) and the percent reduction requirements in § 63.444(b)(1), the total HAP concentration for the pulping component may be measured as either total HAP or methanol using the following:

(i) The average result of three tests using Method 308 shall be used to determine methanol concentration in the emission point gas stream; or

(ii) Any other method or data that has been validated according to the applicable procedures in Method 301 of Part 63, Appendix A, may be used to determine the concentration to be used in the following procedures or emission rate.

(2) For the mass limit requirements or percent reduction requirements in § 63.445 (a) and (b), the total HAP concentration in the bleaching component may be measured as either total HAP or methanol and chlorine individually using the following:

(i) The average result of three tests using Method 308 shall be used to determine methanol concentration and the average result of three tests using Method 26A shall be used to determine the chlorine concentration in the emission point gas stream; or

(ii) Any other method or data that has been validated according to the applicable procedures in Method 301 of Part 63, Appendix A, may be used to determine the concentration to be used in the following procedures or emission rate.

(3) The minimum sampling time for each of the three runs per method shall be 1 hour in which either an integrated sample or four grab samples shall be taken. If grab sampling is used, then the samples shall be taken at approximately equal intervals in time, such as 15 minute intervals during the run.

(4) The methanol, chlorine, or total HAP mass emission rate in the emission point gas stream shall be calculated using the following equation:

$$E = K_2\left[\sum_{j=1}^{n} 150nC_jM_j\right]Q_s$$

where:

E=Mass emission rate of total HAP, chlorine, or methanol in the sample, kilograms per hour.

$K_2$=Constant, $2.494\times10^{-6}$ (parts per million)$^{-1}$ (gram-mole per standard cubic meter) (kilogram/gram) (minutes/hour), where standard temperature for (gram-mole per standard cubic meter) is 20 °C.

$C_j$=Concentration on a dry basis of compound j in parts per million as measured by Method 308, or Method 26A as indicated in paragraph (d) (1) or (2) of this section.

$M_j$=Molecular weight of j, gram/gram-mole.

$Q_s$=Vent stream flow rate (dry standard cubic meter per minute) at a temperature of 20 °C as indicated in paragraph (c)(2) of this section.

(5) The total HAP, chlorine, or methanol mass emission per unit of pulp produced as specified in § 63.444(a)(4) or § 63.445(a)(3) shall be calculated using the following equation:

$$F = \frac{Ej}{P}$$

where:

F=Mass emission rate of total HAP, chlorine, or methanol in the sample, kilograms per air dry megagram of pulp.

$E_j$=Mass emission rate of total HAP, chlorine, or methanol in the sample, kilogram per hour as calculated in (d)(4) of this section.

P=The mass of pulp produced during the sample, megagrams ADP per hour.

(e) Except as provided in paragraphs (a) of this section, the owner or operator complying with the percent reduction efficiency requirements in § 63.444(b)(1) and § 63.445(b) shall conduct a performance test using the procedures in paragraphs (e)(1) through (e)(4) of this section.

(1) The procedures specified in paragraph (c) of this section shall be used for selection of the sampling sites.

(2) The owner or operator shall use the test methods specified in paragraph (d) of this section to determine emission rates at the inlet and outlet of the control device.

(3) If a combustion device is used to comply with the 20 ppmv limit in § 63.444(b)(1), the concentrations

obtained at the outlet of the combustion device using the appropriate test method shall be corrected to 3 percent oxygen using the following procedures:

(i) The emission rate correction factor or excess air, integrated sampling and analysis procedures of Method 3B of Part 60, Appendix A shall be used to determine the oxygen concentration ($\%O_{2d}$). The samples shall be taken during the same time that the HAP, or methanol samples are taken.

(ii) The concentration corrected to 3 percent oxygen ($C_c$) shall be computed using either of the following equations:

$$C_C = C_m\left(\frac{17.9}{20.9 - \%O_{2d}}\right)$$

where:

$C_c$=Concentration of total HAP, chlorine, or methanol corrected to 3 percent oxygen, dry basis, parts per million by volume.

$C_m$=Concentration of total HAP, methanol or chlorine, dry basis, parts per million by volume, as specified in paragraph (d) of this section.

$\%O_{2d}$=Concentration of oxygen, dry basis, percent by volume.

(4) The percent reduction of total HAP, methanol, or chlorine as specified in § 63.444(b)(1) or § 63.445(b)(1) shall be calculated as follows:

$$R = \frac{E_i - E_O}{E_i}(100)$$

where:

R=Control efficiency of control device, percent.

$E_i$=Mass emission rate of HAP, chlorine, or methanol at the inlet to the control device as calculated under paragraph (d)(4) of this section, kilograms of constituent per hour.

$E_o$=Mass emission rate of HAP, chlorine, or methanol at the outlet of the control device, as calculated under paragraph (d)(4) of this section, kilograms constituent per hour.

(f) To determine the annual average process wastewater flow rate for a process wastewater stream as specified in § 63.446(a)(2) and (h), the owner or operator shall use one of the following methods:

(1) Use the maximum annual production capacity of the process equipment, knowledge of the process, and mass balance information to either: estimate directly the process wastewater flow rate, in liters per minute; or estimate the total annual process wastewater volume and then divide total volume by 525,600 minutes in a year to determine the process wastewater flow rate in liters per minute;

(2) Select the highest flow rate of process wastewater from historical records representing the most recent 5 years of operation or, if the process unit has been in service for less than 5 years but at least 1 year, from historical records representing the total operating life of the process unit;

(3) Measure the flow rate of the process wastewater at the point of generation during conditions that are representative of wastewater generation rates.

(g) An owner or operator shall determine the annual average total HAP concentration of a process wastewater stream as required in § 63.446(a)(3) at the point of generation by one of the methods in paragraphs (g)(1), (2), or (3) of this section. For the purpose of determining the annual average total HAP concentration in a process wastewater stream, either total HAP or methanol concentration may be measured.

(1) Knowledge of the process wastewater. The owner or operator shall provide sufficient information to document the annual average total HAP or methanol concentration of the process wastewater stream. Examples of information that could constitute knowledge include material balances or previous test results provided the results are still representative of current operating practices at the process unit(s). If test data are used, then the owner or operator shall provide documentation describing the testing protocol and the means by which sampling variability and analytical variability were accounted for in the determination of the concentration for the process wastewater stream; or

(2) Bench-scale or pilot-scale test data. The owner or operator shall provide sufficient information to demonstrate that the bench-scale or pilot-scale test concentration data are representative of the actual annual average total HAP or methanol concentration. The owner or operator shall also provide documentation describing the testing protocol, and the means by which sampling variability and analytical variability were accounted for in the determination of the total HAP or methanol concentration for the process wastewater stream; or

(3) Measurements made at the point of generation or, when not feasible, measurements made at a downstream location that are corrected to point of generation values of the total HAP or methanol concentration in the process wastewater stream in accordance with the following procedures:

(i) Collect a minimum of three samples from each process wastewater stream which are representative of normal flow and concentration conditions. Where feasible, samples shall be taken from an enclosed pipe prior to the process wastewater being exposed to the atmosphere. Process wastewater samples shall be collected using the sampling procedures specified in 40 CFR, Appendix A, Method 305.

(ii) When sampling from an enclosed pipe is not feasible, a minimum of three representative samples shall be collected in a manner to minimize exposure of the sample to the atmosphere and loss of HAP compounds prior to sampling.

(iii) Each process wastewater sample shall be analyzed using one of the following test methods for determining the total HAP or methanol concentration in a process wastewater stream:

(A) Test Method 305; or

(B) A method or results from a test method that measures methanol concentration in the process wastewater, and that has been validated according to Method 301.

(iv) The methanol concentration shall be calculated by averaging the results of the sample analyses as follows and correcting for the fraction measured by the method:

where:

$$\overline{C} = \frac{1}{n}\sum_{i=1}^{n} C_i/fm$$

C=Methanol concentration for process wastewater stream, parts per million by weight.

n=Number of process wastewater samples (at least 3).

$C_i$=Measured average methanol concentration in process wastewater sample i, parts per million by weight.

fm=Fraction of total HAP or methanol measured by the method compared to total mass in the liquid for Method 305, the fm for methanol is 0.85.

(h) The owner or operator shall use the following procedures to demonstrate compliance of a treatment process with the parts per million by weight process wastewater stream concentration limits at the outlet of the treatment process as specified in § 63.446(f)(2). For the purpose of demonstrating compliance with the process wastewater stream concentration limits, either total HAP or methanol concentration may be measured.

(1) The total HAP or methanol concentration shall be measured using Test Method 305.

(2) A minimum of three representative samples of the process wastewater stream exiting the treatment process shall be collected and analyzed using the procedures in paragraph (g)(3) of this subpart.

(i) The owner or operator shall use the following procedures to demonstrate compliance with the percent reduction limits for total HAP or methanol mass flow rate as specified in § 63.446(f)(3) except as specified in paragraph (j) of this section.

(1) The percent reduction of total HAP or methanol mass flow rate shall be measured using Method 305 from both the inlet and outlet of the treatment process or a method or results from a test method that measures methanol concentration in the process wastewater, and that has been validated according to Method 301.

(2) The mass flow rate of total HAP or methanol entering the treatment process ($E_b$) and exiting the treatment process ($E_a$) shall be determined by computing the product of the flow rate of the process wastewater stream entering or exiting the treatment process, and the total HAP or methanol concentration of the entering or exiting wastewater streams, respectively.

(i) The flow rate of the entering and exiting process wastewater streams shall be determined using the inlet and outlet flow meters, respectively.

(ii) The total HAP or methanol concentration of the entering and exiting process wastewater streams shall be determined using the method specified in paragraph (g)(3)(iii) and (iv) of this section.

(iii) Three grab samples of the entering process wastewater stream shall be taken at equally spaced time intervals over a 1-hour period. Each 1-hour period constitutes a run, and the performance test shall consist of a minimum of 3 runs.

(iv) Three grab samples of the exiting process wastewater stream shall be taken at equally spaced time intervals over a 1-hour period. Each 1-hour period constitutes a run, and the performance test shall consist of a minimum of 3 runs conducted over the same 3-hour period at which the mass flow rate of methanol entering the treatment process is determined.

(v) The mass flow rates of total HAP or methanol entering and exiting the treatment process are calculated as follows:

$$E_b = \frac{K}{n \times 10^6}\left(\sum_{i=1}^{n} nV_{bi}C_{bi}\right)$$

$$E_a = \frac{K}{n \times 10^6}\left(\sum_{i=1}^{n} nV_{ai}C_{ai}\right)$$

where:

$E_b$=Mass flow rate of total HAP or methanol entering the treatment process, kilograms per hour.

$E_a$=Mass flow rate of total HAP or methanol exiting the treatment process, kilograms per hour.

K=Density of the process wastewater stream, kilograms per cubic meter.

$V_{bi}$=Average volumetric flow rate of process wastewater entering the treatment process during each run i, cubic meters per hour.

$V_{ai}$=Average volumetric flow rate of process wastewater exiting the treatment process during each run i, cubic meters per hour.

$C_{bi}$=Average concentration of total HAP or methanol in the process wastewater stream entering the treatment process during each run i, parts per million by weight, as specified in paragraph (g)(3)(iii) and (iv) of this section.

$C_{ai}$=Average concentration of total HAP or methanol in the process wastewater stream exiting the treatment process during each run i, parts per million by weight, as specified in paragraph (g)(3)(iii) and (iv) of this section.

n=Number of runs.

(3) The percent reduction across the treatment process shall be calculated as follows:

$$R = \frac{E_b - E_a}{E_b} \times 100$$

where:

R=Control efficiency of the treatment process, percent.

$E_b$=Mass flow rate of total HAP or methanol entering the treatment process, kilograms per hour, as specified in paragraph (i)(3)(v) of this section.

$E_a$=Mass flow rate of total HAP or methanol exiting the treatment process, kilograms per hour, as specified in paragraph (i)(3)(v) of this section.

(j) The owner or operator shall use the following procedures to demonstrate compliance with the percent reduction of total HAP for a biological treatment unit as specified in § 63.446(f)(3). For the purpose of demonstrating compliance with the process wastewater stream concentration limits, methanol concentration may be measured.

(1) The procedures in paragraph (i)(1) and (2) of this section shall be used to measure the mass flow rate of methanol entering and exiting the biological treatment process.

(2) The percent reduction due to destruction in the biological treatment process shall be calculated as follows:

$$R = \frac{(E_b - E_a) \times (f_{bio})}{E_b} \times 100$$

where:

R=Destruction of methanol in the biological treatment process, percent.

$E_b$=Mass flow rate of methanol entering the biological treatment process, kilograms per hour.

$E_a$=Mass flow rate of methanol exiting the biological treatment process, kilograms per hour.

$f_{bio}$=The fraction of methanol removed using WATER7. The site specific biorate constants used as inputs to WATER7 shall be determined using Method 304 of Appendix A of this Part.

(k) An owner or operator of a closed vent system as specified in § 63.450 or a process wastewater collection system as specified in § 63.446(b), (c), (d), and (e) shall test equipment for no detectable leaks as indicated by an instrument reading of less than 500 parts per million by volume above background in accordance with the following requirements:

(1) Method 21, from Appendix A of 40 CFR part 60, shall be used to determine the presence of leaking sources.

(2) The instrument shall be calibrated before use on each day of its use by the procedures specified in Method 21. The following calibration gases shall be used:

(i) Zero air (less than 10 parts per million by volume of hydrocarbon in air); and

(ii) A mixture of methane or n-Hexane and air at a concentration of approximately, but less than, 10,000 parts per million by volume methane or n-Hexane.

(l) An owner or operator of an enclosure as specified in § 63.450 shall test all process equipment enclosure openings for negative pressure using one of the following:

(1) Use an anemometer to demonstrate flow into the enclosure opening; or

(2) Measure the static pressure across the opening; or

(3) Visually demonstrate flow into the enclosure opening; or

(4) Calculate the average face velocity for all openings.

(m) To determine total HAP or methanol mass loading for the sum of all pulp and process wastewater streams entering the process equipment as specified in § 63.444(a)(5), an owner or operator shall:

(1) Determine the total HAP or methanol mass loading rate in each pulp and process wastewater stream following the procedures specified in paragraph (i)(1) and (2) of this subpart for the streams entering the process equipment only. Samples shall be obtained prior to dilution with other streams entering the process and prior to exposure to the atmosphere.

