

GAO

Report to the Chairman, Subcommittee on  
Investigations and Oversight, Committee  
on Public Works and Transportation,  
House of Representatives

March 1987

# WATER POLLUTION

## Application of National Cleanup Standards to the Pulp and Paper Industry



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United States  
General Accounting Office  
Washington, D.C. 20548

Resources, Community, and  
Economic Development Division

B-226207

March 18, 1987

The Honorable James L. Oberstar  
Chairman, Subcommittee on  
Investigations and Oversight  
Committee on Public Works and  
Transportation  
House of Representatives

Dear Mr. Chairman:

As requested in your June 7, 1985, letter and subsequent discussions with your office, we have reviewed the application of the Environmental Protection Agency's (EPA) national effluent standards, which limit the types and amounts of pollutants that can be discharged into the nation's water under the Clean Water Act, using the example of the pulp and paper industry.

As arranged with your office, unless you publicly announce its contents earlier, we will make this report available to other interested parties 30 days after the date of this letter. At that time, we will send copies to other appropriate congressional committees; the Administrator, EPA; the Director, Office of Management and Budget; and other interested parties upon request.

This work was performed under the direction of Hugh J. Wessinger, Senior Associate Director. Other major contributors are listed in appendix I.

Sincerely yours,



J. Dexter Peach  
Assistant Comptroller General

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# Executive Summary

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## Purpose

If left untreated, polluted wastewater—including that generated by industry—can harm aquatic life and leave water unfit for human use. To address this problem, in 1972 Congress enacted the Clean Water Act, which required the Environmental Protection Agency (EPA) to develop national standards for each industry on the types and amounts of non-toxic pollutants they could discharge into the nation's waters.

To determine what these national standards have accomplished, the Chairman, Subcommittee on Investigations and Oversight, House Committee on Public Works and Transportation, requested GAO to determine, using the example of the pulp and paper industry, whether (1) discharge permit limits are at least as stringent as the appropriate national standards require and (2) the amount of pollutants in selected pulp and paper mills' effluent meets the appropriate national standards. GAO also obtained information on changes that have evolved in the program.

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## Background

The Clean Water Act requires industrial facilities to have permits for effluent discharge. Permit limits specify the types and amounts of pollutants allowed in effluent over time and are set by permitting authorities (the states or in some cases EPA regional offices). They are based on, among other things, national standards or, where necessary to deal with local water quality problems, more stringent, site-specific water quality needs. EPA based its national standards on studies it made that quantified the results achieved by actual industry practices in limiting the amount of pollutants in their effluent.

A two-stage approach for establishing national standards was called for by the act. Under the first stage, EPA was to set separate national standards for both existing and new industrial facilities, including certain expansions of existing facilities. Under the second stage, national standards more stringent than required by first-stage standards were to be established for nontoxic pollutants discharged by existing industrial facilities if EPA found the costs of meeting them to be reasonable.

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## Results in Brief

Major pulp and paper mills hold permits whose pollutant discharge limits as written are, with few exceptions, at least as stringent as first-stage national standards require. Mills sampled by GAO were generally discharging the key industry pollutants at levels in line with their permit limits as written and in amounts over a 2-year period that were less than the national standards allowed.

GAO found, however, two problems with the way in which permit limits are being set. These problems could result in discharges of more pollutants than allowed by appropriate permit limits and national standards. First, mill production figures available in setting some permit limits did not include 5-year historical production figures, which according to EPA guidelines should be considered. Second, permit writers are not consistently applying more stringent new-source standards to some expansions of existing pulp and paper mills. As a result, some expansions have not been required to meet the more stringent discharge standards.

Two important changes characterize the current status of the program. First, there is more emphasis on local, site-specific water-quality needs with EPA's national standards serving as a minimum cleanup level that is often augmented with more stringent state standards. Second, the second-stage standards were set by EPA at the same level as first-stage standards because EPA determined that more stringent standards could not be cost-justified.

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## Principal Findings

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### Most Established Limits Meet Standards

The vast majority of the 193 major effluent-discharging pulp and paper mills hold permits whose limits as written are at least as stringent as first-stage national standards require. About 94 percent of the 1,050 permit limits contained in the 193 permits were equal to or more stringent than national standards. GAO referred those limits which were less stringent to appropriate EPA and state officials for action. (See ch. 2.)

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### Pollutant Discharges in Line With Permit Limits

Mills sampled by GAO in 5 major pulp and paper producing areas were generally discharging the two key nontoxic pollutants for the industry at levels in line with permit limits as written. For 47 mills in eight states over the 2-year period ending June 30, 1985, monthly discharges were within written permit limits about 91 percent of the time. (See ch. 2.)

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### Limits Established May Not Be Correct

GAO found two problems with the way in which permit limits are being set. Permit limits that are based on national standards are generally determined for pulp and paper mills by multiplying expected production

during the life of the permit by the applicable national standards allowance. If expected production figures or the national standards used are incorrect, permit limits will be incorrect.

Production figures available to determine expected production and set permit limits for 80 of 143 mills GAO sampled did not include long-term historical production figures, as suggested by EPA guidance, or the basis of the figures available was unknown. Permitting authorities had obtained other types of production figures with which they were satisfied. However, if production data considered in setting expected production figures are greater than long-term historical production, the permit limits set could allow the discharge of more pollutants than permitted by the national standards.

Permitting authorities in the five major pulp and paper producing areas GAO reviewed have not made consistent judgments about applying national standards to permit limits for certain expansions of existing mills (called new-source standards). EPA guidance allows authorities discretion in defining what is to be considered an expansion of a mill. While such expansions were required by some permitting authorities to meet the new-source standards in setting limits that are more stringent than national standards for existing mills, similar expansions at other permitting authorities are, by contrast, required to meet national standards for existing mills.

GAO was unable to determine if either of these situations resulted in some permit limits being set that were greater than allowed by national standards because needed historical production figures were not readily available or EPA criteria was not specific enough to make such determinations. However, these situations potentially could result in some permit limits and pollutant discharges exceeding appropriate national standards. (See ch. 2.)

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## Program Evolution

The act envisioned a water pollution program that would provide consistent cleanup standards nationwide, with more stringent standards being set over time. In recent years, the program has changed in two important ways. First, individual states, not the federal government, have become the driving force in setting cleanup levels for the pulp and paper industry. This results from the central role states have in setting permit limits and site-specific water pollution problems they face. National standards have come to represent minimum treatment levels. Of the

1,050 permit limits, 57 percent were more stringent than national standards, while 37 percent were the same. Water quality-based limits, which served as the basis for at least one limit in 86 of the 193 permits, resulted in limits for the two key pollutants that averaged 55 percent of the pollutant limits contained in the national standards.

