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REPORT BY THE

Comptroller General

OF THE UNITED STATES

RELEASED

Costly Wastewater Treatment Plants Fail To Perform As Expected

Over $25 billion in Federal funds and several billion more in State and local moneys have been spent to construct new wastewater treatment plants or to significantly modify existing plants. The Environmental Protection Agency estimates that through the year 2000 an additional $35.6 billion in Federal funds alone will be needed to construct additional treatment plants.

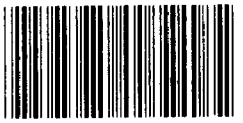
GAO found that many of the plants, in operation for several years, have seldom or never met the performance standards they were designed to achieve. Failure of treatment plants to meet performance expectations may not only have an adverse impact on the Nation's ability to meet its clean water goals, but may also represent the potential waste of tens of millions of dollars in Federal, State, and local moneys.

GAO recommends that the Congress and the Administrator, EPA, test various alternatives to improve the construction grants funding program and to identify

--treatment plants experiencing serious operational problems,

--the extent of repairs required for these plants, and

--who will pay for the repairs.



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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-200800

The Honorable Norman Y. Mineta, Chairman
The Honorable James C. Cleveland
Ranking Minority Member
Subcommittee on Oversight and Review
Committee on Public Works and Transportation
House of Representatives

As requested in your May 24, 1979, letter and after talks with your offices, we reviewed the operation and maintenance of publicly owned municipal wastewater treatment plants to determine the degree and severity of plant performance problems.

This report discusses the extent of the performance problem and makes recommendations to the Congress and the Administrator, Environmental Protection Agency, on the need to identify and hold the accountable party(s) responsible for treatment plant performance problems. The report also suggests several alternatives for improving the construction grants funding program.

As arranged with your offices, unless the contents of this report are announced earlier, we plan no further distribution until 30 days from the date of the report. At that time, the report will be sent to the appropriate congressional committees; the Director, Office of Management and Budget; and the Administrator, Environmental Protection Agency. Copies will also be sent to other parties upon request.

Comptroller General
of the United States

COMPTROLLER GENERAL'S REPORT TO THE CHAIRMAN AND RANKING MINORITY MEMBER SUBCOMMITTEE ON OVERSIGHT AND REVIEW, HOUSE COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION

COSTLY WASTEWATER TREATMENT PLANTS FAIL TO PERFORM AS EXPECTED

D I G E S T

Wastewater treatment plants are considered to be the frontline of the Nation's battle to eliminate water pollution and restore water quality to the thousands of miles of contaminated rivers, lakes, streams, and ocean shorelines throughout the country.

Despite a Federal investment of $25 billion, plus several billion more in State and local funds, to construct new wastewater treatment plants or to modify and expand existing plants, many are not treating wastewater at the efficiency levels they were designed to achieve. The Environmental Protection Agency's (EPA's) statistical reports on plant performance indicate that at any given point in time 50 to 75 percent of the plants are in violation of their National Pollutant Discharge Elimination System permit. GAO's random sample of 242 plants in 10 States shows an even more alarming picture--87 percent of the plants were in violation of their permit; 31 percent were, in GAO's opinion, in serious violation. (See p. 8.)

The National Pollutant Discharge Elimination System permit is EPA's principal tool for enforcing the Nation's water cleanup program. Each wastewater treatment plant must have a discharge permit that specifies the type and limits the amount of pollutant that can be discharged into a receiving body of water.

GAO classified a plant as being in "serious violation" of its permit when the plant was found to be in noncompliance with the permit for 4 consecutive months and exceeded the permit discharge limits by more than 50

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percent. EPA has not defined "serious violation." However, EPA officials said that GAO's definition was conservative. (See p. 10.)

Why aren't the plants working as intended? GAO found that usually not just one but a combination of problems limit a plant's ability to treat raw waste. These problems generally fall into one or more of the following categories:

--Design deficiencies.
--Equipment deficiencies.
--Infiltration/inflow overloads.
--Industrial waste overloads.
--Operation and maintenance deficiencies.
(See p. 14.)

EPA and the States have tried to correct performance problems at wastewater treatment plants, but their attempts have not been timely or effective in bringing plants into compliance with their discharge permits. Nor does the situation seem to be improving. For example, GAO found that:

--Technical assistance provided by EPA and the States is limited and not effective in resolving problems. (See p. 25.)

--Enforcement action varied from none to minimal and followed no consistent pattern. (See p. 27.)

--Funding needed for plant modifications was not readily approved or available. (See p. 32.)

While immediate solutions to complex performance problems are not to be expected, especially where extensive construction modifications are involved, GAO believes that EPA and the States could have done more to achieve faster results.

When a treatment plant fails to meet performance expectations, who is accountable and/or responsible for making the necessary repairs? Technically, under the terms of the grant agreement, the municipality as the grantee is responsible. All too often, however, the

grantee is the one party least qualified. GAO found that municipalities generally have neither the expertise nor the technical staff to deal with the diverse, complex issues involved in the design and construction of a wastewater treatment plant. (See p. 35.)

The question of accountability and/or responsibility for fixing wastewater treatment plants that have seldom or never performed as efficiently as they were designed to be is a tangled web of charges, countercharges, innuendos, and finger pointing by the various parties involved in plant construction. Included in this group are EPA, State, local, and industrial officials; design engineers; equipment manufacturers; and finally, the construction contractors and subcontractors.