(2) The total HAP or methanol liquid phase concentration shall be calculated using the following equation:

$$L_p = \frac{\sum_{i=1}^{n} E_{bi}}{P}$$

where:

$L_p$=Liquid phase value of total HAP or methanol entering process equipment, kilograms per megagram ADP.

$E_{bi}$=Individual stream total HAP or methanol entering process equipment mass loading entering the piece of process equipment, kilograms per hour.

P=The mass of pulp handled in the process equipment during the sampling period, megagrams ADP per hour.

**§ 63.452 [Reserved]**

**§ 63.453 Continuous monitoring.**

(a) Each enclosure and closed vent system used to comply with § 63.450 shall comply with the requirements specified in paragraphs (a)(1) through (a)(4) of this section.

(1) For each enclosure opening, a visual inspection of the seal or closure mechanism specified in § 63.450(a)(1) shall be performed at least once every 30 days to ensure the opening is maintained in the closed position and sealed.

(2) Visually inspect each closed vent system as specified in § 63.450(a)(2) every 30 days and at other times as requested by the Administrator. The visual inspection shall include inspection of ductwork, piping, enclosures, and connections to covers for evidence of visible defects.

(3) Demonstrate no detectable leaks as specified in § 63.450(a)(2) measured initially and annually by the procedures in § 63.451(k).

(4) If visible defects in ductwork, piping, enclosures and connections to covers as specified in § 63.450 are observed during an inspection required by paragraph (a)(3) of this section; or if an instrument reading of 500 parts per million by volume or greater above background is measured; or if enclosure openings do not have negative pressure during an inspection required by § 63.450(a)(1), it shall be repaired as soon as practicable.

(i) A first effort to repair the closed vent system shall be made as soon as practicable but no later than 5 calendar days after identification.

(ii) Repair shall be completed no later than 15 calendar days after identification.

(b) Each owner or operator using an incinerator or a combustion device to comply with § 63.444 (b)(1) or (b)(2) shall install, calibrate, maintain, and operate according to manufacturers specifications a temperature monitoring device measuring the temperature in the firebox or in the ductwork immediately downstream of the firebox in a position before any substantial heat exchange occurs. The monitor shall be equipped with a continuous recorder.

(c) Each owner or operator using a gas scrubber to comply with § 63.445(b), shall install, calibrate, maintain, and operate with a continuous recorder according to manufacturers specifications equipment to monitor the following:

(1) The pH of the gas scrubber effluent; and

(2) The gas scrubber vent gas inlet flow rate; and

(3) The gas scrubber liquid influent flow rate.

(d) Each owner or operator using a steam stripper to comply with § 63.446(f) (2), (3), or (4) shall install, calibrate, maintain, and operate with a continuous recorder, according to manufacturers specifications equipment to monitor the following:

(1) The process wastewater mass feed rate; and

(2) The steam feed rate; and

(3) The process wastewater column feed temperature.

(e) Each owner or operator using a biological treatment unit to comply with § 63.446(f)(3) shall:

(1) Measure total HAP or methanol concentration as specified in § 63.451(i) in the influent and effluent of the process wastewater treatment system once every 30 days.

(2) Install, calibrate, maintain and operate according to manufacturer's specifications monitors for appropriate parameters as specified in the operating permit and demonstrated to the Administrator's satisfaction.

(f) Each process wastewater collection system used to comply with § 63.446 (b), (c), (d), or (e) shall comply with requirements specified:

(1) Visually inspect each closed collection system weekly and at other times as requested by the Administrator. The visual inspection shall include, but not be limited to, inspection of piping and connections to covers for evidence of visible defects.

(2) Demonstrate no detectable leaks measured initially and annually by the procedures in § 63.451(k).

(3) If visible defects in, but not limited to, piping and connections to covers are observed during an inspection required by paragraph (c) of this section; or if emissions of 500 parts per million by volume or greater above background, it shall be repaired as soon as practicable.

(i) A first effort to repair the closed collection system shall be made as soon as practicable but no later than 5 calendar days after identification.

(ii) Repair shall be completed no later than 15 calendar days after identification.

(g) An owner or operator using a device other than those specified in paragraphs (b) through (e) of this section shall establish appropriate operating parameters that will be monitored as specified in the operating permit and demonstrated to the Administrator's satisfaction.

(h) The owner or operator shall establish the parameter value for each operating parameter monitored under paragraphs (b) through (e) and (g) of this section during the initial performance test specified in § 63.451. The owner or operator complying with § 63.444(b) (2) or (3), or § 63.446(f)(4) shall use the parameter values specified in these sections.

(i) An owner or operator seeking to monitor an alternative operating parameter, or at an alternative frequency to the requirements in paragraphs (b) through (e) of this section shall first demonstrate to the Administrator's satisfaction that the alternative parameter or frequency provides continuous compliance with the applicable standards.

(j) Each owner or operator of a control device subject to the monitoring provisions of this Subpart shall operate the control device in a manner consistent with the minimum or maximum (as appropriate) operating parameter value or procedure required to be monitored under paragraphs (a) through (i) of this section and established under this Subpart. Operation of the control device below minimum operating parameter values or above maximum operating parameter values established under this Subpart or failure to perform procedures required by this Subpart shall constitute a violation of the applicable emission standard of this Subpart.

**§ 63.454 Recordkeeping.**

(a) The owner or operator shall record and meet the recordkeeping requirements for § 63.10 (a), (b), and (c) for the monitoring parameters specified in § 63.453.

(b) The owner or operator shall record the monitoring parameters specified in § 63.453 and meet the requirements specified in paragraph (a) of this section for any emission point or process wastewater stream that becomes subject to the standards in this Subpart due to an increase in the flow, concentration, or mass parameters equal to or greater than the limits specified in § 63.444(a), § 63.445(a), or § 63.446 (a) or (h).

**§ 63.455 Reporting.**

(a) Each owner or operator of a source subject to this subpart shall submit the reports listed in paragraphs (a)(1) through (a)(5) of this section.

(1) An Initial Notification described in § 63.9 (a) through (d) and § 63.10(f).

(2) A Notification of Performance Tests specified in § 63.7 and § 63.9(g),

(3) A Notification of Compliance Status specified in § 63.9(h),

(4) Exceedance Reports specified in § 63.10(e)(3) (i) through (v) and (viii).

(i) If actions taken by an owner or operator during a startup, shutdown, or malfunction of an affected source (including actions taken to correct a malfunction) are not completely consistent with the procedures specified in the source's startup, shutdown, and malfunction plan specified in § 63.6(e)(3), the owner or operator shall state such information in the quarterly report. The startup, shutdown, and malfunction report shall consist of a letter, containing the name, title, and signature of the responsible official who is certifying its accuracy, that shall be submitted to the Administrator, and

(ii) If the seals on the secured enclosure openings specified in § 63.453(a) are broken, the duration of the event and an explanation of the reason for breaking the seal shall be included in the exceedance report.

(iii) Separate exceedance reports are not required if the information is included in the quarterly report in paragraph (a)(5) of this section.

(5) A quarterly summary report specified in § 63.10(e)(3). The summary report shall be entitled "Summary Report—Gaseous Excess Emissions and Continuous Monitoring System Performance." The quarterly report must contain any information for the Exceedance Report in paragraph (a)(4) of this section if an Exceedance Report is required.

(b) The owner or operator shall meet the requirements specified in paragraph (a) of this section for any emission point or process wastewater stream that becomes subject to the standards in this Subpart due to an increase in the flow, concentration, or mass parameters equal to or greater than the limits specified in § 63.444(a), § 63.445(a), and § 63.446 (a) and (h).

**§ 63.456 Delegation of authority.**

(a) In delegating implementation and enforcement authority to a State under section 112(d) of the Act, the authorities contained in paragraph (b) of this section shall be retained by the Administrator and not transferred to a State.

(b) Authorities which will not be delegated to States: The authority conferred in § 63.6(g) will not be delegated to any State.

**§ 63.457 [Reserved]**

**§ 63.458 [Reserved]**

**§ 63.459 [Reserved]**

3. It is proposed that Appendix A to part 63 be amended by adding Method 308 to read as follows:

**Appendix A to Part 63—Test Methods**

* * * * *

Method 308—Procedure for Determination of Methanol Emission from Stationary Sources

**1. Applicability and Principle**

*1.1 Applicability.* This method applies to the measurement of methanol emissions from specified stationary sources.

*1.2 Principle.* A gas sample is extracted from the sampling point in the stack. The methanol is collected in deionized distilled water and adsorbed on silica gel. The sample is returned to the laboratory where the methanol in the water fraction is separated from other organic compounds with a gas chromatograph (GC) and is then measured by a flame ionization detector (FID). The fraction adsorbed on silica gel is extracted with an aqueous solution of n-propanol and is then separated and measured by GC/FID.

**2. Apparatus**

*2.1 Sampling.* The sampling train is shown in Figure 308–1 and component parts are discussed below.

*2.1.1 Probe.* Teflon, approximately 6-mm outside diameter.

*2.1.2 Impingers.* Two 30-mL midget impingers. The impingers must be connected in series with leak-free glass connectors. Silicone grease may not be used to lubricate the connectors.

*2.1.3 Adsorbent Tube.* Glass tubes packed with the required amount of the specified adsorbent.

*2.1.4 Valve.* Needle valve, to regulate sample gas flow rate.

*2.1.5 Pump.* Leak-free diaphragm pump, or equivalent, to pull gas through the train. Install a small surge tank between the pump and rate meter to eliminate the pulsation effect of the diaphragm pump on the rotameter.

*2.1.6 Rate Meter.* Rotameter, or equivalent, capable of measuring flow rate to within 2 percent of the selected flow rate of about 1000 cc/min.

*2.1.7 Volume Meter.* Dry gas meter (DGM), sufficiently accurate to measure the sample volume to within 2 percent, calibrated at the selected flow rate and conditions actually encountered during sampling, and equipped with a temperature gauge (dial thermometer, or equivalent) capable of measuring temperature accurately to within 3°C (5.4°F).

*2.1.8 Barometer.* Mercury, aneroid, or other barometer capable of measuring atmospheric pressure to within 2.5 mm (0.1 in.) Hg. See the note in Method 5 (40 CFR Part 60, Appendix A), Section 2.1.9.

*2.1.9 Vacuum Gauge and Rotameter.* At least 760-mm (30-in.) Hg gauge and 0— to 40-cc/min rotameter, to be used for leak-check of the sampling train.

*2.2 Sample Recovery.*

*2.2.1 Wash Bottles.* Polyethylene or glass, 500-mL, two.

*2.2.2 Sample Vials.* Glass 40-mL with Teflon-lined septa, to store impinger samples (one per sample).

*2.3 Analysis.*

*2.3.1 Gas Chromatograph.* GC with an FID, programmable temperature control, and heated liquid injection port.

*2.3.2 Pump.* Capable of pumping 100 mL/min. For flushing sample loop.

*2.3.3 Flow Meter.* To monitor accurately sample loop flow rate of 100 mL/min.

*2.3.4 Regulators.* Two-stage regulators used on gas cylinders for GC and for cylinder standards.

*2.3.5 Recorder.* To record, integrate, and store chromatograms.

*2.3.6 Syringes.* 1.0- and 10-microliter size, calibrated, for injecting samples.

*2.3.7 Tubing Fittings.* Stainless steel, to plumb GC and gas cylinders.

*2.3.8 Vials.* Two 5.0-mL glass vials with screw caps fitted with Teflon-lined septa for each sample. Also one for each standard for adsorbent tube samples.

*2.3.9 Vials.* Glass 40-mL with Teflon-lined septa, to prepare calibration standards (one per standard) for impinger samples.

**3. Reagents**

Unless otherwise indicated, all reagents must conform to the specifications established by the Committee on Analytical Reagents of the American Chemical Society. Where such specifications are not available, use the best available grade.

*3.1 Sampling.*

*3.1.1 Water.* Deionized distilled to conform to ASTM Specification D 1193–77, Type 3. At the option of the analyst, the $KMnO_4$ test for oxidizable organic matter may be omitted when high concentrations of organic matter are not expected to be present.

*3.1.2 Silica Gel.* Deactivated chromatographic grade 20/40 mesh silica gel packed in glass adsorbent tubes. The silica gel is packed in two sections. The front section contains 520 mg of silica gel, and the back section contains 260 mg.

*3.2 Analysis.*

*3.2.1 Water.* Same as 3.1.1.

*3.2.2 N-Propanol, 10 Percent.* Mix 10 mL of n-propanol with 90 mL of water.

*3.2.3 Methanol Standards For Impinger samples.* Prepare a series of methanol standards by injecting 0, 10, 20, 30, and 40 µg of methanol respectively into five 40-mL glass vials filled with water and capped with Teflon septa.

*3.2.4 Methanol Standards for Adsorbent Tube Samples.* Prepare a series of methanol standards by injecting 0, 10, 20, 30, and 40 µg of methanol respectively into five 5-mL glass vials capped with Teflon-lined septa and containing 3 mL of a 10% n-propanol solution.

*3.2.5 GC Column.* Capillary column, 30 meters long with an ID of 0.53 mm, coated with DB 624 to a film thickness of 3.0 microns, or an equivalent column.

*3.2.6 Helium.* Ultra high purity.

*3.2.7 Hydrogen.* Zero Grade.

*3.2.8 Oxygen.* Zero grade.

**4. Procedure**

*4.1 Sampling.*

*4.1.1 Preparation of Collection Train.* Measure 20 mL of water into the midget impinger. The adsorbent tube must contain 520 mg of silica gel in the front section and 260 mg of silica gel in the backup section. Assemble the train as shown in Figure 308–1. Place crushed ice and water around the impinger.

*4.1.2 Leak Check.* A leak-check prior to the sampling run is optional; however, a leak-check after the sampling run is mandatory. The leak-check procedure is as follows:

Temporarily attach a suitable (e.g., 0- to 40-cc/min) rotameter to the outlet of the DGM, and place a vacuum gauge at or near the probe inlet. Plug the probe inlet, pull a vacuum of at least 250 mm (10 in.) Hg, and note the flow rate as indicated by the rotameter. A leakage rate not in excess of 2 percent of the average sampling rate is acceptable.

Note: Carefully release the probe inlet plug before turning off the pump.