Second, the second-stage standards set by EPA for nation-wide application are not more stringent than the first-stage standards. The 1977 amendments to the act required EPA to demonstrate that the cost of meeting the second-stage, more stringent national standards for existing industrial facilities was reasonable. EPA determined in July 1986 that the cost of meeting such standards was not reasonable for the pulp and paper industry. Consequently, second-stage cleanup standards were set, according to EPA, at first-stage cleanup levels. About 93 percent of the 1,050 permit limits are affected by second-stage standards. EPA officials acknowledge that more advanced technology cleanup controls need to be reassessed in the future as cost benefit data may change, but they have no specific plans for periodic reassessment at this time as their assessment of cost reasonableness was recently completed. (See ch 3.)

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## Recommendations

GAO is making recommendations aimed at ensuring that historic production data is obtained and used in setting permit limits, promoting the consistent application of new-source national standards to mills expansion, and establishing specific time frames for periodic reevaluations of the more advanced pollution control technologies for the industry. (See pp. 28 and 35.)

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## Agency Comments

GAO discussed the contents of the report with EPA officials and has included their comments where appropriate. EPA officials expressed the belief that the report would provide useful insights into the operation of the permit program and how it has evolved over time. However, GAO did not obtain official comments on a draft of this report.

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**Abbreviations**

BPT	best practicable technology
BOD <sub>5</sub>	biochemical oxygen demand over a 5-day period
EPA	Environmental Protection Agency
GAO	General Accounting Office
NPDES	National Pollutant Discharge Elimination System
RCED	Resources, Community, and Economic Development Division
TSS	total suspended solids

# Introduction

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Billions of gallons of polluted wastewater are generated each day from industries across the country. Left untreated, this contaminated waste enters the nation's waterways and may kill fish and other aquatic life and leave the water unfit for human use. To address this problem, Congress enacted the Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. 1251, *et seq.*), known as the Clean Water Act. This act required the Environmental Protection Agency (EPA) to set national standards on the types and amounts of pollutants industries could discharge into the nation's waters.<sup>1</sup>

To achieve its objectives, the Clean Water Act requires every industrial facility discharging wastewater to obtain a permit from the state (or in some cases EPA) that limits the amounts and types of pollutants the facility may discharge. Industrial permit limits must at least meet the national standards established by EPA for each industry or, where necessary, tighter, more stringent limits on permissible pollutant discharges established by the states to deal with site-specific local water-quality problems. All permits are issued and enforced under the act's National Pollutant Discharge Elimination System (NPDES), administered both by EPA and the states.

Of the approximate 58,080 industrial facilities with permits under the NPDES program, about 8,280 are considered major dischargers and about 49,800 are considered minor dischargers. Industrial permittees range in size from minor permittees with relatively small discharges to major pulping mills that discharge 20 to 30 million gallons of wastewater daily.

This report examines wastewater cleanup efforts in the pulp and paper industry. This industry, according to EPA officials, is the largest discharger of conventional pollutants in the nation subject to national effluent standards.<sup>2</sup> In common with other such dischargers, pulp and paper mills have (1) a permitting process that is well-defined by regulation; (2) conventional pollutants that are controlled by technologies used by all dischargers; and (3) national standards that are based on production levels of individual facilities.

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<sup>1</sup>The act also regulates municipalities' discharges.

<sup>2</sup>Conventional pollutants include organic waste, sediment, acid, bacteria and viruses, nutrients, oil, grease, and heat. The effects of these pollutants vary. In high concentrations, some of these are toxic. According to EPA, the types of pollutants discharged by pulp and paper mills have a greater effect on the ecology of streams and lakes than they do on human health.

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## The Clean Water Act

Through the Clean Water Act, Congress in 1972 changed the federal approach to cleaning up polluted water. The act focused federal cleanup efforts on controlling the type and quantity of pollutants discharged into the nation's rivers, streams, and lakes, rather than on regulating the quality of individual bodies of water, as was the case under earlier legislation.<sup>3</sup>

The Clean Water Act uses the results achieved by pollution-control technologies in limiting pollutant discharges as the basis for establishing permissible national standards for wastewater discharge. National standards are, according to EPA officials, in effect determined by "the ability of technology to cleanse waste, rather than on the ability of rivers and streams to assimilate wastes." In establishing national standards, EPA first reviewed water pollution-control technologies in use by industrial facilities to control pollutant discharges. EPA established national standards on the basis of results achieved by these actual industry practices in limiting pollutant discharges. Examples of water pollution-control technologies in use in the pulp and paper industry to limit pollutant discharges include a large pond of water in which pollutants are reduced by the natural action of sunlight and bacteria, and an activated sludge process that uses a highly concentrated mass of bacteria confined in an aerated basin, which is agitated.

The Administrator, EPA, is responsible for establishing national standards on an industry-by-industry basis so that all facilities within a particular industry are required to meet similar cleanup requirements. In cases where meeting national standards could still result in damage to the environment, states have the right to establish permit limits that are more stringent than national standards in order to ensure protection of the environment.

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## Development of Standards

The act establishes the criteria that the Administrator, EPA, must follow in setting national standards. These criteria require EPA to take into account the latest scientific evidence regarding the impact of pollutants on the environment and actual industry practices.

The Clean Water Act called for the development of a two-stage approach to establishing national effluent standards. In the first stage, EPA was to

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<sup>3</sup>The Federal Water Pollution Control Act, originally enacted in 1948, and amended by the Water Pollution Control Act Amendments of 1956 and subsequent amendments until passage of the 1972 act

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set, by 1977, separate national standards for existing industrial facilities and new industrial facilities (including certain expansions of existing facilities). In the second stage, EPA was to set, by 1984, for existing industrial facilities only, more stringent national standards that would reduce permissible conventional pollutant discharge limits below those required by first-stage national standards.

In the first stage, the act required EPA to set, for existing industrial facilities, national standards that would bring every facility up to the best average industry control technology termed the "best practicable technology" (BPT). The BPT standard was to be based on the average of actual pollutant discharges by facilities of various ages, sizes, and production processes. An EPA official described the best average standards in 1976 testimony as:

"techniques which have been used to treat industrial wastes for 50 years. The performance levels reflect, generally, the averages of well-designed and -operated treatment plants during the late 1960s and early 1970s. Congress expected BPT [best practicable technology] to correct past deficiencies, to get all plants in all industrial subcategories up to the level of those plants using the best current practice."

Also in the first stage, new industrial facilities and certain expansions of existing facilities were required by the act to meet "best available demonstrated technology" standards. Under this concept, new construction was to incorporate the best pollution-control technologies available at the time of design. These are called "new-source" standards.

