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United States
Environmental Protection
Agency

Office of Water and
Waste Management
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EPA

Proposed Effluent Guidelines

Rulemaking for Pulp, Paper, and Paperboard Builders' Paper and Board Mills Point Source Categories

Background

The Clean Water Act

Under the Clean Water Act (the Federal Water Pollution Control Act Amendments of 1972, as amended by the Clean Water Act of 1977), the Environmental Protection Agency (EPA) is charged with the responsibility to restore and maintain the chemical, physical, and biological integrity of the Nation's waters.

Direct Dischargers

The Act requires that all industries discharging wastes into navigable waters achieve by July 1, 1977, the "best practicable control technology currently available" (BPT). This control technology represents the average of the best existing waste treatment performance within each industry category or subcategory.

By July 1, 1984, the Act requires the application of effluent limitation technology based on the very best control and treatment measures that have been developed or that are capable of being developed within the industry category or subcategory. These effluent limitations require:

- *Toxic and Nonconventional Pollutants*—Application of the "best available technology economically achievable" (BAT)
- *Conventional Pollutants*—Application of the "best conventional pollutant control technology" (BCT)

New source performance standards (NSPS) are also established for the control of toxic, conventional, and nonconventional pollutants discharged by new industrial direct dischargers. NSPS, which goes into effect at the commencement of operation, is described as the "best available demonstrated control technology, processes, operating methods, or other alternatives including, where practicable, a standard permitting no discharge of pollutants."

Indirect Dischargers

Indirect dischargers are industrial facilities that discharge pollutants to publicly owned treatment works (POTW). The Clean Water Act directs EPA to establish national pretreatment standards for pollutants that are incompatible with municipal treatment plants. The Act requires:

- Achievement, within 3 years of promulgation, of pretreatment standards for existing sources (PSES)
- Achievement, upon commencement of operation, of pretreatment standards for new sources (PSNS)

Purpose of Proposed Regulations

The primary purpose of these regulations is to provide effluent limitations guidelines for BAT and BCT and to establish NSPS, PSES, and PSNS under Sections 301, 304, 306, 307, and 501 of the Clean Water Act To promote these purposes, the regulations may also establish monitoring requirements under Section 308 of the Act and Best Management Practices (BMP) under Section 304(e) of the Act.

While the requirements for direct dischargers are to be incorporated into National Pollutant Discharge Elimination System (NPDES) permits issued under Section 402 of the Act by EPA and participating States, pretreatment standards are enforceable directly by the agency against indirect dischargers.

The proposed regulations do not require the installation of any particular treatment technology. Rather, they require achievement of effluent limitations representative of the proper operation of demonstrated technologies or equivalent technologies.

Industry

Coverage

The Pulp, Paper, and Paperboard Industry (which includes the Pulp, Paper, and Paperboard and the Builders' Paper and Board Mills Point Source Categories) is included within the U.S. Department of Commerce, Bureau of the Census Standard Industrial Classifications (SIC) 2611, 2621, 2631, and 2661.

This industry, which produces wood pulp, nonwood pulp, paper, and paperboard, can be divided into three major segments: integrated, nonintegrated, and secondary fiber mills. Integrated mills manufacture pulp alone, or pulp and paper or paperboard on site Nonintegrated mills manufacture paper or paperboard but do not manufacture pulp on site. Secondary fiber mills use wastepaper as the primary raw material to produce paper or paperboard.

- Products of this industry include pulp, newsprint, coated printing papers, unbleached and bleached linerboard, tissue papers, glassine and greaseproof papers, cotton fiber paper, special industrial papers, and bleached and unbleached kraft papers.
- This is a high-water-use industry. The major uses of water are similar industrywide, although the amount used varies. Wastewater discharges total 16 million cubic meters (4.2 billion gallons) per day, with 87 percent from integrated mills.
- Between 1969 and 1979, sales increased annually by 10.4 percent; after-tax return on sales averaged 5 percent, slightly higher than the average for all manufacturing industries.
- Closures are expected to occur in all three segments of the industry, caused by declining demand for some products and concentration of the industry in the larger mills. The production capacity lost through

these closures will be replaced either by transferring excess or idle capacity to existing mills or by expanding existing mills to allow for more production.