*4.1.3 Sample Collection.* Record the initial DCM reading and barometric pressure. To begin sampling, position the tip of the Teflon tubing at the sampling point, connect the tubing to the impinger, and start the pump. Adjust the sample flow to a constant rate of approximately 200 mL/min as indicated by the rotameter. Maintain this constant rate (±10 percent) during the entire sampling run. Take readings (DGM, temperatures at DGM and at impinger outlet, and rate meter) at least every 5 minutes. Add more ice during the run to keep the temperature of the gases leaving the last impinger at 20°C (68°F) or less. At the conclusion of each run, turn off the pump, remove the Teflon tubing from the stack, and record the final readings. Conduct a leak-check as in Section 4.1.2. (This leak-check is mandatory.) If a leak is found, void the test run or use procedures acceptable to the Administrator to adjust the sample volume for the leakage.

*4.2 Sample Recovery.*

*4.2.1 Impingers.* Disconnect the impingers. Pour the contents of the midget impingers into a leak-free polyethylene bottle marked for shipment. Rinse the two midget impingers and the connecting tubes with water, and add the washings to the same storage container. Mark the fluid level. Seal and identify the sample container.

*4.2.2 Adsorbent Tubes.* Seal the silica gel adsorbent tubes and place them in an ice chest for shipment to the laboratory.

*4.3 Sample Analysis.*

*4.3.1 Gas Chromatograph Operating Conditions.*

*4.3.1.1 Injector.* Configured for capillary column, splitless, 200°C.

*4.3.1.2 Carrier.* Helium at 10 mL/min.

*4.3.1.3 Oven.* Initially at 45°C for 3 minutes; then raise by 10°C to 70°C; then raise by 70°C/min to 200°C.

*4.3.2 Impinger Sample.*

*4.3.2.1* Note level of liquid in container, and confirm whether any sample was lost during shipment; note this on analytical data sheet. If a noticeable amount of leakage has occurred, either void the sample or use methods, subject to the approval of the Administrator, to correct the final results.

*4.3.2.2* Transfer the contents of the storage container to a 100-mL volumetric flask, and dilute to exactly 100 mL with water.

*4.3.2.3* Inject 1 µl of the diluted sample into the gas chromatograph. Repeat the injection until the responses of two successive injections agree within 5%. If the sample response is above that of the highest calibration standard, either dilute the sample until it is in the measurement range of the calibration line or prepare additional calibration standards. If the sample response is below that of the lowest calibration standard, prepare additional calibration standards. If additional calibration standards are prepared, there shall be at least two which bracket the response of the sample. These standards should produce approximately 80% and 120% of the response of the sample.

*4.3.3 Silica Gel Adsorbent Sample.*

*4.3.3.1 Preparation of Samples.* Extract the front and backup sections of the adsorbent tube separately. With a file score the glass adsorbent tube in front of the first section of silica gel. Break the tube open. Remove and discard the glass wool. Transfer the first section of the silica gel to a 5-mL glass vial and stopper the vial. Remove the spacer between the first and second section of the adsorbent tube and discard it. Transfer the second section of silica gel to a separate 5-mL glass vial and stopper the vial.

*4.3.3.2 Desorption of Samples.* Add 3 mL of the 10% n-propanol solution to each of the stoppered vials and shake or vibrate the vials for 30 minutes.

*4.3.3.3* Inject 1 µl of the diluted sample into the gas chromatograph. Repeat the injection until the responses of two successive injections agree within 5%. If the sample response is above that of the highest calibration standard, either dilute the sample until it is in the measurement range of the calibration line or prepare additional calibration standards. If the sample response is below that of the lowest calibration standard, prepare additional calibration standards. If additional calibration standards are prepared, there shall be at least two which bracket the response of the sample. These standards should produce approximately 80% and 120% of the response of the sample.

**5. Calibration**

*5.1 Metering System.*

*5.1.1 Initial Calibration.*

*5.1.1.1* Before its initial use in the field, first leak-check the metering system (drying tube, needle valve, pump, rotameter, and DGM) as follows: Place a vacuum gauge at the inlet to the drying tube, and pull a vacuum of 250 mm (10 in.) Hg; plug or pinch off the outlet of the flow meter, and then turn off the pump. The vacuum shall remain stable for at least 30 seconds. Carefully release the vacuum gauge before releasing the flow meter end.

*5.1.1.2* Next, remove the drying tube, and calibrate the metering system (at the sampling flow rate specified by the method) as follows: Connect an appropriately sized wet test meter (e.g., 1 liter per revolution) to the inlet of the drying tube. Make three independent calibrations runs, using at least five revolutions of the DGM per run. Calculate the calibration factor, Y (wet test meter calibration volume divided by the DGM volume, both volumes adjusted to the same reference temperature and pressure), for each run, and average the results. If any Y-value deviates by more than 2 percent from the average, the metering system is unacceptable for use. Otherwise, use the average as the calibration factor for subsequent test runs.

*5.1.2 Post-Test Calibration Check.* After each field test series, conduct a calibration check as in Section 5.1.1 above, except for the following variations: (a) The leak-check is not to be conducted, (b) three, or more revolutions of the DGM may be used, and (c) only two independent runs need be made. If the calibration factor does not deviate by more than 5 percent from the initial calibration factor (determined in Section 5.1.1), then the DGM volumes obtained during the test series are acceptable. If the calibration factor deviates by more than 5 percent, recalibrate the metering system as in Section 5.1.1, and for the calculations, use the calibration factor (initial or recalibration) that yields the lower gas volume for each test run.

*5.2 Thermometers.* Calibrate against mercury-in-glass thermometers.

*5.3 Rotameter.* The rotameter need not be calibrated, but should be cleaned and maintained according to the manufacturer's instruction.

*5.4 Barometer.* Calibrate against a mercury barometer.

*5.5 Gas Chromatograph.*

*5.5.1 Initial Calibration.* Inject 1 µl of each of the standards prepared in Section 3.3.3 into the GC and record the response. Repeat the injections for each standard until two successive injections agree within 5%. Using the mean response for each calibration standard, prepare a linear least squares equation relating the response to the mass of methanol in the sample. Perform the calibration before analyzing each set of samples.

*5.5.2 Continuing Calibration.* At the beginning of each day, analyze the mid-level calibration standard as described in Section 5.5.1. The response from the daily analysis must agree with the response from the initial calibration within 10%. If it does not the initial calibration must be repeated.

**6. Quality Assurance**

*6.1 Applicability.* When the method is used to analyze samples to demonstrate compliance with a source emission regulation, an audit sample must be analyzed, subject to availability.

*6.2 Audit Procedure.* Analyze an audit sample with each set of compliance samples. Concurrently analyze the audit sample and a set of compliance samples in the same manner to evaluate the technique of the analyst and the standards preparation. The same analyst, analytical reagents, and analytical system shall be used both for the compliance samples and the EPA audit sample.

*6.3 Audit Sample Availability.* Audit samples will be supplied only to enforcement agencies for compliance tests. Audit samples may be obtained by writing: Source Test Audit Coordinator (MD–77B), Quality Assurance Division, Atmospheric Research and Exposure Assessment Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711, or by calling the Source Test Audit Coordinator (STAC) at (919) 541–7834. The audit sample request must be made at least 30 days prior to the scheduled compliance sample analysis.

*6.4 Audit Results.* Calculate the audit sample concentration according to the calculation procedure provided in the audit instructions included with the audit sample. Fill in the audit sample concentration and the analyst's name on the audit response form included with the audit instructions. Send one copy to the EPA Regional Office or the appropriate enforcement agency and a second copy to the STAC. The EPA Regional Office or the appropriate enforcement agency will report the results of the audit to the laboratory being audited. Include this response with the results of the compliance samples in relevant reports to the EPA Regional Office or the appropriate enforcement agency.

**7. Calculations**

*7.1 Nomenclature*

E=Mass emission rate of methanol, kg/hr (lb/hr).

$M_a$=Mass of methanol in the front and back half of the adsorbent tube, µg.

$M_i$=Mass of methanol in the impinger portion of the sample train, µg.

$M_{tot}$=Total mass of methanol collected in the sample train, µg.

$P_{bar}$=Barometric pressure at the exit orifice of the DGM, mm Hg (in. Hg).

$P_{std}$=Standard absolute pressure, 760 mm Hg (29.92 in. Hg).

$Q_{std}$=Dry volumetric stack gas flow rate corrected to standard conditions, dscm/hr (dscf/hr).

$T_m$=Average DGM absolute temperature, K (R).

$T_{std}$=Standard absolute temperature, 293 K (528 R).

$V_a$=Volume of sample aliquot titrated, ml.

$V_m$=Dry gas volume as measured by the DGM, dcm (dcf).

$V_{m(std)}$=Dry gas volume measured by the DGM, corrected to standard conditions, dscm (dscf).

*7.2 Mass of Methanol.* Calculate the total mass of methanol collected in the sampling train using Equation 308–1.

$$M_{tot} = M_i + M_a \qquad \text{Equation 308-1}$$

*7.3 Dry Sample Gas Volume, Corrected to Standard Conditions.* Calculate the volume of gas sampled at standard conditions using Equation 308–2.

$$V_m(\text{std}) = \frac{V_m Y T_{std} P_{bar}}{T_m P_{std}} \qquad \text{Equation 308-2}$$

*7.4 Mass Emission Rate of Methanol.* Calculate the mass emission rate of methanol using Equation 308–3.

$$E = \frac{M_{tot} Q_{sd}}{V_{m(std)}} \qquad \text{Equation 308-3}$$

**8. Bibliography**

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5. NIOSH Manual of Analytical Methods, Volume 2. U. S. Department of Health and Human Services National Institute for Occupational Safety and Health. Center for Disease Control. 4676 Columbia Parkway, Cincinnati, Ohio 45226. May be available from the

Superintendent of Documents, Government Printing Office, Washington, DC 20402.

6. Pinkerton, J. E. Method for Measuring Methanol in Pulp Mill Vent Gases. National Council of the Pulp and Paper Industry for Air and Stream Improvement, Inc., New York, NY.

1. Part 430 is revised to read as follows:

## PART 430—THE PULP, PAPER, AND PAPERBOARD POINT SOURCE CATEGORY

General Provisions

Sec.
430.00 Applicability
430.01 General definitions
430.02 Monitoring requirements
430.03 Best management practices plans for pulping liquor management, spill prevention, and control

### Subpart A—Dissolving Kraft Subcategory

Sec.
430.10 Applicability; description of the dissolving kraft subcategory.
430.11 Specialized definitions.
430.12 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).
430.13 Effluent limitations representing the degree of effluent reduction attainable by the best conventional pollutant control technology (BCT).
430.14 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).
430.15 New source performance standards (NSPS).
430.16 Pretreatment standards for existing sources (PSES). [Reserved]
430.17 Pretreatment standards for new sources (PSNS).
430.18 Best management practices (BMPs).

### Subpart B—Bleached Papergrade Kraft and Soda Subcategory

Sec.
430.20 Applicability; description of the bleached papergrade kraft and soda subcategory.
430.21 Specialized definitions.
430.22 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).
430.23 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).
430.24 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).
430.25 New source performance standards (NSPS).
430.26 Pretreatment standards for existing sources (PSES).
430.27 Pretreatment standards for new sources (PSNS).
430.28 Best management practices (BMPs).

### Subpart C—Unbleached Kraft Subcategory

Sec.
430.30 Applicability; description of the unbleached kraft subcategory.
430.31 Specialized definitions.
430.32 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).
430.33 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).
430.34 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).
430.35 New source performance standards (NSPS).
430.36 Pretreatment standards for existing (PSES).
430.37 Pretreatment standards for new sources (PSNS).
430.38 Best management practices (BMPs).

### Subpart D—Dissolving Sulfite Subcategory

Sec.
430.40 Applicability; description of the dissolving sulfite subcategory.
430.41 Specialized definitions.
430.42 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).
430.43 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).
430.44 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).
430.45 New source performance standards (NSPS).
430.46 Pretreatment standards for existing sources (PSES). [Reserved]
430.47 Pretreatment standards for new sources (PSNS).
430.48 Best management practices (BMPs).

### Subpart E—Papergrade Sulfite Subcategory

Sec.
430.50 Applicability; description of the papergrade sulfite subcategory.
430.51 Specialized definitions.
430.52 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).
430.53 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).
430.54 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).
430.55 New source performance standards (NSPS).
430.56 Pretreatment standards for existing sources (PSES).
430.57 Pretreatment standards for new sources (PSNS).
430.58 Best management practices (BMPs).

### Subpart F—Semi-Chemical Subcategory

Sec.
430.60 Applicability; description of the semi-chemical subcategory.
430.61 Specialized definitions.
430.62 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).
430.63 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).
430.64 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).
430.65 New source performance standards (NSPS).
430.66 Pretreatment standards for existing sources (PSES).
430.67 Pretreatment standards for new sources (PSNS).
430.68 Best management practices (BMPs).

### Subpart G—Mechanical Pulp Subcategory

Sec.
430.70 Applicability; description of the mechanical pulp subcategory.
430.71 Specialized definitions.
430.72 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).
430.73 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).
430.74 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT). [Reserved]
430.75 New source performance standards (NSPS).
430.76 Pretreatment standards for existing sources (PSES). [Reserved]
430.77 Pretreatment standards for new sources (PSNS). [Reserved]
430.78 Best management practices (BMPs) [Reserved]

### Subpart H—Non-Wood Chemical Pulp Subcategory

Sec.
430.80 Applicability; description of the non-wood chemical pulp subcategory.
430.81 Specialized definitions.

Sec.
430.82 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).
430.83 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).
430.84 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT). [Reserved]
430.85 New source performance standards (NSPS).
430.86 Pretreatment standards for existing sources (PSES). [Reserved]
430.87 Pretreatment standards for new sources (PSNS). [Reserved]
430.88 Best management practices (BMPs).