In the second stage, the act required, for existing industrial facilities only, that EPA establish more stringent national standards that would reduce permissible pollutant discharge limits below those required by first-stage national standards. These national standards were to be designed so that the average pollutant discharges within an industry represented the best of industry practice.

Subsequently, the 1977 amendments to the act distinguished between toxic and conventional pollutants in setting national standards and mandated that before an industry would be required to meet more stringent national standards for conventional pollutants for its existing facilities, EPA must demonstrate that the cost of meeting such standards was "reasonable" in relation to the benefits derived.<sup>4</sup> According to EPA officials,

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<sup>4</sup>The more stringent standards are still required without a cost test for toxic pollutants

Congress was concerned that technology required to meet more stringent limits for conventional pollutants was likely to be unreasonably expensive in some cases.

National standards established for pollutants are generally expressed in terms of limits on the concentration of the pollutant per volume of wastewater, or in amounts of pollutants that can be discharged on average and in what maximum amount over a certain time period. For example, a pollutant concentration limit of 20 micrograms per liter of wastewater means 20 parts of pollutant to one million parts of wastewater. Limits based on the total amount of pollutants that can be discharged over time are the most common for pulp and paper mills. For example, the national standard for one type of pollutant allows a monthly daily average of 7.1 pounds of the pollutant to be discharged for each 1,000 pounds of daily production. If the permit limit for the pollutant were based on the national standard and 10,000 pounds of production were expected each day, national standards will allow the mill's permit limit to be set for 71 pounds of the pollutant to be discharged on average each day during the month.

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## Permitting Authorities

Permit conditions and limits are set by "permitting authorities"—the states or EPA regional offices. EPA has delegated permitting authority to 37 of the 50 states. Although delegated states become the issuing authorities for the permits, EPA remains responsible for the permits' correctness. Both delegated states and EPA regions that issue permits are referred to as permitting authorities in this report.

EPA headquarters provides, among other things, the permitting authorities with

- policy on management, goals, and expected operation of the NPDES program;
- regulations on the operation and requirements of the program; and
- national effluent standards for each industry.

In the delegated states and EPA regions for nondelegated states, permit writers prepare permits using (1) applications from industrial facilities that provide information on, among other things, the amount and type of pollutants to be discharged; (2) standards and regulations developed by EPA headquarters; (3) state water-quality standards; and (4) guidance from EPA headquarters, if specific technical questions arise.

In delegated states, the applicable EPA regional office oversees the state's permit program and reviews the permits prepared by the state. EPA has the authority to reject a permit prepared by a delegated state and reissue it with conditions that EPA believes are appropriate. Overall, EPA regional offices are responsible for ensuring that the permitting process is accomplished in line with the law, regulations, and guidance from EPA headquarters.

## Permitting Process

There are four principal participants in the permitting process: the company, the state, EPA regions, and EPA headquarters. To discharge pollutants into the nation's waterways, industrial facilities must have a permit that specifies

- who is allowed to discharge pollutants,
- the types and amounts of pollutants to be discharged,
- the conditions under which the discharge is to occur, and
- the discharge location, called an outfall.

A company's application to discharge wastewater must include information about the size, nature, and location of the discharge. Company officials are responsible for the accuracy of the information and are subject to fine and imprisonment for knowingly falsifying information on the application. The application is sent to the permitting authority—the state in which the discharge is located or the appropriate EPA region.

The permitting authority reviews the information on the application and determines whether the facility has had a permit before and, if so, what if anything has changed since the last permit was issued. Permits can be issued for up to 5 years.

In general, the permit is prepared by the permit writer, who researches the previous permit (if one exists), the permitting authorities' files, the application, relevant national standards, and the receiving waters' water-quality standards. From these sources, the permit writer prepares specific pollutant-discharge limits. EPA requires the following criteria to be met in establishing limits.

- The new limits must be at least as stringent as the previous permit limits, if a previous permit existed.
- National standards must serve as the basis of the permit limits, unless the standard does not apply to the individual mill or the water quality of the receiving waters would not be protected by the national standards.

- The strictest appropriate basis for permit limits—the previous permit, national standards, or the water-quality needs of the receiving stream—must be used in setting limits.

For some pollutants and industries, national standards have not been developed, receiving waters do not have water quality limitations, and no previous permit exists. The act and EPA regulations provide that permit writers may consider the relevant facts about the facility and prepare limits in such cases on the basis of “best professional judgment ”

There are basically five bases on which to set permit limits—national standards, water-quality requirements, professional judgment, a previous permit, or state standards.

An individual permit can contain limits on a number of pollutants, each of which can be derived in one of the above ways. For example, some pollutants that reduce oxygen in water may need to be controlled in a permit to a greater degree than called for by national standards because of a water-quality limited situation. However, another pollutant in the same permit may not be water-quality limited. Consequently, permit writers adapt permit limits to the local situation.

Permits are prepared in draft and released for public and agency comment. Upon completion of the comment period, any needed changes are made. Before the permit is issued, the company may petition for modification of the permit on the basis of the act, the regulations, or technical evidence showing that the permitting authority erred in interpreting the facts. However, once the permit is issued, it represents a legal commitment on the part of the company to discharge within its limits.

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## Enforcing Permits

The Clean Water Act requires permittees to monitor their wastewater discharges and report them in a manner dictated by the Administrator, EPA. This requirement has resulted in EPA regulations that require dischargers to monitor their discharges, analyze what is being discharged, and report monthly to the permitting authority the amount and type of discharges.

Permitting authorities compare reports received from permittees with their permit limits and, if the permittee has not complied with permit limits, some enforcement action is to be taken. EPA's actions depend upon

the type of noncompliance and the severity and frequency of past non-compliance. Enforcement actions range from telephone inquiries to determine the reason for noncompliance to a lawsuit in federal court.

EPA also requires that the most severe noncompliances, called significant noncompliance, be tracked and corrected through a quarterly reporting system.<sup>5</sup> Under this system, EPA requires that all permitting authorities report to EPA headquarters any company that is in significant noncompliance on a quarterly basis. EPA has set a goal of bringing companies in significant noncompliance into compliance or taking formal enforcement action before the next quarterly report.

EPA's fiscal year 1986 budget included about \$44 million for enforcement, permitting, and standards preparation. Of this total, 39 percent is for enforcement, 42 percent for permitting activities, and the remaining 19 percent for standards preparation

## The Pulp and Paper Industry

The pulp and paper industry is a major contributor to the nation's economy, with sales of \$24 billion in 1982. There are major plants in 30 states. As shown in table 1.1, these plants are concentrated primarily in 4 geographical regions according to the American Paper Institute.