Pollutants

Pollutants discharged by the industry include:

- *Toxic Pollutants*—Chloroform, zinc, trichlorophenol, and pentachlorophenol
- *Conventional Pollutants*—BOD_5, TSS, and pH
- *Nonconventional Pollutants*—Ammonia, color, resin acids, and bleach plant derivatives

EPA'S Development Program

To implement the Clean Water Act, EPA conducted a complex development program. This program included:

- Development of analytical methods for detecting and measuring toxic pollutants
- Sampling of raw and treated wastewater and intake water of a representative sample of plants
- Use of the analytical methods developed for detecting and measuring toxics, i.e., gas chromatography/mass spectrometry (GC/MS), atomic adsorption spectrophotometry (AAS), and inductively coupled argon plasma (ICAP) excitation with appropriate quality control/quality assurance (QC/QA) procedures

Technical Data Gathering

The technical analysis was based on:

- Detailed questionnaires distributed to 678 operating mills, of which 632 responded
- Contact with State regulatory agencies, EPA regional offices, and EPA and private research facilities to obtain available pertinent data and information on unpublished research activities
- A literature survey to obtain information on the presence of toxic and nonconventional pollutants that may be discharged from mills and on the production process controls and effluent treatment technologies employed in the industry, including review of over 1 million articles and 3,500 environmental data files

Methodology

After gathering detailed technical data on all segments of the Pulp, Paper, and Paperboard Industry, EPA studied the data to determine whether differences among the segments of the industry required separate effluent limitations and standards of performance.

Next, EPA identified the wastewater constituents to be considered for effluent limitations guidelines and standards of performance and identified in-plant and end-of-process treatment technologies that were being used, or that could be used, by the industry. EPA analyzed data on the performance of each technology, and its associated non-water-quality environmental impacts.

The cost of each control and treatment technology was estimated from unit cost curves, and the economic impacts of these costs were evaluated. EPA derived unit process costs from model plant characteristics (production and flow) applied to each treatment process unit cost curve (i.e., activated sludge, chemically assisted clarification/sedimentation, granular activated carbon adsorption, mixed media filtration). These unit process costs were combined to yield total cost at each treatment level. After confirming the accuracy of cost estimates by comparing EPA cost estimates with treatment system costs supplied by the industry, the Agency evaluated the economic impacts of these costs.

EPA then identified the various treatment technology options for BAT, BCT, NSPS, PSES, and PSNS. Finally, EPA selected the preferred option by industry subcategory for each set of standards.

Subcategories

The existing subcategorization for the Pulp, Paper, and Paperboard Industry was reviewed to determine its adequacy in representing industrial practices. The regulations proposed in this rulemaking apply to the following subcategories:

- Integrated Mills
  - —Dissolving Kraft
  - —Market Bleached Kraft
  - —Board, Coarse, and Tissue Bleached Kraft
  - —Fine Bleached Kraft
  - —Soda
  - —Unbleached Kraft
  - —Semi-Chemical
  - —Unbleached Kraft and Semi-Chemical
  - —Dissolving Sulfite Pulp
  - —Papergrade Sulfite (Blow Pit Wash)
  - —Papergrade Sulfite (Drum Wash)
  - —Groundwood—Thermo-Mechanical
  - —Groundwood—Coarse, Molded, and News (CMN) Papers
  - —Groundwood—Fine Papers
- Nonintegrated Mills
  - —Nonintegrated—Fine Papers
  - —Nonintegrated—Tissue Papers
  - —Nonintegrated—Lightweight Papers
  - —Nonintegrated—Paperboard
  - —Nonintegrated—Filter and Nonwoven Papers

- Secondary Fiber Mills
  - —Deink
  - —Tissue From Wastepaper
  - —Paperboard From Wastepaper
  - —Wastepaper-Molded Products
  - —Builders' Paper and Roofing Felt

The subcategories described above do not reflect the industry segments used to evaluate the economic impacts of the proposed regulations. At mills in certain subcategories, a variety of end products can be manufactured. Because of this, the economic impacts are presented for both mill and product types.