**Subpart I—Secondary Fiber Deink Subcategory**

Sec.
430.90 Applicability; description of the secondary fiber deink subcategory.
430.91 Specialized definitions.
430.92 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).
430.93 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).
430.94 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT). [Reserved]
430.95 New source performance standards (NSPS).
430.96 Pretreatment standards for existing sources (PSES). [Reserved]
430.97 Pretreatment standards for new sources (PSNS). [Reserved]
430.98 Best management practices (BMPs). [Reserved]

**Subpart J—Secondary Fiber Non-Deink Subcategory**

Sec.
430.100 Applicability; description of the secondary fiber non-deink subcategory.
430.101 Specialized definitions.
430.102 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).
430.103 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).
430.104 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT). [Reserved]
430.105 New source performance standards (NSPS).
430.106 Pretreatment standards for existing sources (PSES). [Reserved]
430.107 Pretreatment standards for new sources (PSNS). [Reserved]
430.108 Best management practices (BMPs). [Reserved]

**Subpart K—Fine and Lightweight Papers From Purchased Pulp Subcategory**

Sec.
430.110 Applicability; description of the fine and lightweight papers from purchased pulp subcategory.
430.111 Specialized definitions.
430.112 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).
430.113 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).
430.114 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT). [Reserved]
430.115 New source performance standards (NSPS).
430.116 Pretreatment standards for existing sources (PSES). [Reserved]
430.117 Pretreatment standards for new sources (PSNS). [Reserved]
430.118 Best management practices (BMPs). [Reserved]

**Subpart L—Tissue, Filter, Non-Woven, and Paperboard from Purchased Pulp Subcategory**

Sec.
430.120 Applicability; description of the tissue, filter, non-woven, and paperboard from purchased pulp subcategory.
430.121 Specialized definitions.
430.122 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).
430.123 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).
430.124 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT). [Reserved]
430.125 New source performance standards (NSPS).
430.126 Pretreatment standards for existing sources (PSES). [Reserved]
430.127 Pretreatment standards for new sources (PSNS). [Reserved]
430.128 Best management practices (BMPs). [Reserved]

**Authority:** Sections 301, 304, 306, 307, and 501, Pub. L. 95–217, 91 Stat. 156, and Pub. L. 100–4 (33 U.S.C. 1311, 1314, 1316, 1317, and 1361).

## General Provisions

**§ 430.00 Applicability.**

This part applies to any pulp, paper, or paperboard mill that discharges or may discharge process wastewater pollutants to the waters of the United States, or that introduces or may introduce process wastewater pollutants into a publicly owned treatment works. The provisions of this subpart are also applicable to discharges resulting from the production of builders' paper and roofing felt from wastepaper, previously part 431, the builders' paper and roofing felt subcategory. EPA is proposing to include mills that produce builders' paper and roofing felt from wastepaper in part 430, subpart J, and to eliminate part 431.

**§ 430.01 General definitions.**

In addition to the definitions set forth in 40 CFR part 401, the following definitions shall apply to this part:

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

(b) Annual average—The mean concentration, mass loading or production-normalized mass loading of a pollutant over a period of 365 consecutive days (or such other period of time determined by the permitting authority to be sufficiently long to encompass expected variability of the concentration, mass loading, or production-normalized mass loading at the relevant point of measurement).

(c) Bleach plant—All process equipment beginning with the first application of bleaching agents (e.g., chlorine, chlorine dioxide, ozone, sodium or calcium hypochlorite, peroxide), each subsequent extraction stage, and each subsequent stage where bleaching agents are applied to the pulp. A limited number of mills produce specialty grades of pulp using hydrolysis or extraction stages prior to the first application of bleaching agents. The bleach plant includes those pulp pretreatment stages. Oxygen delignification prior to the application of bleaching agents is not part of the bleach plant.

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

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

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

(g) Elemental chlorine-free (ECF)—Any process for bleaching pulps in the absence of elemental chlorine.

(h) End-of-pipe effluent—Final mill effluent discharged to waters of the United States or to a POTW.

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

(j) New source—EPA's NPDES regulations define the term "new source" at 40 CFR § 122.2 and § 122.29. The following examples supplement those definitions for the pulp, paper, and paperboard industry only.

(1) The following are examples of "new sources" within the pulp, paper, and paperboard industry:

(i) At existing chemical pulp mills with bleaching operations, (Subparts A, B, D and E): the construction, within any five year period, of

(A) a new pulping digester or pulping digester that completely replaces an existing digester, in combination with

(B) a new bleaching facility or bleaching facility that completely replaces an existing bleaching facility.

(ii) At existing chemical pulp mills without bleaching operations (Subparts C, F, and H):

(A) new pulping digester(s); or

(B) new pulping digester(s) that totally replace(s) an existing pulping digester.

(iii) At mechanical pulp, secondary fiber, and non-integrated mills (Subparts G, I, J, K, and L):

(A) a new paper or paperboard machine; or

(B) a paper or paperboard machine that totally replaces a paper or paperboard machine.

(2) The following are examples of changes in the pulp, paper, and paperboard industry that alone do not cause an existing mill to become a "new source":

(i) upgrades of existing pulping operations;

(ii) upgrades or replacement of pulp screening and washing operations;

(iii) installation of oxygen delignification systems or other post-digester, prebleaching delignification systems; and,

(iv) bleach plant modifications including changes in method or amounts of chemical applications, new chemical applications, installation of new bleaching towers to facilitate replacement of sodium or calcium hypochlorite, and installation of new pulp washing systems.

(k) Non-continuous discharger—Discharge of wastewaters stored for periods of at least 24 hours and released on a batch basis.

(l) Nonconventional pollutants—Pollutants that are neither conventional pollutants nor toxic pollutants.

(m) Non-detect (ND) limitation—A concentration-based measurement reported below the minimum level that can be reliably measured by the analytical method for the pollutant. The following minimum levels (for water samples only) and analytical methods apply to pollutants in this part.

| Pollutant | Method | Minimum level |
|---|---|---|
| 2,3,7,8-TCDD | 1613 | 10 pg/L. |
| 2,3,7,8-TCDF | 1613 | 10 pg/L. |
| Chloroform | 1624 | 10 µg/L. |
| Acetone | 1624 | 50 µg/L. |
| Methyl ethyl ketone | 1624 | 50 µg/L. |
| Methylene chloride | 1624 | 10 µg/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. |
| COD | 410.1 or 410.2 | Specified in 40 CFR 136. |
| Color | NCASI 253 | N/A. |
| $BOD_5$ | (*) | (*) |
| TSS | (*) | (*) |

*As specified in 40 CFR 136.

(n) POTW—Publicly owned treatment works as defined at § 403.3 (o).

(o) Process wastewater—Any water which during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product. For purposes of this part, process wastewater includes boiler blowdown; wastewaters from water treatment and other utility operations; blowdowns from high rate (e.g., greater than 98 percent) recycled non-contact cooling water systems to the extent they are mixed and co-treated with other process wastewaters; and, stormwaters from the immediate process areas to the extent they are mixed and co-treated with other process wastewaters. For purposes of this part, contaminated groundwaters from on-site or off-site groundwater remediation projects are not process wastewaters. The discharge of such groundwaters must be regulated separately, or in addition to, process wastewaters.

(1) The following process materials are excluded from the definition of process wastewater:

(i) Pulping Liquors: Green liquor at any liquor solids level; White liquor at any liquor solids level; Black liquor at any liquor solids level resulting from processing knots and screen rejects; Black liquor after any degree of concentration in the kraft or soda chemical recovery process; Reconstituted sulfite and semi-chemical pulping liquors prior to use; Any pulping liquor at any liquor solids level resulting from spills or intentional diversions from the process;

(ii) Lime mud and magnesium oxide, except to the extent they are used for wastewater treatment or effluent pH control;

(iii) Pulp stock;

(iv) Bleach chemical solutions prior to use;

(v) Paper making additives prior to use (e.g., alum, starch and size, clays and coatings).

The discharge of these process materials into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

(p) Product—As used in the regulation tables, "product" means:

(1) For TSS and $BOD_5$ effluent limitations applied at the end-of-pipe, the annual off-the-machine production (including additives and coatings, at off-the-machine moisture for paper and paperboard and at 10 per cent moisture for market pulp) divided by the number of operating days of the paper machine during the year;

(2) For COD and color effluent limitations applied at the end-of-pipe, the annual unbleached pulp production (at 10 percent moisture) divided by the number of operating days of the pulp mill during the year; or

(3) For effluent limitations on all other pollutants, either at the bleach plant (2,3,7,8–TCDD, 2,3,7,8–TCDF, chlorinated phenolic compounds, volatile compounds) or at end-of-pipe AOX, the annual unbleached pulp production that enters the bleach plant (at 10 percent moisture) divided by the number of operating days of the bleach line.

Production in each of the foregoing cases shall be determined for each mill based upon the highest annual production in the past five years divided by the number of operating days that year.

(q) Purchased pulp—Virgin pulp purchased from an off-site facility or obtained from an intra-company transfer from another site.

(r) Totally chlorine-free (TCF)—Any process for bleaching pulps in the absence of both chlorine and chlorine-containing compounds.

(s) Toxic pollutants—The pollutants designated by EPA as toxic in 40 CFR § 401.15.

(t) Zero discharge (ZD)—No discharge of wastewater to waters of the United States or to a POTW.

### § 430.02 Monitoring requirements.

The following monitoring requirements apply to this part:

| CAS No. | Pollutant | Monitoring frequency | |
|---|---|---|---|
| | | BPE | FE |
| 1198556 | Tetrachlorocatechol | Monthly | None. |
| 2539175 | Tetrachloroguiacol | | |
| 2539266 | Trichlorosyringol | | |
| 2668248 | 4,5,6-trichloroguaiacol | | |
| 32139723 | 3,4,6-trichlorocatechol | | |
| 56961207 | 3,4,5-trichlorocatechol | | |
| 57057837 | 3,4,5-trichloroguaiacol | | |
| 58902 | 2,3,4,6-tetrachlorophenol | | |
| 60712449 | 3,4,6-trichloroguaiacol | | |
| 87865 | pentachlorophenol | | |
| 88062 | 2,4,6-trichlorophenol | | |
| 95954 | 2,4,5-trichlorophenol | | |
| 1746016 | 2,3,7,8–TCDD | Monthly | None. |
| 51207319 | 2,3,7,8–TCDF | | |
| 67641 | 2-propanone (acetone) | Weekly | None. |
| 67663 | chloroform | | |
| 75092 | methlyene chloride | | |
| 78933 | 2-butanone (MEK) | | |
| 59473040 | AOX | None | Daily. |
| Color | Color | | |
| 1004 | COD | | |
| 1002 | BOD | | |
| 1009 | TSS | | |

BPE=Bleach Plant Effluent.
FE=Final Effluent.

### § 430.03 Best management practices plans for pulping liquor management, spill prevention, and control.

(a) The provisions of this part are applicable to pulp, paper and paperboard mills with pulp production in Subparts A (Dissolving Kraft), B (Bleached Papergrade Kraft and Soda), C (Unbleached Kraft), D (Dissolving Sulfite), E (Papergrade Sulfite), F (Semi-Chemical), or H (Non-Wood Chemical Pulp).

(b) Specialized definitions

(1) Board of review—A meeting among process operators, maintenance personnel, process engineering personnel, supervisory personnel, and environmental control staff conducted as soon as practicable after a pulping liquor spill or intentional pulping liquor diversion that is not contained within the immediate process area. The purpose of the board of review is to review the circumstances leading to the incident, to review the effectiveness of the corrective actions taken, and to develop changes to equipment and operating and maintenance practices to prevent recurrence.

(2) Immediate process area—The location at the mill where pulping, screening, knotting, pulp washing, pulping liquor concentration or processing, chemical recovery, and pulping liquor preparation facilities are located, generally the battery limits of

the aforementioned processes. "Immediate process area" includes pulping liquor storage and spill control tanks located at the mill, whether or not they are located in the immediate process area.

(3) Pulping liquor—Any intermediate or final chemical solution used for digesting or cooking wood or non-wood fibrous materials in kraft, sulfite, semi-chemical or non-wood chemical pulping processes (e.g., green, white, and black kraft liquors; ammonium, calcium, magnesium and sodium base sulfite liquors; semi-chemical liquors; and, non-wood chemical liquors).

(4) Equipment in pulping liquor service—Any process vessel, storage tank, pumping system, evaporator, heat exchanger, recovery furnace or boiler, pipeline, valve, fitting, or other device that contains, processes, transports, or comes into contact with pulping liquor.

(c) Owners or operators of pulp, paper, or paperboard mills with pulp production in Subparts A, B, C, D, E, F, or H shall prepare and implement a Best Management Practices Plan, hereafter referred to as a "BMPs plan," for each mill on or before the compliance dates set out in this part. New sources must develop BMPs plans, and these plans must be incorporated in their NPDES permits prior to discharging. The BMPs plan shall contain the elements set out in, and be prepared in accordance with, § 430.03(j). The BMPs plan shall be prepared within 120 days from the effective date of this part and shall be fully implemented within thirty months from the effective date of this part.

(d) The BMPs plan shall contain the following key elements:

(1) Engineering analyses,

(2) engineered controls and containment,

(3) work practices,

(4) preventive maintenance,

(5) dedicated monitoring and alarm systems,

(6) surveillance and repair programs, and

(7) employee training. The principal objective of the BMPs plan shall be to prevent losses and spills of pulping liquors from equipment items in pulping liquor service; the secondary objectives shall be to contain, collect, and recover at the immediate process area, or otherwise control, those spills and losses that do occur, and to minimize atmospheric emissions of total reduced sulfur compounds and hazardous air pollutants.

(e) No BMPs plan shall be effective to satisfy the requirements of this part unless it has been reviewed by a registered professional engineer and certified to by such registered professional engineer. By means of this certification, the engineer, having examined the mill and being familiar with the provisions of this part, shall attest that the BMPs plan has been prepared in accordance with good engineering practices. Such certification shall in no way relieve the owner or operator of the mill of the obligation to prepare and fully implement the BMPs plan in accordance with § 430.03(j), as required by paragraph (a) of this section.

(f) The owner or operator of a mill for which a BMPs plan is required by paragraph (a) of this section shall maintain a complete copy of the plan at such mill at all times and shall make such plan available to the Regional Administrator or his designee for on-site review during normal working hours.

(g) The owner or operator of a mill subject to § 430.03 shall amend the BMPs plan for such mill in accordance with § 430.03(j) whenever there is a change in mill design, construction, operation or maintenance which materially affects the potential for spills or losses of pulping liquor from the immediate process areas.

(h) Notwithstanding compliance with paragraph (a) of this section, the owner or operator of a mill subject to § 430.03 shall complete a review and evaluation of the BMPs plan at least once every three years from the date such mill becomes subject to this part. As a result of this review and evaluation, the owner or operator shall amend the BMPs plan within six months of the review to include any management practices or technologies that would significantly reduce the likelihood of pulping liquor losses from the immediate process areas.