**Table 1.1: Calendar Year 1983 Pulp and Paper Production by Region**

Region	Wood Pulp		Paper	
	Production <sup>a</sup>	Percentage	Production <sup>a</sup>	Percentage
New England	2,849	5	4,511	14
Middle Atlantic	1,801	3	3,411	11
East North Central	3,700	7	6,264	19
West North Central	935	2	943	3
South Atlantic	17,194	31	4,691	15
East South Central	10,131	19	4,030	12
West South Central	9,335	17	3,841	12
Mountain and Pacific	8,863	16	4,514	14
<b>Total</b>	<b>54,808</b>	<b>100</b>	<b>32,205</b>	<b>100</b>

<sup>a</sup>Production figures in thousand short tons

The pulp and paper industry has experienced growth in each of the above regions of the country between 1970 and 1983, except for wood pulp production capacity in the West North Central Region. Production

<sup>5</sup>Defined by EPA as an average monthly discharge of 40 percent or more than allowed by permit limits for 2 out of 6 months for conventional pollutants

capacity increases have ranged from 8 percent for wood pulp in one region to about 61 percent for paper production capacity in another.

The papermaking process results in the discharge of the greatest amount of conventional pollutants of any industry. The trees used in papermaking are broken mechanically into small chunks, and the chunks are then broken into finer parts through a chemical process. The resulting pulp is rolled, heated, and treated to make various types of paper. The other raw material used in making paper is recycled paper. The wastewater from the mills contains waste from the papermaking process, including bark and chemicals.

According to a publication by the Department of Commerce's Bureau of the Census, the pulp and paper industry spent about \$472 million for capital equipment to control water pollution between 1979-82, the most recent period for which figures are available. The industry also spent about \$1.8 billion to operate this equipment during the same period.

## Objectives, Scope, and Methodology

The Chairman, Subcommittee on Investigations and Oversight, House Committee on Public Works and Transportation requested in his letter of June 7, 1985, that we determine what has been accomplished as a result of establishing and applying technology-based, national effluent standards to industrial dischargers. We subsequently agreed with the Chairman's office to address this issue by responding to the following questions, using the example of major dischargers in the pulp and paper industry.

- Are discharge permits in the industry at least as stringent as the appropriate national effluent standards require?
- Are pollutants being discharged by selected pulp and paper mills meeting the appropriate national effluent standards?

We also obtained information on changes that have evolved in the program as a result of applying national effluent standards to the industry.

Initially, the Chairman was interested in including two other industries in this review—the inorganic chemical and organic chemical industries. The Chairman selected these industries so that the review would include an industry with well-established national standards—the pulp and paper industry; an industry without standards—the organic chemical industry; and an industry that has recently acquired standards—the inorganic chemical industry. Subsequently, as agreed with the

Chairman's office, the review was limited to the pulp and paper industry because data to measure and compare the performance of the inorganic and organic chemical industries was not readily available.

EPA defines pulp and paper mills as major dischargers through a ranking process. This process considers the relative size of plant discharge, the presence of toxins in the waste streams, and the proximity of the discharges to downstream public drinking water supplies. In addition, a facility may be designated as a major discharger on the basis of the judgment of permitting authorities.

As agreed with the Chairman's office, this report deals with major effluent-discharging pulp and paper mills that discharge wastewater directly into the nation's waters and are therefore required to obtain a NPDES program permit. Pulp and paper mills without NPDES permits are not included. For example, facilities that discharge to a municipal system are not required to have NPDES permits because only facilities with direct discharges to the nation's waterways must have such permits. Standards for indirect dischargers are prepared under another section of the Clean Water Act—the national pretreatment program.

We also agreed with the Chairman's office that we would obtain information for this review from two specific segments of the pulp and paper industry which represented the largest number of pulp and paper mills listed in EPA's computer records: mills producing pulp as their primary product and mills producing various types of paper. There were 193 major effluent discharging pulp and paper mills in these industry segments. (See figure 1.1 for the locations of these mills). We verified the completeness and accuracy of the 193-mill universe through a questionnaire that we sent to all permitting authorities in the nation.



Information obtained on how pollutant limits were established was used to calculate what the limits would have been using national standards; these limits were compared with actual permit limits. We also made file searches and conducted interviews with permit writers and program officials responsible for 39 pulp and paper mills we randomly selected from the 90 mills permitted by 5 permitting authorities.

To determine whether pollutant discharges by selected pulp and paper mills were meeting national standards, we obtained actual pollutant discharge data on the two key pulp and paper pollutants for 47 pulp and paper mills. These we randomly selected from the 90 mills permitted under the program by the above-mentioned 5 permitting authorities. For the 47 mills, we reviewed for the 2-year period ending June 1985 monthly pollutant-discharge reports submitted by the mills to the permitting authorities, along with permit compliance records. We also reviewed significant noncompliance reports for all 90 mills for the same time period for all pollutants.

To determine what changes have evolved in the program as a result of the application of national effluent standards to the industry, we analyzed information and data obtained on our questionnaire on the bases used in setting pollutant limits and what those limits were. The thrust of this analysis was to determine how often limits were based on factors other than national standards and whether consistent levels of cleanup requirements were being imposed across the industry. We also reviewed the legislative history of the Clean Water Act and obtained data on the growth of the pulp and paper industry.

The five permitting authorities we selected included: states that have been delegated management of the program—Alabama, Washington, and Wisconsin; and EPA regions acting for nondelegated states—EPA region I for the state of Maine and EPA region IV for Arkansas, Louisiana, Oklahoma, and Texas. We selected these permitting authorities because, in addition to representing both delegated and nondelegated permitting programs, the 90 mills permitted by these authorities represented about 47 percent of the major effluent-discharging mills producing pulp and paper, had removed the most amounts of conventional pollutants, and had the highest yearly operating expenses for water pollution control in the nation.

While we obtained information on how permit limits were set for the industry and compared permit limits with the national standards to

determine whether the limits meet national standards, we did not evaluate the reasonableness of the national standards established by EPA, nor the appropriateness of the permit limits that were established. We also did not evaluate EPA's determination of the reasonableness of the costs to implement second-stage national standards for existing pulp and paper mills.

We performed our review in accordance with generally accepted government auditing standards, except for the limitations noted above. The views of EPA officials directly responsible for the NPDES program were sought during our review and are incorporated into the report where appropriate. In accordance with the wishes of the Chairman's office, we did not request EPA or the permitting authorities included in our review to officially comment on a draft of this report.