Summary of Control Technologies Considered

The following pollution control technologies were considered by EPA in developing standards for the Pulp, Paper, and Paperboard Industry·

Toxic Pollutant Controls

- *Option 1*—Proper application and operation of the technologies that formed the basis of BPT effluent limitations
- *Option 2*—Chemical substitution

Conventional Pollutant Controls

- *Option 1*—BPT plus additional production process controls to reduce raw waste loads
- *Option 2*—BPT plus chemically assisted clarification for those subcategories where BPT was based on biological treatment *or* BPT plus biological treatment for subcategories where BPT was based on primary treatment only
- *Option 3*—Option 1 plus chemically assisted clarification for those subcategories where BPT was based on biological treatment *or* Option 1 plus biological treatment for those subcategories where BPT was based on primary treatment only
- *Option 4*—Upgrading of existing BPT to attain effluent levels characteristic of best performing mills
- For NSPS, the application of production process controls to reduce wastewater discharge and raw waste loads plus end-of-pipe treatment (biological treatment or primary clarification)

Nonconventional Pollutant Controls

- Substitution of a different base chemical for ammonia
- Application of biological treatment to allow conversion of ammonia to nitrate
- Application of chemically assisted clarification where highly colored effluents are discharged

The Proposed Regulations

Proposed BAT

- *The Regulation*
  - —Option 1 (equal to BPT) for all subcategories where chlorine or zinc is used to bleach pulps
  - —Option 2 (chemical substitution for slimicides and biocides) for all subcategories
- *Technology*—Screening, primary clarification, and biological treatment (Option 1)
- *Rationale*—No incremental cost would be associated with Option 1, and toxic chemicals would be substantially reduced; Option 2 would eliminate expensive end-of-pipe treatments and is already being used at 80 percent of the mills
- *Regulated Pollutants*—Chloroform and zinc (Option 1) and pentachlorophenol and trichlorophenol (Option 2)

Proposed BCT

- *The Regulation*
  - —Option 4 (equal to best mill performance in each subcategory) for subcategories that pass the BCT cost-reasonableness test
  - —Option 1 (BPT plus additional in-plant production process controls) for subcategories that fail the BCT cost-reasonableness test: nonintegrated—tissue, nonintegrated—lightweight, nonintegrated—filter and nonwoven
  - —Same as BPT for the dissolving sulfite pulp, the builders' paper and roofing felt and nonintegrated paperboard subcategories
- *Technology*
  - —Option 4· Aerated stabilization basins with a spill prevention and control system, increased aeration and additional settling capacity, *or* an activated sludge system with spill prevention and control, equalization, increased aeration capacity, operation in the contact stabilization mode, and larger clarification and sludge-handling equipment; *or* oxidation ponds with rapid sand filtration; *or* a primary treatment sytem with reduced clarifier overflow rates, addition of chemical coagulants, and increased sludge-handling capacity
  - —Option 1: BPT plus segregation of noncontact cooling water, use of dry barking operations, collection of spills and leaks for reprocessing, increased efficiency of pulp washing, collection and reuse of paper machine spills, improvement in save-all operation, and effluent recycle/reuse

- *Rationale*—Option 4 yields significant removals of BOD_5 and TSS at lower cost to the industry and has proved successful in full-scale operation throughout the entire range of process types; it also allows considerable flexibility to the industry in achieving BCT

- *Regulated Pollutants*—BOD_5, TSS, and pH

- *Results*—Removal of 370.4 million pounds (167.9 million kilograms) of BOD_5 and TSS per year

Proposed NSPS

- *The Regulation*

  —Option 1 (production process controls plus end-of-pipe treatment) for all subcategories

  —Option 2 (use of chemical substitutes for toxic pollutants)