(i) No amendment to a BMPs plan shall be effective to satisfy the requirements of this section unless it has been certified by a registered professional engineer in accordance with § 430.03(e).

(j) The BMPs plan shall be prepared in accordance with good engineering practice. If the BMPs plan calls for additional management practices, facilities or procedures, methods, or equipment not fully operational, the details of the installation and the operational start-up should be explained. The complete BMPs plan shall contain the elements described below:

(1) The BMPs plan shall be approved and signed by the mill manager.

(2) A detailed engineering review of the pulping and chemical recovery operations, including but not limited to process equipment, storage tanks, pipelines and pumping systems, loading and unloading facilities, and other appurtenant pulping and chemical recovery equipment items in pulping liquor service, to determine the magnitude and routing of potential leaks, spills and intentional pulping liquor diversions during the following periods of operation:

(i) process start-ups and shut downs;

(ii) maintenance;

(iii) grade changes;

(iv) storm events;

(v) power failures; and

(vi) normal operations.

(3) A detailed engineering review of existing pulping liquor containment facilities for the purpose of determining whether there is adequate capacity for collection and storage of anticipated intentional liquor diversions with sufficient contingency for collection and containment of spills, based upon good engineering practice. Secondary containment equivalent to the volume of the largest tank plus sufficient freeboard for precipitation should be provided for bulk storage tanks. The engineering review shall also consider the need for process wastewater diversion facilities to protect end-of-pipe wastewater treatment facilities from adverse effects of pulping liquor spills and diversions; the potential for contamination of storm water from the immediate process areas; the extent to which segregation and/or collection and treatment of contaminated storm water from the immediate process areas is appropriate; and the potential to reduce atmospheric emissions of total reduced sulfur compounds and hazardous air pollutants.

(4) Development and implementation of preventive maintenance practices, standard operating procedures, work practices, engineered controls and monitoring systems to prevent liquor losses and to divert pulping liquors to containment facilities such that the diverted or spilled liquors may be returned to the process or metered to the wastewater treatment system.

(5) A program of regular visual inspections (at least once per operating shift) of equipment items in pulping liquor service and a program for repair of leaking equipment items. The repair program shall encompass immediate repairs when possible and tagging for repair during the next maintenance outage those leaking equipment items that cannot be repaired during normal operations. The owner or operator of the mill shall also establish conditions under which production will be curtailed or halted to repair leaking equipment items or prevent liquor losses. The repair program shall include tracking repairs over time to identify those equipment items where upgrade or replacement may be warranted based

upon frequency and severity of leaks or failures. The owner or operator shall maintain logs showing the date pulping liquor leaks were detected, the type of pulping liquor (e.g., weak black liquor, intermediate black liquor, strong black liquor), an estimate of the magnitude of the leak, the date of first attempt at repair, and the date of final repair. The logs shall be maintained at the mill for review by the Regional Administrator or his designee during normal working hours.

(6) A program of initial and refresher training of operators, maintenance personnel, and other technical and supervisory personnel who have responsibility for operating, maintaining, or supervising the operation and maintenance of equipment items and systems in pulping liquor service. The refresher training shall be conducted annually. The training shall be documented and records of training shall be maintained at the mill for review by the Regional Administrator or his designee during normal working hours.

(7) A program of "boards of review" to evaluate each spill not contained at the immediate process area and any intentional pulping liquor diversion not contained in the immediate process area. The boards of review shall be conducted as soon as practicable after the event and shall be attended by the involved process operators, maintenance personnel, process engineering personnel, and supervisory personnel and environmental control staff. A brief report shall be prepared for each board of review. The report shall describe the equipment items involved, the circumstances leading to the incident, the effectiveness of the corrective actions taken, and plans to develop changes to equipment and operating and maintenance practices to prevent recurrence. Reports of the boards of review shall be included as part of the annual refresher training.

(8) A program to review any planned modifications to the pulping and chemical recovery facilities and any construction activities in the pulping and chemical recovery areas before these activities commence. The purpose of the reviews shall be to ensure that pulping liquor spill prevention and control is considered as part of the planned modifications and that construction and supervisory personnel are aware of possible liquor diversions and the potential for liquor spills during construction.

(9) A schedule not to exceed thirty months from the effective date of this part for construction of any pulping liquor containment or diversion facilities necessary to fully implement the BMPs plan. A schedule not to exceed eighteen months from the effective date of this part for installation or upgrade of continuous, automatic monitoring systems, including but not limited to, high level monitors and alarms on existing storage tanks, process area conductivity (or pH) monitoring and alarms, and process area sewer, process wastewater, and wastewater treatment plant conductivity (or pH) monitoring and alarms. Notwithstanding any construction activities, the owner or operator shall begin implementing all other aspects of the BMPs plan not later than four months from the effective date of this part.

## Subpart A—Dissolving Kraft Subcategory

**§ 430.10 Applicability; description of the dissolving kraft subcategory.**

(a) The provisions of this subpart are applicable to discharges resulting from the production of pulp and paper at dissolving kraft mills. This subcategory includes, but is not necessarily limited to, mills using an alkaline sodium hydroxide and sodium sulfide cooking liquor with acid prehydrolysis.

(b) To qualify for alternative limitations at § 430.14, § 430.15, § 430.16, and § 430.17, the owner or operator of the facility must certify, in the NPDES permit application or pretreatment baseline monitoring report, that chlorine or chlorine-containing compounds are not used for pulp bleaching. In addition, the owner or operator of the facility must provide, as a part of the NPDES permit application or pretreatment baseline monitoring report, monitoring results for three composite bleach plant wastewater samples for CDDs/CDFs and chlorinated phenolics, and three grab samples for chloroform and methylene chloride. Such samples shall be obtained at approximately weekly intervals.

(c) The discharge of process materials excluded from the definition of process wastewater at § 430.01 into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

**§ 430.11 Specialized definitions.**

The general definitions, abbreviations, and methods of analysis set forth in 40 CFR 401 and 430.01 shall apply to this subpart.

**§ 430.12 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations for $BOD_5$ and TSS. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

| Pollutant or pollutant parameter | BPT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 8.21 | 4.90 | 3.51 |
| TSS | 17.0 | 6.84 | 4.85 |

**§ 430.13 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). The limitations shall be the same as those specified in § 430.12 of this subpart for the best practicable control technology currently available (BPT).

**§ 430.14 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT), except that non-continuous dischargers shall not be subject to the monthly average mass effluent limitations. Non-continuous dischargers shall be subject to the end-of-pipe maximum day or annual average mass effluent limitations.

(a) The following limitations shall apply to the bleach plant effluent of all dischargers not using a TCF process:

BLEACH PLANT EFFLUENT

| Pollutant or pollutant property | BAT effluent limitations | |
|---|---|---|
| | Maximum for any 1 day | Monthly average |
| TCDD | 300 ng/kkg | N/A. |
| TCDF | 415 ng/kkg | N/A. |
| Chloroform | 10.1 g/kkg | 7.06 g/kkg. |
| Acetone | 35.1 g/kkg | 17.2 g/kkg. |
| Methyl ethyl ketone | 1.89 g/kkg | 1.04 g/kkg. |
| Methylene chloride | ND | N/A. |
| trichlorosyringol | 218 mg/kkg | N/A. |
| 3,4,5-trichlorocatechol | 5690 mg/kkg | N/A. |
| 3,4,6-trichlorocatechol | 180 mg/kkg | N/A. |
| 3,4,5-trichloroguaiacol | 2230 mg/kkg | N/A. |
| 3,4,6-trichloroguaiacol | 97.7 mg/kkg | N/A |
| 4,5,6-trichloroguaiacol | 400 mg/kkg | N/A. |
| 2,4,5-trichlorophenol | ND | N/A. |
| 2,4,6-trichlorophenol | 2180 mg/kkg | N/A. |
| tetrachlorocatechol | 554 mg/kkg | N/A. |
| tetrachloroguaiacol | 134 mg/kkg | N/A. |
| 2,3,4,6-tetrachlorophenol | 223 mg/kkg | N/A. |
| pentachlorophenol | ND | N/A. |

(b) The following limitations shall apply to the end-of-pipe effluent of all dischargers not using a TCF process:

END-OF-PIPE EFFLUENT

| Pollutant or pollutant property | BAT effluent limitations | Continuous dischargers | Non-continuous dischargers | |
|---|---|---|---|---|
| | | Maximum for any 1 day (kg/kkg) | Monthly average (kg/kkg) | Maximum for any 1 day |
| AOX | 1.67 | 0.650 | N/A | 0.553 |
| COD | 118 | 84.1 | N/A | 70.3 |

(c) The following limitations shall apply to the end-of-pipe effluent of all dischargers using a TCF process:

ALTERNATIVE EFFLUENT LIMITATIONS FOR FACILITIES USING TCF PROCESSES

[End-of-Pipe Effluent]

| Pollutant or pollutant parameter | BAT effluent limitations | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly Average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |
| COD | 118 | 84.1 | N/A | 70.3 |

**§ 430.15 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the monthly average mass effluent limitations. Non-continuous dischargers shall be subject to the end-of-pipe maximum day or annual average mass effluent standards.

(a) The following limitations shall apply to the bleach plant effluent of all dischargers not using a TCF process:

BLEACH PLANT EFFLUENT

| Pollutant or pollutant property | New source performance standards | |
|---|---|---|
| | Maximum for any 1 day | Monthly average |
| TCDD | 300 ng/kkg | N/A. |
| TCDF | 415 ng/kkg | N/A. |
| Chloroform | 10.1 g/kkg | 7.06 g/kkg. |
| Acetone | 35.1 g/kkg | 17.2 g/kkg. |
| Methyl ethyl ketone | 1.89 g/kkg | 1.04 g/kkg. |
| Methylene chloride | ND | N/A. |
| trichlorosyringol | 218 mg/kkg | N/A. |
| 3,4,5-trichlorocatechol | 5690 mg/kkg | N/A. |
| 3,4,6-trichlorocatechol | 180 mg/kkg | N/A. |
| 3,4,5-trichloroguaiacol | 2230 mg/kkg | N/A. |
| 3,4,6-trichloroguaiacol | 97.7 mg/kkg | N/A. |
| 4,5,6-trichloroguaiacol | 400 mg/kkg | N/A. |
| 2,4,5-trichlorophenol | ND | N/A. |
| 2,4,6-trichlorophenol | 2180 mg/kkg | N/A. |
| tetrachlorocatechol | 554 mg/kkg | N/A. |
| tetrachloroguaiacol | 134 mg/kkg | N/A. |
| 2,3,4,6-tetrachlorophenol | 223 mg/kkg | N/A. |
| pentachlorophenol | ND | N/A. |

(b) The following standards shall apply to the end-of- pipe effluent of all dischargers:

END-OF-PIPE EFFLUENT

| Pollutant or pollutant parameter | New source performance standards | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 8.21 | 4.90 | 3.51 |
| TSS | 17.0 | 6.84 | 4.85 |

(c) The following limitations shall apply to the end-of-pipe effluent of all dischargers not using a TCF process:

END-OF-PIPE EFFLUENT

| Pollutant or pollutant property | New source performance standards | | | |
|---|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers | |
| | Maximum for any 1 day (kg/kkg) | Monthly average (kg/kkg) | Maximum for any 1 day | Annual average (kg/kkg) |
| AOX | 1.67 | 0.650 | N/A | 0.553 |
| COD | 118 | 84.1 | N/A | 70.3 |

(d) The following standards shall apply to the end-of-pipe effluent of all dischargers using a TCF process:

ALTERNATIVE EFFLUENT STANDARDS FOR FACILITIES USING TCF PROCESSFS

[End-of-Pipe Effluent]

| Pollutant or pollutant parameter | New source performance standards | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |
| COD | 118 | 84.1 | N/A | 70.3 |

**§ 430.16 Pretreatment standards for existing sources (PSES). [Reserved]**

**§ 430.17 Pretreatment standards for new sources (PSNS).**

Except as provided in 40 CFR 403.7, any new source subject to this subpart that introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve the following pretreatment standards for new sources (PSNS), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent standards. Non-continuous dischargers shall be subject to the discharge-to-the-POTW maximum day or annual average mass effluent standards.

(a) The following limitations shall apply to the bleach plant effluent of all dischargers not using a TCF process:

BLEACH PLANT EFFLUENT

| Pollutant or pollutant property | Pretreatment standards for new sources | |
|---|---|---|
| | Maximum for any 1 day | Monthly average |
| TCDD | 300 ng/kkg | N/A. |
| TCDF | 415 ng/kkg | N/A. |
| Chloroform | 10.1 g/kkg | 7.06 g/kkg. |
| Acetone | 35.1 g/kkg | 17.2 g/kkg. |
| Methyl ethyl ketone | 1.89 g/kkg | 1.04 g/kkg. |
| Methylene chloride | ND | N/A. |
| trichlorosyringol | 218 mg/kkg | N/A. |
| 3,4,5-trichlorocatechol | 5690 mg/kkg | N/A. |
| 3,4,6-trichlorocatechol | 180 mg/kkg | N/A. |
| 3,4,5-trichloroguaiacol | 2230 mg/kkg | N/A. |
| 3,4,6-trichloroguaiacol | 97.7 mg/kkg | N/A. |
| 4,5,6-trichloroguaiacol | 400 mg/kkg | N/A. |
| 2,4,5-trichlorophenol | ND | N/A. |
| 2,4,6-trichlorophenol | 2180 mg/kkg | N/A. |
| tetrachlorocatechol | 554 mg/kkg | N/A. |
| tetrachloroguaiacol | 134 mg/kkg | N/A. |
| 2,3,4,6-tetrachlorophenol | 223 mg/kkg | N/A. |
| pentachlorophenol | ND | N/A |

(b) The following standards shall apply to the discharge-to-the-POTW effluent of all dischargers not using a TCF process:

DISCHARGE-TO-THE-POTW

| Pollutant or pollutant property | Pretreatment standards for new sources | | | |
|---|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers | |
| | Maximum for any 1 day (kg/kkg) | Monthly average (kg/kkg) | Maximum for any 1 day | Annual average (kg/kkg) |
| AOX | 1.67 | 0.650 | N/A | 0.553 |
| COD | 118 | 84.1 | N/A | 70.3 |

(c) The following standards shall apply to the discharge-to-the-POTW effluent of all dischargers using a TCF process:

ALTERNATIVE EFFLUENT STANDARDS FOR FACILITIES USING TCF PROCESSES
[Discharge-to-the-POTW]

| Pollutant or pollutant parameter | Pretreatment standards for new sources | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |
| COD | 118 | 84.1 | N/A | 70.3 |

**§ 430.18 Best management practices (BMPs).**

The definitions and requirements set forth in 40 CFR § 430.03 apply to this subpart.