# Application of First-Stage National Standards to Pulp and Paper Mills

EPA and the states have implemented the first-stage national standards. Permit limits as written for the 193 major effluent discharging mills are generally as stringent as national standards require or more stringent primarily because of local water quality needs or permit writer's judgments. However, we found two problems with the way in which permit limits are being set that have the potential of resulting in incorrect permit limits and pollutant discharges exceeding applicable national standards.

Production data available to permit writers in setting some permit limits did not include long-term historical production figures, as suggested by EPA guidance, or the basis of the figures available was unknown. Also, there is a problem with the consistency with which new-source national standards were applied in setting some permit limits. We were unable to determine if either of these situations resulted in some permit limits being set that were greater than allowed by national standards because needed production figures were not readily available or EPA criteria was not specific enough to make such determinations. However, these situations potentially could result in some permit limits and pollutant discharges exceeding appropriate national standards.

Mills we sampled in five major pulp-and paper-producing areas were generally discharging the key conventional pollutants for the industry at levels in line with their permit limits as written. Similarly, these mills discharged the one key pollutant we tested in amounts that were less than the national standards allowed over a 2-year period.

## Permit Limits, as Written, Are Generally as Stringent as National Standards

Permit limits are generally determined for pulp and paper mills by multiplying expected production during the life of the permit by the applicable national standards for each type of pollutant discharged. The limits are generally expressed in terms of pounds of a pollutant which may be discharged on a daily average basis during each month and in what maximum amount each day for each 1,000 pounds of product. For example, as discussed on page 11, if the national standard allows a monthly daily average of 7.1 pounds of a certain pollutant per 1,000 pounds of daily product and expected production during the life of the permit is 10,000 pounds of product per day, national standards will allow permit limits to be set for a maximum of 71 pounds of pollutant to be discharged on average each day during the month.

To determine whether permits issued in the industry are at least as stringent as the national standards require, we asked permitting authorities in a questionnaire to provide information on how pollutant limits were established to set the 1,050 pollutant limits for the 193 major pulp and paper mills. The responses showed that 984 of the 1,050 limits (about 94 percent) were at least as stringent as national standards require. Of the 1,050 permit limits, 975 (93 percent) were based on first-stage national standards for existing industrial facilities and the remaining 75 (7 percent) on first-stage new-facility standards.

About 57 percent of the limits (596) were more stringent, requiring less pollutant discharges than allowed by national standards primarily because of local water-quality needs or permit writers' judgments. About 37 percent of the limits (388) were the same as national standards. For the remaining 66 limits, about 5 percent (49) were not as stringent as national standards require, and the data provided by permitting authorities for about 1 percent (17) was not sufficient to determine compliance with national standards. In December 1986 we brought to the attention of EPA and state officials the 49 limits that were not as stringent as national standards required. An EPA headquarters official told us that any needed corrective action would be taken.

While the above responses show that pulp and paper mills have, for the most part, been issued permits containing limits based on national or more stringent local standards, our fieldwork raised concerns about whether the correct production data and standards (existing vs. new facility) were always used in setting permit limits. As the following sections show, applying production figures not representative of a mill's actual production or the wrong standard has the potential of resulting in permit limits and pollutant discharges which exceed applicable national standards.

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### **Mill Production Data Available to Set Some Permit Limits May Not Be Representative**

EPA's national standards for the pulp and paper industry are based on historic long-term average yearly production. EPA regulations require that historic long-term average yearly production figures be considered in determining expected production for establishing permit limits. However, one section of the regulations implies that permit limits could be based on production figures other than historic yearly average production. EPA issued a memorandum in 1984 to clarify the regulations and provide additional advice about selecting the appropriate production figures to serve as a basis for setting permit limits.

The memorandum states that permitting authorities should use long-term average production figures based on 5 years of historic production to set permit limits. The memorandum also points out that permitting authorities should use production figures that represent the reasonably expected production of the mill and avoid the use of limited amounts of production data such as data from one month that may be unusually high or the mill's design capacity. According to the memorandum, a different basis for estimating production can be used only when historic trends, market forces, or company plans indicate that a different level of production will prevail during the life of a permit.

### Permitting Authorities Not Always Complying With EPA Guidelines

In our questionnaire we asked permitting authorities what production figures were available to set permit limits. We received responses for 143 of 154 mills. We did not ask this question for 39 randomly selected mills covered by our visits to the five permitting authorities. Instead, we determined the policies followed by these permitting authorities regarding obtaining and considering production data.

According to the permitting authorities responding, for 63 of the mills (44 percent) long-term average historic production figures were available to set permit limits. For 33 of the mills (23 percent) production figures available were maximum yearly or monthly production, an average month's production, or the design capacity of the mill. For 47 of the mills (33 percent) the basis of the production figures available to set permit limits was unknown to the permitting authority.

Four of the five permitting authorities we examined were not obtaining 5 year-average production figures to consider in setting permit limits. According to an official at one permitting authority, it undertakes a multistep process to obtain production figures for its mills and check such figures. This process includes obtaining 2 to 3 years of historical production data and verifying the data at the mills before the draft permit is issued. Another authority, for its major mills, adds state instructions, which include a request for the past year's daily production figures, to the NPDES permit application instructions. Two other authorities said they depend upon the mills' certification on the permit application that they have provided the proper production data. These two permitting authorities also depend on the permit writers to determine whether or not additional data should be requested from the mills.

One permitting authority requires mills to include production data on their monthly discharge reports to the authority. Consequently, 5 year-

historic production figures are available to permit writers in this authority when establishing permit limits

Permitting authority officials said they were satisfied that production figures available for use in setting permit limits, while not always representing 5 years-historic production figures, were nevertheless sufficient to ensure that proper permit limits within national standards were set.

We were unable to determine if this situation resulted in some permit limits being set that were greater than allowed by national standards because needed mills' historical production figures were not readily available. However, this situation has the potential of resulting in some permit limits and pollutant discharges exceeding appropriate national standards as demonstrated by an EPA report.

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### **EPA Reports Some Permit Limits Not Meeting National Standards**

EPA region IV examined the 56 major permits for pulp, paper, and paper-board mills issued between 1979 and 1983. It compared the mills' actual production data as collected at the mills with the production data used to set permit limits. In a September 1986 report, the region reported that of the 56 permits, 21 (38 percent) were not as stringent as national standards require. Production figures used to set the limits for these 21 mills were greater than the mills' highest production in the period studied.

Of the 21 mills that did not meet national standards, 16 had limits that were 3 percent or more less stringent than the national standards. The study used 3 percent as the criterion for determining significant variance from national standards.

Of the 16 mills, 10 had limits at least 12 percent less stringent than national standards require. For one mill, limits were 40 percent less stringent than required. On the basis of effluent discharges of the 16 mills, 7 mills could meet the national standards if their permit limits are calculated using appropriate production figures, according to the region's study.