- *Technology*—Production process controls, end-of-pipe treatment, substitution of sodium hydrosulfite for zinc hydrosulfite, and use of slimicides and biocides that do not contain trichlorophenol and pentachlorophenol

- *Rationale*—Options 1 and 2 will substantially reduce the identified toxic and conventional pollutants

- *Regulated Pollutants*—Chloroform, BOD_5, TSS, zinc, trichlorophenol, and pentachlorophenol

Proposed PSES and PSNS

- *The Regulation*—Chemical substitutes for toxic pollutants

- *Technology*—Substitution of sodium hydrosulfite for zinc hydrosulfite and use of slimicides and biocides that do not contain trichlorophenol and pentachlorophenol

- *Rationale*—Will ensure minimal discharge of toxic pollutants that pass through POTW or limit POTW sludge management alternatives and will involve minimal cost

- *Regulated pollutants*—Zinc, trichlorophenol, and pentachlorophenol

- *Results*—Removal of 22,000 pounds of trichlorophenol, 8,000 pounds of pentachlorophenol, and 44,000 pounds of zinc per year

Non-Water-Quality Aspects of Pollution Control

Air Pollution

- No additional air pollution problems are anticipated

Solid Waste

- Proposed BAT, BCT, and PSES will increase the industry's total generated solid waste by 1.3 percent

Energy Requirements

- Proposed BAT, BCT, and PSES will increase energy consumption by about 0.9 percent

Best Management Practices

Although EPA is not proposing them at this time, the Agency is considering development of BMP specific to the Pulp, Paper, and Paperboard Industry. These will be applicable to all industrial sites and will offer guidance to permit authorities in establishing the BMP required by unique circumstances at a given plant.

Economic Impact Analysis

The economic analysis was based on:

- Questionnaires distributed to 706 mills, of which 682 responded

- A survey of government publications, industry members, trade associations, and publicly available financial studies

- Site visits to selected mills

Impact Summary

- Integrated Mills

  —Mills in this segment are expected to make an initial investment of $1.1 billion and to incur annual costs of $338 million per year at the projected 1982 industry capacity to comply with the proposed regulations

  —One mill is expected to close as a result of the proposed regulations

  —One mill, which would otherwise close, is expected to remain open as a result of the proposed regulations (due to improved competitive standing)

- Nonintegrated Mills

  —Mills in this segment are expected to make an initial investment of $29 million and to incur annual costs of $8 million per year at the projected 1982 industry capacity to comply with the proposed regulations

  —One mill is expected to close as a result of the proposed regulations

  —One mill, which would otherwise close, is expected to remain open as a result of the proposed regulations (due to improved competitive standing)

- Secondary Fiber Mills

  —Mills in this segment are expected to make an initial investment of $57 million and to incur annual costs of $21 million per year at the projected 1982 industry capacity to comply with the proposed regulations

  —Five mills are expected to close as a result of the proposed regulations

  —Two mills, which would otherwise close, are expected to remain open as a result of the proposed regulations (due to improved competitive standing)

Glossary

AAS	Atomic adsorption spectrophotometry
BAT	"Best available technology economically achievable," to be achieved by July 1, 1984
BCT	"Best conventional pollutant control technology," to be achieved by July 1, 1984
BMP	Best management practices
BOD_5	Biochemical oxygen demand
BPT	"Best practicable control technology currently available," to be achieved by July 1, 1977
EPA	U.S. Environmental Protection Agency
GC/MS	Gas chromatography/mass spectrometry
ICAP	Inductively coupled argon plasma
NPDES	National Pollutant Discharge Elimination System
NSPS	New source performance standards, to be achieved upon commencement of operation of a new plant
POTW	Publicly owned treatment works
PSES	Pretreatment standards for existing sources, to be achieved within 3 years of promulgation of a regulation
PSNS	Pretreatment standards for new sources, to be achieved upon commencement of operation of a new plant
QC/QA	Quality control/quality assurance
SIC	Standard Industrial Classification (Department of Commerce, Bureau of the Census)
TSS	Total suspended solids

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