## Subpart B—Bleached Papergrade Kraft and Soda Subcategory

**§ 430.20 Applicability; description of the bleached kraft and soda subcategory.**

(a) The provisions of this subpart are applicable to discharges resulting from the production of pulp and paper at bleached kraft and soda mills. This subcategory includes, but is not limited to, mills that produce a bleached kraft wood pulp using an alkaline sodium hydroxide and sodium sulfide cooking liquor. This subcategory also includes, but is not limited to, mills that produce bleached soda wood pulp using an alkaline sodium hydroxide cooking liquor.

(b) To qualify for alternative limitations at § 430.24, § 430.25, § 430.26, and § 430.27, the owner or operator of the facility must certify, in the NPDES permit application or pretreatment baseline monitoring report, that chlorine or chlorine-containing compounds are not used for pulp bleaching. In addition, the owner or operator of the facility must provide, as a part of the NPDES permit application or pretreatment baseline monitoring report, monitoring results for three composite bleach plant wastewater samples for CDDs/CDFs and chlorinated phenolics, and three grab samples for chloroform and methylene chloride. Such samples shall be obtained at approximately weekly intervals.

(c) The discharge of process materials excluded from the definition of process wastewater at § 430.01 into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

**§ 430.21 Specialized definitions.**

The general definitions, abbreviations, and methods of analysis set forth in 40 CFR 401 and 430.01 shall apply to this subpart.

**§ 430.22 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations for $BOD_5$ and TSS. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

| Pollutant or pollutant parameter | BPT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly Average | |
| $BOD_5$ | 4.26 | 2.19 | 1.57 |
| TSS | 8.75 | 3.89 | 2.72 |

**§ 430.23 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). The limitations shall be the same as those specified in § 430.22 of this subpart for the best practicable control technology currently available (BPT).

**§ 430.24 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT), except that non-continuous dischargers shall not be subject to the monthly average mass effluent limitations. Non-continuous dischargers shall be subject to the end-of-pipe maximum day or annual average mass effluent limitations.

(a) The following limitations shall apply to the bleach plant effluent of all dischargers not using a TCF process:

BLEACH PLANT EFFLUENT

| Pollutant or pollutant property | BAT effluent limitations | |
|---|---|---|
| | Maximum for any 1 day | Monthly average |
| TCDD | ND | N/A. |
| TCDF | 359 ng/kkg | N/A. |
| Chloroform | 5.06 g/kkg | 2.01 g/kkg. |
| Acetone | 43.0 g/kkg | 21.9 g/kkg. |
| Methyl ethyl ketone | 3.81 g/kkg | 1.75 g/kkg. |
| Methylene chloride | 1.33 g/kkg | 0.518 g/kkg. |
| trichlorosyringol | 218 mg/kkg | N/A. |
| 3,4,5-trichlorocatechol | ND | N/A. |
| 3,4,6-trichlorocatechol | ND | N/A. |
| 3,4,5-trichloroguaiacol | ND | N/A. |
| 3,4,6-trichloroguaiacol | ND | N/A. |
| 4,5,6-trichloroguaiacol | ND | N/A. |
| 2,4,5-trichlorophenol | ND | N/A. |
| 2,4,6-trichlorophenol | 78.6 mg/kkg | N/A. |
| tetrachlorocatechol | ND | N/A. |
| tetrachloroguaiacol | ND | N/A. |
| 2,3,4,6-tetrachlorophenol | ND | N/A. |
| pentachlorophenol | ND | N/A. |

(b) The following limitations shall apply to the end-of-pipe effluent of all dischargers not using a TCF process:

END-OF-PIPE EFFLUENT

| Pollutant or pollutant property | BAT effluent limitations | | | |
|---|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers | |
| | Maximum for any 1 day (kg/kkg) | Monthly average (kg/kkg) | Maximum for any 1 day | Annual average (kg/kkg) |
| AOX | 0.267 | 0.156 | N/A | 0.143 |
| COD | 35.7 | 25.4 | N/A | 21.3 |
| Color | 120 | 76.3 | N/A | 71.2 |

(c) The following limitations shall apply to the end-of-pipe effluent of all dischargers using a TCF process:

ALTERNATIVE EFFLUENT LIMITATIONS FOR FACILITIES USING TCF PROCESSES

[End-of-Pipe Effluent]

| Pollutant or pollutant parameter | BAT effluent limitations | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |
| COD | 35.7 | 25.4 | N/A | 21.3 |
| Color | 120 | 76.3 | N/A | 71.2 |

**§ 430.25 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the monthly average mass effluent standards. Non-continuous dischargers shall be subject to the end-of-pipe maximum day or annual average mass effluent standards.

(a) The following limitations shall apply to the bleach plant effluent of all dischargers not using a TCF process:

BLEACH PLANT EFFLUENT

| Pollutant or pollutant property | New source performance standards | |
|---|---|---|
| | Maximum for any 1 day | Monthly average |
| TCDD | ND | N/A. |
| TCDF | 329 ng/kkg | N/A. |
| Acetone | 12.0 g/kkg | 6.09 g/kkg. |
| Methylene chloride | ND | N/A. |
| trichlorosyringol | 218 mg/kkg | N/A. |
| 3,4,5-trichlorocatechol | ND | N/A. |
| 3,4,6-trichlorocatechol | ND | N/A. |
| 3,4,5-trichloroguaiacol | ND | N/A. |
| 3,4,6-trichloroguaiacol | ND | N/A. |
| 2,4,5-trichlorophenol | ND | N/A. |
| 2,4,6-trichlorophenol | ND | N/A. |
| tetrachlorocatechol | ND | N/A. |
| tetrachloroguaiacol | ND | N/A. |
| 2,3,4,6-tetrachlorophenol | ND | N/A. |
| pentachlorophenol | ND | N/A. |

(b) The following standards shall apply to the end-of-pipe effluent of all dischargers:

END-OF-PIPE

| Pollutant or pollutant parameter | New source performance standards | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly Average | |
| $BOD_5$ | 0.726 | 0.365 | 0.262 |
| TSS | 0.988 | 0.383 | 0.241 |

(c) The following standards shall apply to the end-of-pipe effluent of all dischargers using a TCF process:

ALTERNATIVE EFFLUENT LIMITATIONS FOR FACILITIES USING TCF PROCESSES

[End-of-Pipe Effluent]

| Pollutant or pollutant parameter | New source performance standards | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |

**§ 430.26 Pretreatment standards for existing sources (PSES).**

Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to this subpart that introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve the following pretreatment standards for existing sources (PSES), except that non-continuous dischargers shall not be subject to the monthly average mass effluent standards. Non-continuous dischargers shall be subject to the discharge-to-the-POTW maximum day or annual average mass effluent standards.

(a) The following limitations shall apply to the bleach plant effluent of all dischargers not using a TCF process:

BLEACH PLANT EFFLUENT

| Pollutant or pollutant property | Pretreatment standards for existing sources | |
|---|---|---|
| | Maximum for any 1 day | Monthly average |
| TCDD | ND | N/A. |

BLEACH PLANT EFFLUENT—Continued

| Pollutant or pollutant property | Pretreatment standards for existing sources | |
|---|---|---|
| | Maximum for any 1 day | Monthly average |
| TCDF | 359 ng/kkg | N/A. |
| Chloroform | 5.06 g/kkg | 2.01 g/kkg. |
| Acetone | 43.0 g/kkg | 21.9 g/kkg. |
| Methyl ethyl ketone | 3.81 g/kkg | 1.75 g/kkg. |
| Methylene chloride | 1.33 g/kkg | 0.518 g/kkg. |
| trichlorosyringol | 218 mg/kkg | N/A. |
| 3,4,5-trichlorocatechol | ND | N/A. |
| 3,4,6-trichlorocatechol | ND | N/A. |
| 3,4,5-trichloroguaiacol | ND | N/A. |
| 3,4,6-trichloroguaiacol | ND | N/A. |
| 4,5,6-trichloroguaiacol | ND | N/A. |
| 2,4,5-trichlorophenol | ND | N/A. |
| 2,4,6-trichlorophenol | 78.6 mg/kkg | N/A. |
| tetrachlorocatechol | ND | N/A. |
| tetrachloroguaiacol | ND | N/A. |
| 2,3,4,6-tetrachlorophenol | ND | N/A. |
| pentachlorophenol | ND | N/A. |

(b) The following standards shall apply to the discharge-to-the-POTW effluent of all dischargers not using a TCF process:

DISCHARGE-TO-THE-POTW

| Pollutant or pollutant property | Pretreatment standards for existing sources | | | |
|---|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers | |
| | Maximum for any 1 day (kg/kkg) | Monthly average (kg/kkg) | Maximum for any 1 day | Annual average (kg/kkg) |
| AOX | 0.267 | 0.156 | N/A | 0.143 |
| COD | 35.7 | 25.4 | N/A | 21.3 |
| Color | 120 | 76.3 | N/A | 71.2 |

(c) The following standards shall apply to the discharge-to-the-POTW effluent of all dischargers using a TCF process:

ALTERNATIVE EFFLUENT LIMITATIONS FOR FACILITIES USING TCF PROCESSES
[Discharge-to-the-POTW]

| Pollutant or pollutant parameter | Pretreatment standards for existing sources | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |
| COD | 35.7 | 25.4 | N/A | 21.3 |
| Color | 120 | 76.3 | N/A | 71.2 |

**§ 430.27 Pretreatment standards for new sources (PSNS).**

Except as provided in 40 CFR 403.7, any new source subject to this subpart that introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve the following pretreatment standards for new sources (PSNS), except that non-continuous dischargers shall not be subject to the monthly average mass effluent standards. Non-continuous dischargers shall be subject to the discharge-to-the-POTW maximum day or annual average mass effluent standards.

(a) The following limitations shall apply to the bleach plant effluent of all dischargers not using a TCF process:

BLEACH PLANT EFFLUENT

| Pollutant or pollutant property | Pretreatment standards for new sources | |
|---|---|---|
| | Maximum for any 1 day | Monthly average |
| TCDD | ND | N/A. |
| TCDF | 329 ng/kkg | N/A. |
| Acetone | 12.0 g/kkg | 6.09 g/kkg. |
| Methylene chloride | ND | N/A. |
| trichlorosyringol | 218 mg/kkg | N/A. |
| 3,4,5-trichlorocatechol | ND | N/A. |
| 3,4,6-trichlorocatechol | ND | N/A |
| 3,4,5-trichloroguaiacol | ND | N/A. |
| 3,4,6-trichloroguaiacol | ND | N/A. |
| 2,4,5-trichlorophenol | ND | N/A. |
| 2,4,6-trichlorophenol | ND | N/A. |
| tetrachlorocatechol | ND | N/A. |
| tetrachloroguaiacol | ND | N/A. |
| 2,3,4,6-tetrachlorophenol | ND | N/A. |
| pentachlorophenol | ND | N/A. |

(b) The following standards shall apply to the discharge-to-the-POTW effluent of all dischargers using a TCF process:

ALTERNATIVE EFFLUENT LIMITATIONS FOR FACILITIES USING TCF PROCESSES
[Discharge-to-the-POTW]

| Pollutant or pollutant parameter | Pretreatment standards for new sources | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |

**§ 430.28 Best management practices (BMPs).**

The definitions and requirements set forth in 40 CFR § 430.03 apply to this subpart.

## Subpart C—Unbleached Kraft Subcategory

**§ 430.30 Applicability; description of the unbleached kraft subcategory.**

(a) The provisions of this subpart are applicable to discharges resulting from the production of pulp and paper at unbleached kraft mills. This subcategory includes, but is not limited to, mills that produce kraft wood pulp without bleaching, using an alkaline sodium hydroxide and sodium sulfide cooking liquor. This subcategory also includes, but is not limited to, mills that produce both unbleached kraft and semi-chemical wood pulps with cross-recovery processes.

(b) The discharge of process materials excluded from the definition of process wastewater at § 430.01 into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

**§ 430.31 Specialized definitions.**

The general definitions, abbreviations, and methods of analysis set forth in 40 CFR 401 and 430.01 shall apply to this subpart.

**§ 430.32 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations for $BOD_5$ and TSS. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

| Pollutant or pollutant parameter | BPT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 4.19 | 1.90 | 1.32 |
| TSS | 8.14 | 3.45 | 2.57 |

**§ 430.33 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). The limitations shall be the same as those specified in § 430.32 of this subpart for the best practicable control technology currently available (BPT).

**§ 430.34 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

END-OF-PIPE EFFLUENT

| Pollutant or pollutant parameter | BAT effluent limitations | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| COD | 40.2 | 24.6 | 20.8 |

**§ 430.35 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent standards.Non-continuous dischargers shall be subject to the annual average mass effluent standards.

END-OF-PIPE EFFLUENT

| Pollutant or pollutant parameter | New source performance standards | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 0.736 | 0.315 | 0.236 |
| TSS | 1.87 | 0.892 | 0.685 |
| COD | 40.2 | 24.6 | 20.8 |

**§ 430.36 Pretreatment standards for existing sources (PSES).**

Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to this subpart that introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve the following pretreatment standards for existing sources (PSES), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent standards. Non-continuous dischargers shall be subject to the discharge-to-the-POTW annual average mass effluent standards.

DISCHARGE-TO-THE-POTW

| Pollutant or pollutant parameter | Pretreatment standards for existing sources | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly Average | |
| COD | 40.2 | 24 6 | 20 8 |

**§ 430.37 Pretreatment standards for new sources (PSNS).**

Except as provided in 40 CFR 403.7, any new source subject to this subpart that introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve the following pretreatment standards for new sources (PSNS), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent standards. Non-continuous dischargers shall be subject to the discharge-to-the-POTW annual average mass standards.

DISCHARGE-TO-THE-POTW

| Pollutant or pollutant parameter | Pretreatment standards for existing sources | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| COD | 40.2 | 24.6 | 20.8 |

**§ 430.38 Best management practices (BMPs).**

The definitions and requirements set forth in 40 CFR § 430.03 apply to this subpart.