EPA region IV also reviewed the permit files for the 16 mills to determine what production figures were used. For five permits, the limits were set too high because production figures were based on the mills' design capacity, or monthly maximum, which overstated the mills' production when compared with actual, historical production data. Four of the permits did not contain adequate documentation to explain how the limits were developed. For four other permits, the region's review of the files

did not identify the cause of the discrepancy. On the remaining three permits, limits were higher for various technical reasons.

The report concluded that using inappropriate methods to determine production rates or, in some instances, having no basis for the rates used was significant because production rates are used to calculate permit limits, with higher production rates resulting in less stringent permit limits.

The report recommended that historical production data be requested for the 16 permits so that an estimate of the actual long-term average production rate expected over the life of the permit could be made.

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## New-Source Standards May Not Be Applied Correctly

Permit limits based on new-source standards for new facilities and certain expansions of existing facilities can result in reducing pollutant discharges by as much as 50 percent, compared with national standards for existing industrial facilities. However, since in the pulp and paper industry growth has come from modifying existing plants and not from constructing new ones, permitting authorities have been placed in the position of determining whether modifications to an existing mill create new sources of discharge or merely change the processes.

EPA's regulations for new-source permit limits distinguish between plant expansions that result in a new source of discharge and modifications that change only the production processes of an existing mill. The key to EPA's policy regarding application of new-source standards is in the EPA regulations (40 CFR 122.29):

"Construction on a site at which an existing source is located results in a modification rather than a new source (or a new discharger) if the construction does not create a new building, structure, facility, or installation . . . but otherwise alters, replaces, or adds to existing process or production equipment."

From this criteria, EPA has developed guidelines for permitting authorities that in essence call for mill modifications not to be subject to new-source standards when a substantial interconnection exists between the modified process and the existing production process.

EPA has adopted various approaches for determining when new-source standards apply to expansions at existing facilities. In May 1980 EPA proposed a new-source definition with these characteristics: a discharger would be classified as a new source if it were a new facility, if it

totally replaced an existing source, or if the construction at the site of an existing facility changed the nature or quantity of pollutants discharged.

In September 1980, however, EPA withdrew the proposed definition in response to industry criticism. EPA reported that industry considered the language for application of new sources to modifications of existing dischargers as overly broad and subject to an interpretation that would classify some structures as new sources that more appropriately should be considered modifications to existing sources.

EPA subsequently developed the substantial independence (also referred to as substantial interconnection) test, designed to help permitting authorities decide whether the existing source undertaking major construction has the opportunity to install the best and most efficient wastewater treatment technologies. If the decision is affirmative, then the existing source should be required to meet new-source performance standards at that facility.

Permitting authority officials charged with making new-source determinations and permit writers at the five permitting authorities we visited told us that it is a difficult engineering task to determine whether the changes proposed by a mill would result in a new discharge or are just changes to the existing production processes. For example, one permitting authority official said that "de-bottle necking," a production line to bring all parts of the line to the same production capacity and thereby get more production from a process with more pollutant discharges resulting, would not be considered a new source. An official in another permitting authority said that it would be.

Approaches to identifying and applying new-source requirements to mills have differed among permitting authorities. One authority, for example, uses an informal "rule of thumb" for assigning new-source requirements to an existing mill that has experienced production growth. While mills having a 20-percent or greater gain in production are considered new sources, regardless of whether the "substantial interconnection" definition can be applied, permit writers for this authority have applied new-source limits to mills with 15 percent production gains. Since no written policy exists on new-source application at the permitting authorities, such decisions depend on the judgment of individual permit writers, according to one permitting authority official.

Another permitting authority holds to the EPA "substantial interconnection" definition and consequently requires mills meet only national standards for existing facilities, even when the mills have production increases that would have triggered new-source standards by other authorities. For example, the addition of a new papermaking machine would result in more stringent new-source standards being applied to the added discharge, according to one authority official. The same change would represent a modification to an existing permit, according to the substantial interconnection policies followed by another permitting authority.

The application of new-source standards to the mills in our universe is limited. Only 15 of the 193 mills have permit limits in whole or in part based on new-source standards. American Paper Institute statistics, however, present a different picture of growth compared with the application of new-source standards in the industry. Industry figures show that the capacity to make paper grew about 38 percent between 1970 and 1983, and that actual paper shipments grew about 41 percent during the same time period, the most recent for which actual statistics were available. The capacity of pulping operations grew 24 percent during the same period.

## Analysis of Key Pollutant Discharges at Selected Mills

To determine whether pollutant discharges from pulp and paper mills met permit limits and national standards, we reviewed pollutant discharge records for the two key conventional pollutants (BOD<sub>5</sub> and TSS)<sup>1</sup> at five permitting authorities responsible for 90 permits (mills) in eight states over a 2-year period ending June 1985. BOD<sub>5</sub> and TSS are the key conventional pollutants for the pulp and paper industry, according to EPA officials. The 90 mills represent about 47 percent of the 193 major effluent-discharging pulp and paper mills.

Permitting authorities' records show that for 47 permittees we selected at random from the 90, discharges of the two key pollutants complied with monthly daily average and maximum daily permit limits about 91 percent of the time over the 2-year period. Nine percent of the time these permittees did not comply with these limits. Of the 47 permittees, 25 did not comply with one or more permit limit for at least one month during the 2-year period with 11 permittees responsible for most of the

<sup>1</sup>BOD<sub>5</sub> (biochemical oxygen demand) refers to the amount of oxygen in water used up by pollutant decomposition over a 5-day period. The more dissolved oxygen used the less available for fish. TSS (total suspended solids) represents material suspended in water that reduces the amount of sunlight on stream plants.

noncompliance—71 percent. Significant noncompliance reports for the 90 permittees showed that for all pollutants and permit limits permittees were in significant noncompliance about 10 percent of the time, over the same time period (an average monthly discharge of 40 percent or more than allowed by permit limits for 2 out of 6 months for conventional pollutants). We calculated compliance rates by dividing the number of monthly (quarterly for significant noncompliance) permit limit violations by the total possible number of violations that could have occurred over the 2-year period and converted these ratios to percentages.

For 46 of the 47 randomly selected permittees, the total amount of BOD<sub>5</sub> discharged was less than the national standard allowed over the 2-year period. Pollutant discharges by one permittee exceeded the limits allowed in the national standard by 10 percent

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## Conclusions

Major pulp and paper mills across the nation hold permits whose pollutant limits as written are generally as stringent as first-stage national standards require. However, for 56 percent of the mills we sampled, 5 year-historic production figures suggested by EPA guidelines were not available in helping set permit limits, or the figures available were of an unknown origin. Permitting authorities had obtained other types of production figures with which they were satisfied. However, if production figures considered in setting permit limits overstate production, the permit limits could be greater than allowed by national standards and, more importantly, actual pollutant discharges could exceed national standards. Also, new-source national standards which reduce pollutant discharges are not being applied consistently to expansions of existing pulp and paper mills at five permitting authorities. EPA regulations do not specifically state how permitting authorities are to determine if new-source standards should be applied to such expansions, but rather rely upon permit writers' judgments on when to apply the new-source standards.

We were unable to determine if either of these situations resulted in some permit limits being set that were greater than allowed by national standards because historic production data were not readily available or EPA criteria were not specific enough to make such determinations. However, these situations have the potential of resulting in some permit limits and pollutant discharges exceeding appropriate national standards.

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Mills we sampled in five major pulp-and paper-producing areas were generally discharging key industry pollutants at levels in line with their permit limits as written and in amounts that were less than the national standards allowed over a 2-year period.

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## **Recommendations to the Administrator, EPA**

We recommend that the Administrator, EPA, implement EPA instructions by requiring permitting authorities to obtain and use 5 year-historical average production data when setting future pulp and paper mills' permit limits. Exceptions to this procedure should be documented and occur only when historic trends, market forces, or company plans indicate that a different level of production will prevail during the life of a permit.

To promote the consistent application of new-source national standards to mill expansions, we also recommend that the Administrator, EPA, develop instructions that set out specifically how permitting authorities are to determine if new-source standards should be applied to expansions of existing pulp and paper mills, such as linking new-source determinations to a specific percentage of production increases.



# Evolution of the Program

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The NPDES program, as applied to the pulp and paper industry, has evolved from a cleanup strategy that (1) relies on national, technology-based standards to one that emphasizes local, site-specific water-quality needs and (2) envisioned the possibility of more stringent national standards for existing industrial facilities during the second stage of national standard setting to one in which second-stage standards are not more stringent.

National standards for and consistency in cleanup requirements so that the same degree of pollution reduction would be demanded of all facilities within an industry were key aspects of the program's approach to water-pollution cleanup. However, in accommodating site-specific water-quality needs, states are faced with different situations. If the permitting authority believes that the receiving water would not be protected by the national standards, more stringent permit limits can be established. As a result, permit limits for the same pollutant varied from mill to mill.

About 57 percent of the 1,050 permit limits for the 193 mills are more stringent than first-stage national standards—more stringent primarily because of local needs to preserve the water quality of streams, rivers, and lakes. Site-specific water-quality needs and individual permit writers' judgments have therefore become a dominant force in setting more stringent cleanup levels for the industry, more so than national standards.

While states can and are setting permit limits for most mills that are more stringent than first-stage national standards, second-stage national standards issued by EPA on December 17, 1986, for existing mills are not more stringent than first-stage standards. During the second stage of establishing national effluent standards, the Clean Water Act required EPA to set, for existing industrial facilities only, more stringent national standards that would reduce permissible pollutant discharge limits below those which were required by first-stage national standards if EPA determined that the cost of meeting them was reasonable.

The second-stage standards, applicable to existing mills with 975 permit limits (about 93 percent of the 1,050 permit limits), are not more stringent than current first-stage standards for existing pulp and paper mills. EPA has determined that the costs of implementing more stringent second-stage standards are not reasonable. EPA officials acknowledge that more advanced technology cleanup controls needed to achieve more stringent pollutant-discharge limits will be reassessed in the future as

cost benefit data may change, but they have no specific plans for periodic reassessments at this time as EPA's initial assessment of cost reasonableness was recently completed.

### Local Water-Quality Needs, Not National Standards, Determine Most Cleanup Levels

Most permit limits in the pulp and paper industry are based on requirements such as site-specific water-quality needs and permit writers' judgments, not national standards. They also mandate less pollutant discharges than allowed by the national standards. This shift in focus results from the central role states have in setting permit limits based on site-specific water-quality needs, which often require more stringent pollutant discharge limits than those contained in the national standards. The Clean Water Act provided for, among other bases, water quality-based permits. Such permits have become the more usual way in which limits for pollutants are set in the pulp and paper industry. Consequently, while national standards were to affect all facilities within an industry so as to result in consistent levels of industrial cleanup, permit limits among the mills for the same pollutant discharge vary and some mills are required to meet more stringent pollutant discharge limits than are other mills.

### Permit Limits Set by Permitting Authorities

Permitting authorities reported, in response to our questionnaire, that for the 193 permits, about 39 percent were based on combinations of national standards and other requirements, such as water quality, and 8 percent were based on combinations of water quality and best professional judgment. For the remaining permits, 22 percent were based on national standards alone, 7 percent on water quality, 8 percent on best professional judgment, and the bases of 16 percent of the permits were either unknown or based on other requirements. Overall, 86 of the 193 permits (45 percent) had one or more limit based on water quality.

The extent to which different bases were used in setting permit limits also varies by EPA region. For example, as shown in table 3.1, about 92 percent of EPA region II's limits for the key pollutants were based on national standards, while water quality and judgment—not standards—served as the basis for these pollutant limits in region III. The two EPA regions not included in the table had no major pulp and paper mills in their regions.