## Subpart D—Dissolving Sulfite Subcategory

**§ 430.40 Applicability; description of the dissolving sulfite subcategory.**

(a) The provisions of this subpart are applicable to discharges resulting from the production of pulp and paper at dissolving sulfite mills. This subcategory includes, but is not limited to, mills using acidic cooking liquors of calcium, magnesium, ammonium, or sodium sulfites. This subcategory includes mills that manufacture dissolving grade sulfite pulps and papergrade sulfite pulps at the same site.

(b) To qualify for alternative limitations at § 430.44, § 430.45, § 430.46, and § 430.47, the owner or operator of the facility must certify, in the NPDES permit application or pretreatment baseline monitoring report, that chlorine or chlorine-containing compounds are not used for pulp bleaching. In addition, the owner or operator of the facility must provide, as a part of the NPDES permit application or pretreatment baseline monitoring report, monitoring results for three composite bleach plant wastewater samples for CDDs/CDFs and chlorinated phenolics, and three grab samples for chloroform and methylene chloride. Such samples shall be obtained at approximately weekly intervals.

(c) The discharge of process materials excluded from the definition of process wastewater at § 430.01 into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

**§ 430.41 Specialized definitions.**

The general definitions, abbreviations, and methods of analysis set forth in 40 CFR 401 and 430.01 shall apply to this subpart.

**§ 430.42 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations for $BOD_5$ and TSS. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

| Pollutant or pollutant parameter | BPT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 25.6 | 14.1 | 11.7 |
| TSS | 23.3 | 11.8 | 9.44 |

**§ 430.43 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). The limitations shall be the same as those specified in § 430.42 of this subpart for the best practicable control technology currently available (BPT).

**§ 430.44 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations. Non-continuous dischargers shall be subject to the end-of- pipe maximum day or annual average mass effluent limitations.

(a) The following limitations shall apply to the bleach plant effluent of all dischargers not using a TCF process:

BLEACH PLANT EFFLUENT

| Pollutant or pollutant property | BAT effluent limitations | |
|---|---|---|
| | Maximum for any 1 day | Monthly average |
| TCDD | ND | N/A. |
| TCDF | 1,870 ng/kkg | N/A. |
| Chloroform | 232 g/kkg | 74.4 g/kkg. |
| Acetone | 1,620 g/kkg | 688 g/kkg. |
| Methyl ethyl ketone | 505 g/kkg | 167 g/kkg. |
| Methylene chloride | 15.8 g/kkg | 4.77 g/kkg. |
| trichlorosyringol | 218 mg/kkg | N/A. |
| 3,4,5-trichlorocatechol | ND | N/A. |
| 3,4,6-trichlorocatechol | ND | N/A. |
| 3,4,5-trichloroguaiacol | ND | N/A. |
| 3,4,6-trichloroguaiacol | ND | N/A. |
| 4,5,6-trichloroguaiacol | ND | N/A. |
| 2,4,5-trichlorophenol | ND | N/A. |
| 2,4,6-trichlorophenol | 1,500 mg/kkg | N/A. |
| tetrachlorocatechol | ND | N/A. |
| tetrachloroguaiacol | 881 mg/kkg | N/A. |
| 2,3,4,6-tetrachlorophenol | ND | N/A. |
| pentachlorophenol | ND | N/A. |

(b) The following limitations shall apply to the end-of-pipe effluent of all dischargers not using a TCF process:

END-OF-PIPE EFFLUENT

| Pollutant or pollutant property | BAT effluent limitations | | | |
|---|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers | |
| | Maximum for any 1 day (kg/kkg) | Monthly average (kg/kkg) | Maximum for any 1 day | Annual average (kg/kkg) |
| AOX | 3.13 | 1.39 | N/A | 1.22 |

(c) The following limitations shall apply to the end-of-pipe effluent of all dischargers using a TCF process:

ALTERNATIVE EFFLUENT LIMITATIONS FOR FACILITIES USING TCF PROCESSES

[End-of-Pipe Effluent]

| Pollutant or pollutant parameter | BAT effluent limitations | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |

**§ 430.45 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the monthly average mass effluent limitations. Non-continuous dischargers shall be subject to the end-of-pipe maximum day or annual average mass effluent standards.

(a) The following limitations shall apply to the bleach plant effluent of all dischargers not using a TCF process:

BLEACH PLANT EFFLUENT

| Pollutant or pollutant property | New source performance standards | |
|---|---|---|
| | Maximum for any 1 day | Monthly average |
| TCDD | ND | N/A. |
| TCDF | 1,870 ng/kkg | N/A. |
| Chloroform | 232 g/kkg | 74.4 g/kkg. |
| Acetone | 1,620 g/kkg | 688 g/kkg. |
| Methyl ethyl ketone | 505 g/kkg | 167 g/kkg. |
| Methylene chloride | 15.8 g/kkg | 4.77 g/kkg. |
| trichlorosyringol | 218 mg/kkg | N/A. |
| 3,4,5-trichlorocatechol | ND | N/A. |
| 3,4,6-trichlorocatechol | ND | N/A. |
| 3,4,5-trichloroguaiacol | ND | N/A. |
| 3,4,6-trichloroguaiacol | ND | N/A. |
| 4,5,6-trichloroguaiacol | ND | N/A. |
| 2,4,5-trichlorophenol | ND | N/A. |
| 2,4,6-trichlorophenol | 1,500 mg/kkg | N/A. |
| tetrachlorocatechol | ND | N/A. |
| tetrachloroguaiacol | 881 mg/kkg | N/A |
| 2,3,4,6-tetrachlorophenol | ND | N/A. |
| pentachlorophenol | ND | N/A. |

(b) The following standards shall apply to the end-of-pipe effluent of all dischargers:

END-OF-PIPE

| Pollutant or pollutant parameter | New source performance standards | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 25.6 | 14.1 | 11.7 |
| TSS | 23.3 | 11.8 | 9.44 |

(c) The following standards shall apply to the end-of-pipe effluent of all dischargers not using a TCF process:

END-OF-PIPE EFFLUENT

| Pollutant or pollutant property | New source performance standards | | | |
|---|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers | |
| | Maximum for any 1 day (kg/kkg) | Annual average (kg/kkg) | Maximum for any 1 day | Annual average (kg/kkg) |
| AOX | 3.13 | 1.39 | N/A | 1.22 |

(d) The following standards shall apply to the end-of-pipe effluent of all dischargers using a TCF process:

ALTERNATIVE EFFLUENT LIMITATIONS FOR FACILITIES USING TCF PROCESSES
[End-of-Pipe Effluent]

| Pollutant or pollutant parameter | New source performance standards | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) or product | |
| | Maximum for any 1 day | Monthly average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |

**§ 430.46 Pretreatment standards for existing sources (PSES). [Reserved]**

**§ 430.47 Pretreatment standards for new sources (PSNS).**

Except as provided in 40 CFR 403.7, any new source subject to this subpart that introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve the following pretreatment standards for new sources (PSNS), except that non-continuous dischargers shall not be subject to the monthly average mass effluent standards. Non-continuous dischargers shall be subject to the discharge-to-the-POTW maximum day or annual average mass effluent standards.

(a) The following limitations shall apply to the bleach plant effluent of all dischargers not using a TCF process:

BLEACH PLANT EFFLUENT

| Pollutant or pollutant property | Pretreatment standards for new sources | |
|---|---|---|
| | Maximum for any 1 day | Monthly average |
| TCDD | ND | N/A. |
| TCDF | 1,870 ng/kkg | N/A. |
| Chloroform | 232 g/kkg | 74.4 g/kkg. |
| Acetone | 1,620 g/kkg | 688 g/kkg. |
| Methyl ethyl ketone | 505 g/kkg | 167 g/kkg. |
| Methylene chloride | 15.8 g/kkg | 4.77 g/kkg. |
| trichlorosyringol | 218 mg/kkg | N/A. |
| 3,4,5-trichlorocatechol | ND | N/A. |
| 3,4,6-trichlorocatechol | ND | N/A. |
| 3,4,5-trichloroguaiacol | ND | N/A. |
| 3,4,6-trichloroguaiacol | ND | N/A. |
| 4,5,6-trichloroguaiacol | ND | N/A. |
| 2,4,5-trichlorophenol | ND | N/A. |
| 2,4,6-trichlorophenol | 1,500 mg/kkg | N/A. |
| tetrachlorocatechol | ND | N/A. |
| tetrachloroguaiacol | 881 mg/kkg | N/A. |
| 2,3,4,6-tetrachlorophenol | ND | N/A. |
| pentachlorophenol | ND | N/A. |

(b) The following limitations shall apply to the discharge-to-the-POTW effluent of all dischargers not using a TCF process:

DISCHARGE-TO-THE-POTW

| Pollutant or pollutant property | Pretreatment standards for new sources | | | |
|---|---|---|---|---|
| | Continuous dischargers | | Non-continuous dischargers | |
| | Maximum for any 1 day (kg/kkg) | Monthly average (kg/kkg) | Maximum for any 1 day | Annual average (kg/kkg) |
| AOX | 3.13 | 1.39 | N/A | 1.22 |

(c) The following standards shall apply to the discharge-to-the-POTW effluent of all dischargers using a TCF process:

ALTERNATIVE EFFLUENT LIMITATIONS FOR FACILITIES USING TCF PROCESSES
[Discharge-to-the-POTW]

| Pollutant or pollutant parameter | Pretreatment standards for new sources | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |

**§ 430.48 Best management practices (BMPs).**

The definitions and requirements set forth in 40 CFR § 430.03 apply to this subpart.

## Subpart E—Papergrade Sulfite Subcategory

**§ 430.50 Applicability; description of the papergrade sulfite subcategory.**

(a) The provisions of this subpart are applicable to discharges resulting from the production of pulp and paper at papergrade sulfite mills. This subcategory includes, but is not limited to, mills, with or without brightening or bleaching, using an acidic cooking liquor of calcium, magnesium, ammonium, or sodium sulfites.

(b) To qualify for alternative limitations at § 430.54, § 430.55, § 430.56, and § 430.57, the owner or operator of the facility must certify, in the NPDES permit application or pretreatment baseline monitoring report, that chlorine or chlorine-containing compounds are not used for pulp bleaching. In addition, the owner or operator of the facility must provide, as a part of the NPDES permit application or pretreatment baseline monitoring report, monitoring results for three composite bleach plant wastewater samples for CDDs/CDFs and chlorinated phenolics, and three grab samples for chloroform and methylene chloride. Such samples shall be obtained at approximately weekly intervals.

(c) The discharge of process materials excluded from the definition of process wastewater at § 430.01 into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

**§ 430.51 Specialized definitions.**

The general definitions, abbreviations, and methods of analysis set forth in 40 CFR 401 and 430.01 shall apply to this subpart.

**§ 430.52 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations for $BOD_5$ and TSS. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

| Pollutant or pollutant parameter | BPT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 9.55 | 4.83 | 3.60 |
| TSS | 14.8 | 6.75 | 4.74 |

**§ 430.53 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). The limitations shall be the same as those specified in § 430.52 of this subpart for the best practicable control technology currently available (BPT).

**§ 430.54 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT), except that non-continuous dischargers shall not be subject to the monthly average mass effluent limitations. Non-continuous dischargers shall be subject to the end-of-pipe maximum day or annual average mass effluent limitations.

END-OF-PIPE EFFLUENT

| Pollutant or pollutant parameter | BAT effluent limitations | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly Average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |
| COD | 144 | 71.2 | N/A | 63.7 |

**§ 430.55 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the monthly average mass effluent standards. Non-continuous dischargers shall be subject to the end-of-pipe maximum day or annual average mass effluent standards.

END-OF-PIPE EFFLUENT

| Pollutant or pollutant parameter | New source performance standards | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 4.90 | 2.57 | 1.98 |
| TSS | 7.81 | 3.22 | 2.42 |

END-OF-PIPE EFFLUENT

| Pollutant or pollutant parameter | New source performance standards | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |
| COD | 144 | 71.2 | N/A | 63.7 |

**§ 430.56 Pretreatment standards for existing sources (PSES).**

Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to this subpart that introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve the following pretreatment standards for existing sources (PSES), except that non-continuous dischargers shall not be subject to the monthly average mass effluent standards. Non-continuous dischargers shall be subject to the discharge-to-the-POTW maximum day or annual average mass effluent standards.

DISCHARGE-TO-THE-POTW

| Pollutant or pollutant parameter | Pretreatment standards for existing sources | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |
| COD | 144 | 71.2 | N/A | 63.7 |

**§ 430.57 Pretreatment standards for new sources (PSNS).**

Except as provided in 40 CFR 403.7, any new source subject to this subpart that introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve the following pretreatment standards for new sources (PSNS), except that non-continuous dischargers shall not be subject to the monthly average mass effluent standards. Non-continuous dischargers shall be subject to the discharge-to-the POTW maximum day or annual average mass effluent standards.

DISCHARGE-TO-THE-POTW

| Pollutant or pollutant parameter | Pretreatment standards for new sources | | | |
|---|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | |
| | Maximum for any 1 day | Monthly average | Maximum for any 1 day | Annual average |
| AOX | 0.1 | N/A | 0.1 | N/A |
| COD | 144 | 71.2 | N/A | 63.7 |

**§ 430.58 Best management practices (BMPs).**

The definitions and requirements set forth in 40 CFR § 430.03 apply to this subpart.

## Subpart F—Semi-Chemical Subcategory

**§ 430.60 Applicability; description of the semi-chemical subcategory.**

(a) The provisions of this subpart are applicable to discharges resulting from the production of pulp and paper at semi-chemical mills. This subcategory includes, but is not limited to, mills producing bleached or unbleached pulp from wood chips under pressure using a variety of cooking liquors, including but not limited to neutral sulfite semi-chemical (NSSC), sulfur free (sodium carbonate), green liquor, and Permachem®. Mills producing both semi-chemical wood pulp and unbleached kraft wood pulp at the same site using a cross-recovery system are included in the unbleached kraft subcategory.

(b) The discharge of process materials excluded from the definition of process wastewater at § 430.01 into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

**§ 430.61 Specialized definitions.**

The general definitions, abbreviations, and methods of analysis set forth in 40 CFR 401 and 430.01 shall apply to this subpart.