**Table 3.1: Percentage Bases of BOD<sub>5</sub> And TSS Permit Limits by EPA Region**

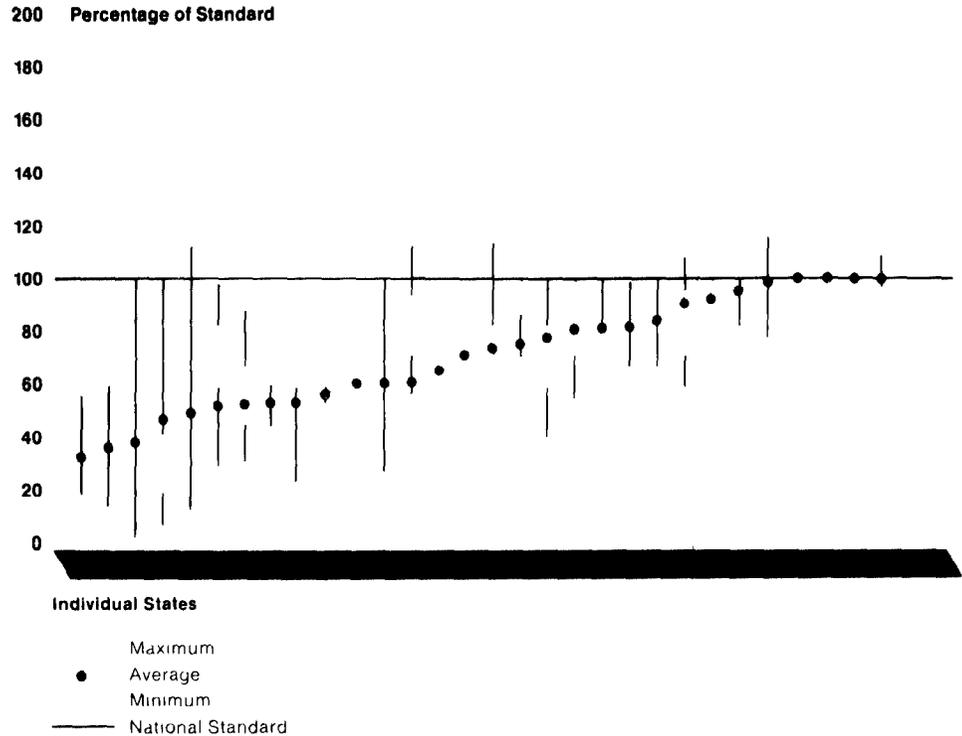
EPA region	National standards	Judgment	Water quality	Other	Unknown
I	8	29	43	20	0
II	92	8	0	0	0
III	0	20	80	0	0
IV	37	24	31	3	5
V	47	2	41	8	2
VI	52	41	0	0	7
IX	62	38	0	0	0
X	44	14	38	4	0

**Permit Limits for the Same Pollutant Vary**

Because states can and are setting permit limits for most pulp and paper mills that are based on local water-quality needs which generally require more stringent than first-stage national standards limits, the limits set vary.

The variances among and within states in setting permit limits for one key pollutant (BOD<sub>5</sub>) are illustrated by figure 3.1. The state average-pollutant discharge limit contained in permits for BOD<sub>5</sub> is shown as a point EPA's national standard is used as a common basis for comparing the level of the limits with 100 percent equaling the national standard. For example, for the first state, BOD<sub>5</sub> permit limits for all state mills average approximately 33 percent of the discharge that would be allowed under the national standard, or about three times more stringent than the national standard. The figure also shows, for each state, the range of the mills' discharge permit limits for BOD<sub>5</sub>. For example, for the first state, BOD<sub>5</sub> permit limits ranged from 20 percent of the national standard for one mill to 55 percent for another BOD<sub>5</sub> permit limits ranged, on average by state, from 33 percent of the national standard to 100 percent. Individual mill limits ranged from 6 percent of the national standard to 137 percent.

**Figure 3.1: Average, Maximum, and Minimum BOD<sub>5</sub> Limits for 30 States**



\*Biochemical oxygen demand over a 5-day period

When national standards serve as the basis for permit limits, the set limits are slightly less than the standards. However, when permit limits are based on requirements other than national standards, the limits established are more stringent than those required by standards, as shown in table 3.2. The table shows the average cleanup level for the 193 permits by the basis of permit limits. Water quality-based limits particularly, which served as the basis for one or more limits in 86 of the 193 permits, resulted in permit limits that averaged about 55 percent of the pollutant discharge allowed by the national standard

**Table 3.2: Percentage of Pollutant Discharge Required by Permit Limits Compared With National Standards Allowances**

Basis of limits	BOD <sub>5</sub> limits	TSS limits
National standards	99	95
Judgment	82	74
Water quality	54	55
Other	57	54
Unknown	71	65

## Second-Stage National Standards Do Not Require More Stringent Limits

The Clean Water Act required industry to meet, over time, more stringent limits for existing facilities by using increasingly effective pollution-control technology. While first-stage national standards, as discussed in chapter 2, have been implemented in the pulp and paper industry, more stringent second-stage national standards for existing facilities will not be achieved in the near future.

According to the head of EPA's Industrial Technology Division, second-stage national standards for existing pulp and paper mills issued by EPA on December 17, 1986, were set at first-stage national standards cleanup levels because more stringent second-stage standards failed to pass the cost test required by the act. The 1977 amendments to the act required that second-stage standards for existing facilities be set taking into account the benefits and the costs of achieving the more stringent cleanup levels. Specifically, the 1977 amendments required a comparison of second-stage national standards' costs with the costs incurred by municipalities in meeting the same levels of wastewater treatment. For the pulp and paper industry, the more advanced water pollution-control technology costs for second-stage standards were determined by EPA in July 1986 to exceed the costs incurred by municipalities for this level of treatment.

EPA considers the search for second-stage existing facilities standards (cleanup levels based on the average pollutant discharges of the best of industry practice) complete at present. EPA headquarters officials do not have plans to periodically compare such costs with municipal costs for the pulp and paper industry. They acknowledge, however, that such costs will be assessed again as pollution-control technologies and cost and benefit data may change. EPA also plans to reassess first-stage standards (cleanup levels based on the average pollutant discharges of pulp and paper industry practices) in the future, but as of February 3, 1987, time frames had not been set.

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## Conclusions

The thrust of the NPDES permit program, as applied to the pulp and paper industry, is changing from a cleanup strategy that relies on national, technology-based standards to one that emphasizes local water-quality needs. This shift results from the central role states have in setting cleanup limits on the basis of site-specific water-quality needs, which often require more stringent pollutant discharge limits than do the first-stage national standards. As a result, the program has evolved so that today:

- Local site-specific water-quality needs—not national pollution standards—dominate determinations of what level of water-pollution cleanup is to be achieved. Individual states—not the federal government—are setting cleanup standards for the most part.
- Uniformity in cleanup requirements cannot be achieved because different bodies of water often require different quality needs. Part of the industry is therefore required to meet more stringent standards than are others in the industry.

The thrust of the program has also changed in that EPA has determined that the costs to implement more stringent, second-stage national standards for existing pulp and paper mills, as envisioned by the 1977 amendments to the Clean Water Act, are not reasonable for the industry. Consequently, while states can and are setting limits for most mills that are more stringent than first-stage national standards, the second-stage national standards recently issued by EPA for the industry's existing mills are not more stringent than first-stage standards.

EPA plans to reassess more advanced technology cleanup controls needed to achieve more stringent pollutant discharge limits in the future as cost benefit data may change, but has no specific plans for periodic reassessments at this time as the initial assessment of cost reasonableness was recently completed.

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## Recommendation to the Administrator, EPA

Because water pollution control technology, costs, and benefits can change over time, we recommend that the Administrator, EPA, establish specific time frames for periodic reevaluations of the costs and benefits of implementing more advanced control technologies for existing pulp and paper mills. If EPA determines that the cost of more advanced control technologies is reasonable, such controls should be implemented.

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