**§ 430.62 Effluent limitations representing the degree of effluent reduction attainable by the application of best practicable control technology currently available (BPT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations for $BOD_5$ and TSS. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

| Pollutant or pollutant parameter | BPT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly Average | |
| $BOD_5$ | 2.96 | 1.43 | 0.971 |
| TSS | 6.71 | 2.90 | 1.96 |

**§ 430.63 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). The limitations shall be the same as those specified in § 430.62 of this subpart for the best practicable control technology currently available (BPT).

**§ 430.64 Effluent limitations representing the degree of effluent reduction attainable by the application of best available technology economically achievable (BAT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations. Non-continuous dischargers shall be subject to the end-of-pipe annual average mass effluent limitations.

END-OF-PIPE EFFLUENT

| Pollutant or pollutant parameter | BAT effluent limitations | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| COD | 40.2 | 24.6 | 20.8 |

**§ 430.65 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent standards. Non-continuous dischargers shall be subject to the end-of-pipe annual average mass effluent standards.

END-OF-PIPE EFFLUENT

| Pollutant or pollutant parameter | New source performance standards | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 1.06 | 0.509 | 0.409 |

END-OF-PIPE EFFLUENT—Continued

| Pollutant or pollutant parameter | New source performance standards | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| TSS | 2.14 | 0.826 | 0.548 |
| COD | 40.2 | 24.6 | 20.8 |

**§ 430.66 Pretreatment standards for existing sources (PSES).**

Except as provided in 40 CFR 403.7 and 403.13, any existing source subject to this subpart that introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve the following pretreatment standards for existing sources (PSES), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent standards. Non-continuous dischargers shall be subject to the discharge-to-the-POTW annual average mass effluent standards.

DISCHARGE-TO-THE-POTW

| Pollutant or pollutant parameter | Pretreatment standards for existing sources | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| COD | 40.2 | 24.6 | 20.8 |

**§ 430.67 Pretreatment standards for new sources (PSNS).**

Except as provided in 40 CFR 403.7, any new source subject to this subpart that introduces pollutants into a publicly owned treatment works must comply with 40 CFR part 403 and achieve the following pretreatment standards for new sources (PSNS), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent standards. Non-continuous dischargers shall be subject to the discharge-to-the-POTW annual average mass effluent standards.

DISCHARGE-TO-THE-POTW

| Pollutant or pollutant parameter | Pretreatment standards for existing sources | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| COD | 40.2 | 24.6 | 20.8 |

**§ 430.68 Best management practices (BMPs).**

The definitions and requirements set forth in 40 CFR 430.03 apply to this subpart.

## Subpart G—Mechanical Pulp Subcategory

**§ 430.70 Applicability; description of the mechanical pulp subcategory.**

(a) The provisions of this subpart are applicable to discharges resulting from the production of pulp and paper at mechanical pulping mills. This subcategory includes, but is not limited to, mills producing mechanical pulps, using mechanical defibration by either stone grinders or steel refiners; or thermo-mechanical pulp (TMP) using steam followed by mechanical defibration in refiners; or chemi- mechanical pulp (CMP) using a chemical cooking liquor to partially cook the wood; or a chemi-thermo-mechanical pulp (CTMP) using steam followed by a chemical cooking liquor to partially cook the wood and mechanical defibration in refiners.

(b) The discharge of process materials excluded from the definition of process wastewater at § 430.01 into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

**§ 430.71 Specialized definitions.**

The general definitions, abbreviations, and methods of analysis set forth in 40 CFR 401 and 430.01 shall apply to this subpart.

**§ 430.72 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).**

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations for $BOD_5$ and TSS. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

| Pollutant or pollutant parameter | BPT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 1.39 | 0.568 | 0.380 |
| TSS | 5.59 | 2.02 | 1.35 |

**§ 430.73 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).**

Except as provided in 40 CFR 125.30–125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).

| Pollutant or pollutant parameter | BCT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | * | * | * |
| TSS | * | * | * |

* EPA is proposing multimedia filtration as the technology basis for BCT limitations for this subcategory. However, EPA does not have sufficient data at this time to propose limitations based upon the use of that technology. See Preamble Sections IX.E.2 and XIII.29.

**§ 430.74 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT). [Reserved]**

**§ 430.75 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent standards. Non-continuous dischargers shall be subject to the annual average mass effluent standards.

END-OF-PIPE

| Pollutant or pollutant parameter | New source performance standards | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 0.480 | 0.208 | 0.155 |
| TSS | 1.62 | 0.598 | 0.455 |

**§ 430.76 Pretreatment standards for existing sources (PSES). [Reserved]**

**§ 430.77 Pretreatment standards for new sources (PSNS). [Reserved]**

**§ 430.78 Best management practices (BMPs). [Reserved]**

## Subpart H—Non-Wood Chemical Pulp Subcategory

**§ 430.80 Applicability; description of the non-wood chemical pulp subcategory**

(a) The provisions of this subpart are applicable to discharges resulting from the production of pulp and paper at non-wood chemical pulp mills. This subcategory includes, but is not limited to, mills producing non-wood pulps from chemical pulping processes such as kraft, sulfite, or soda.

(b) The discharge of process materials excluded from the definition of process wastewater at § 430.01 into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

**§ 430.81 Specialized definitions**

The general definitions, abbreviations, and methods of analysis set forth in 40 CFR 401 and 430.01 shall apply to this subpart.

**§ 430.82 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).**

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations for $BOD_5$ and TSS. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

| Pollutant or pollutant parameter | BPT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 3.71 | 1.97 | 1.59 |
| TSS | 5.44 | 2.52 | 2.03 |

**§ 430.83 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).**

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). The limitations shall be the same as those specified in § 430.82 of this subpart for the best practicable control technology currently available (BPT).

**§ 430.84 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).** [Reserved]

**§ 430.85 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent standards. Non-continuous dischargers shall be subject to the annual average mass effluent standards.

END-OF-PIPE

| Pollutant or pollutant parameter | New source performance standards | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 3.71 | 1.97 | 1.59 |
| TSS | 5.44 | 2.52 | 2.03 |

**§ 430.86 Pretreatment standards for existing sources (PSES).** [Reserved]

**§ 430.87 Pretreatment standards for new sources (PSNS).** [Reserved]

**§ 430.88 Best management practices (BMPs).**

The definitions and requirements set forth in 40 CFR § 430.03 apply to this subpart.

## Subpart I—Secondary Fiber Deink Subcategory

**§ 430.90 Applicability; description of the secondary fiber deink subcategory.**

(a) The provisions of this subpart are applicable to discharges resulting from the production of pulp and paper at secondary fiber deink mills. This subcategory includes, but is not limited to, mills producing deinked pulps from wastepapers using a chemical or solvent process to remove contaminants such as inks, coatings, and pigments.

(b) The discharge of process materials excluded from the definition of process wastewater at § 430.01 into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

**§ 430.91 Specialized definitions.**

The general definitions, abbreviations, and methods of analysis set forth in 40 CFR 401 and 430.01 shall apply to this subpart.

**§ 430.92 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).**

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations for $BOD_5$ and TSS. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

| Pollutant or pollutant parameter | BPT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 5.29 | 2.16 | 1.40 |
| TSS | 6.12 | 2.29 | 1.50 |

**§ 430.93 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).**

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). The limitations shall be the same as those specified in § 430.92 of this subpart for the best practicable control technology currently available (BPT).

**§ 430.94 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT).** [Reserved]

**§ 430.95 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent standards. Non-continuous dischargers shall be subject to the annual average mass effluent standards.

END-OF-PIPE EFFLUENT

| Pollutant or pollutant parameter | New source performance standards | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous discharges; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 3.35 | 1.21 | 0.888 |
| TSS | 4.58 | 1.38 | 0.920 |

**§ 430.96 Pretreatment standards for existing sources (PSES).** [Reserved]

**§ 430.97 Pretreatment standards for new sources (PSNS).** [Reserved]

**§ 430.98 Best management practices (BMPs).** [Reserved]

## Subpart J—Secondary Fiber Non-Deink Subcategory

**§ 430.100 Applicability; description of the secondary fiber non-deink subcategory.**

(a) The provisions of this subpart are applicable to discharges resulting from the production of pulp and paper at secondary fiber non-deink mills. This subcategory includes, but is not limited to, mills producing bleached or unbleached pulps from wastepaper without deinking.

(b) The discharge of process materials excluded from the definition of process wastewater at § 430.01 into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

**§ 430.101 Specialized definitions.**

The general definitions, abbreviations, and methods of analysis set forth in 40 CFR 401 and 430.01 shall apply to this subpart.

**§ 430.102 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).**

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations for $BOD_5$ and TSS. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

| Pollutant or pollutant parameter | BPT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 1.34 | 0.534 | 0.363 |
| TSS | 2.20 | 0.781 | 0.527 |

**§ 430.103 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).**

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). The limitations shall be the same as those specified in § 430.102 of this subpart for the best practicable control technology currently available (BPT).

**§ 430.104 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT). [Reserved]**

**§ 430.105 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent standards. Non-continuous dischargers shall be subject to the annual average mass effluent standards.

(a) Paperboard, Builders' Paper, and Roofing Felt Segment. The following limitations shall apply to the production of paperboard, builders' paper, and roofing felt from wastepaper that has not undergone deinking processes:

No new source within this segment of this subpart shall discharge wastewater to any waters of the United States.

(b) Producers of Other Products from Non-Deink Secondary Fiber. The following limitations shall apply to the production of products other than paperboard, builders' paper, and roofing felt from wastepaper that have not undergone deinking processes:

END-OF-PIPE

| Pollutant or pollutant parameter | New source performance standards | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 1.42 | 0.568 | 0.386 |
| TSS | 2.02 | 0.719 | 0.485 |

**§ 430.106 Pretreatment standards for existing sources (PSES). [Reserved]**

**§ 430.107 Pretreatment standards for new sources (PSNS). [Reserved]**

**§ 430.108 Best management practices (BMPs). [Reserved]**

## Subpart K—Fine and Lightweight Papers From Purchased Pulp Subcategory

**§ 430.110 Applicability; description of the fine and lightweight papers from purchased pulp subcategory.**

(a) The provisions of this subpart are applicable to discharges resulting from the production of pulp and paper at fine and lightweight papers mills. This subcategory includes, but is not limited to, mills producing papers from purchased virgin pulps or secondary fiber.

(b) The discharge of process materials excluded from the definition of process wastewater at § 430.01 into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

**§ 430.111 Specialized definitions.**

The general definitions, abbreviations, and methods of analysis set forth in 40 CFR part 401 and § 430.01 shall apply to this subpart. In addition, purchased virgin pulp is defined as pulp purchased from an off-site facility or obtained from an intra-company transfer from another site.

**§ 430.112 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).**

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations for $BOD_5$ and TSS. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

| Pollutant or pollutant parameter | BPT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 5.87 | 2.29 | 1.59 |
| TSS | 4.87 | 1.62 | 1.23 |

**§ 430.113 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).**

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). The limitations shall be the same as those specified in § 430.112 of this subpart for the best practicable control technology currently available (BPT).

**§ 430.114 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT). [Reserved]**

**§ 430.115 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent standards. Non-continuous dischargers shall be subject to the annual average mass effluent standards.

END-OF-PIPE EFFLUENT

| Pollutant or pollutant parameter | New source performance standards | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 2.37 | 0.922 | 0.641 |
| TSS | 2.16 | 0.921 | 0.724 |

**§ 430.116 Pretreatment standards for existing sources (PSES). [Reserved]**

**§ 430.117 Pretreatment standards for new sources (PSNS). [Reserved]**

**§ 430.118 Best management practices (BMPs). [Reserved]**

## Subpart L—Tissue, Filter, Non-Woven, and Paperboard From Purchased Pulp Subcategory

**§ 430.120 Applicability; description of the tissue, filter, non-woven, and paperboard from purchased pulp subcategory.**

(a) The provisions of this subpart are applicable to discharges resulting from the production of pulp and paper at tissue, filter, non-woven, and paperboard mills. This subcategory includes, but is not limited to, production from purchased virgin pulps or secondary fiber.

(b) The discharge of process materials excluded from the definition of process wastewater at § 430.01 into publicly owned treatment works or waters of the United States without an NPDES permit or individual control mechanism authorizing such discharge is expressly prohibited.

**§ 430.121 Specialized definitions.**

The general definitions, abbreviations, and methods of analysis set forth in 40 CFR part 401 and § 430.01 shall apply to this subpart. In addition, purchased virgin pulp is defined as pulp purchased from an off-site facility or obtained from an intra-company transfer from another site.

**§ 430.122 Effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT).**

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best practicable control technology currently available (BPT), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations for $BOD_5$ and TSS. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

| Pollutant or pollutant parameter | BPT effluent limitations (end-of-pipe) | | |
|---|---|---|---|
| | Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product | | Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
| | Maximum for any 1 day | Monthly average | |
| $BOD_5$ | 2.96 | 0.974 | 0.629 |
| TSS | 5.32 | 1.73 | 1.29 |

**§ 430.123 Effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT).**

Except as provided in 40 CFR 125.30 through 125.32, any existing point source subject to this subpart must achieve the following effluent limitations representing the degree of effluent reduction attainable by the application of the best conventional pollutant control technology (BCT). The limitations shall be the same as those specified in § 430.122 of this subpart for the best practicable control technology currently available (BPT).

**§ 430.124 Effluent limitations representing the degree of effluent reduction attainable by the application of the best available technology economically achievable (BAT). [Reserved]**

**§ 430.125 New source performance standards (NSPS).**

Any new source subject to this subpart must achieve the following new source performance standards (NSPS), except that non-continuous dischargers shall not be subject to the maximum day and monthly average mass effluent limitations. Non-continuous dischargers shall be subject to the annual average mass effluent limitations.

END-OF-PIPE EFFLUENT

| Pollutant or pollutant parameter | New source performance standards: Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product — Maximum for any 1 day | New source performance standards: Continuous dischargers; kg/kkg (or pounds per 1,000 lb) of product — Monthly average | New source performance standards: Non-continuous dischargers; annual average; kg/kkg (or pounds per 1,000 lb) of product |
|---|---|---|---|
| $BOD_5$ | 0.982 | 0.363 | 0.248 |
| TSS | 0.563 | 0.221 | 0.175 |

**§ 430.126 Pretreatment standards for existing sources (PSES). [Reserved]**

**§ 430.127 Pretreatment standards for new sources (PSNS). [Reserved]**

**§ 430.128 Best management practices (BMPs). [Reserved]**

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