Even when the potential exists to legally resolve the accountability and/or responsibility issue and hold another party responsible for correcting plant problems, EPA has not encouraged the grantees to take action or become legally involved. The bottom line generally reads: Federal and State governments spend millions of dollars to fix the same treatment plants they originally spent millions to construct. (See p. 40.)

What is the answer? GAO sees no simple solution to this multibillion dollar problem. However, continuing to fund construction grants in the present fashion will only perpetuate the major problem identified in this report--paying for construction of treatment plants with no assurance that they will do the job.

One way to improve this situation would be to clearly specify who is accountable for ensuring that the plants, once constructed, will work as designed. Then, if deficiencies are noted in a plant's performance, the accountable party would be required to correct them at its expense. (See p. 43.)

To determine the accountable party, various alternatives should be considered and tested. For example:

--One knowledgeable party, preferably the architect-engineering design firm, could be held responsible under contract for planning, designing, and constructing a treatment plant and for demonstrating that the plant will meet both the design criteria and the discharge permit requirements before turning the plant over to the municipality for operation. (This concept is called turnkey.)

--EPA and/or the States could assume a full partnership role with the municipalities by becoming a party (signatory) to the various contracts negotiated for the planning, design, and construction phases. Currently EPA and State agreements extend only to the grantee. With a full vested interest, EPA, the States, and the municipality should be in a stronger position to ensure that contractors perform as they should.

--EPA and/or the States could assume an advisory role to the grantee. This alternative could be used in cases where EPA and/or the States believe that the grantee has the necessary staff and expertise to ensure contract performance. (See p. 44.)

GAO recognizes that there are numerous obstacles and operational details that would have to be identified and resolved before any contract/grant alternative could be tested and that specific approval would be needed from the Congress to require such tests. Yet GAO believes that what is clearly needed is a method for assuring that wastewater treatment plants, once constructed and paid for, will operate as intended. (See p. 45.)

In view of the Nation's fiscal constraints and the desire for a cleaner environment, it is imperative that our limited dollars be used as efficiently as possible. As a Nation, we simply cannot afford the luxury of building wastewater treatment plants that do not work. Therefore, GAO believes that a new approach, or at least a modified approach, to the current construction grants funding program

is needed so that both issues--clean water and limited funds--can be handled more efficiently. (See p. 45.)

RECOMMENDATIONS TO THE CONGRESS

GAO's recommendations to the Congress will not, in themselves, solve the problems identified in this report. Rather, they are a necessary first step toward bringing accountability to EPA's construction grants program.

Because of the magnitude of the problems, there is, in GAO's opinion, a need for congressional oversight of those wastewater treatment plants already constructed, which cost billions of Federal dollars to build, but are in serious violation of their permit conditions; recognition of the significant dollar costs of repairing these facilities; and identifying who--Government or the private sector--will pay for making such repairs.

Therefore, the Congress should require the Administrator, EPA, to:

--Report to the Congress annually on (1) the number of municipal wastewater treatment plants--both major and minor--that have already received Federal grant funding to meet the 1977 secondary treatment requirements but are in serious violation of their permit conditions and (2) what is being proposed and done to ensure that the necessary repairs to these facilities will be made.

--Advise the Congress annually of the progress being made to repair the above identified facilities and who is being held financially accountable/responsible for making the repairs. If Federal funds are being used to make the repairs, advise the Congress on the amount being spent.

In view of the billions of dollars yet to be spent for wastewater treatment plants, GAO also recommends that the Congress require the Administrator, EPA, to:

--Test various alternatives to the current construction grants funding program, including (1) turnkey, (2) becoming a signatory to the various contracts, and (3) assuming an advisory role.

RECOMMENDATION TO THE ADMINISTRATOR, EPA

To provide clearer lines of accountability within the construction grants program and to hold accountable parties responsible for correcting identified deficiencies, the Administrator, EPA, should:

--Reemphasize to all involved parties that clear lines of accountability/responsibility must be established in contracts and that changes and modifications to the proposed systems during any of the three phases--planning, design, and construction--must be clearly documented.

--Develop and issue policy directives and instructions to the EPA Regional Administrators and appropriate State agencies on providing legal and technical assistance to grantees who wish to seek damages through the courts for contract performance deficiencies.

--Require all EPA regions and strongly encourage the States to reinstitute a technical assistance program to help grantees who seek such assistance to identify, evaluate and solve operational problems at their respective treatment plants.

AGENCY COMMENTS

In a September 2, 1980, letter (see app. II) commenting on GAO's draft report, EPA advised that the report accurately describes the severity of the treatment plant compliance problem and that GAO's analysis of the lack of accountability in the construction grants program is on target as a principal cause for the noncompliance.

EPA also stated that it previously recognized many of the issues raised by GAO and that it was currently conducting a series of studies as part of its "1990 Strategy" to identify problems, define alternative solutions, and recommend policies and directions to improve programs which affect publicly owned wastewater treatment plants.

EPA stated that while some of GAO's recommendations are worthwhile, it disagrees with those calling for reports to the Congress. Those recommendations would, in EPA's opinion, impose additional Federal requirements on the States at a time when they are having trouble staffing adequately to meet existing program requirements.

GAO disagrees that additional reporting requirements would have to be imposed on the States. In its monitoring role of State programs, EPA should be receiving data on the efficiency of plant performance. Therefore, in view of the seriousness of the plant performance problems and the enormous Federal investment in these plants, GAO continues to believe its recommendations calling for additional congressional oversight are necessary to improve the wastewater treatment plant construction grants program. (See pp. 47 to 54.)

C O N T E N T S

ABBREVIATIONS

BOD	biochemical oxygen demand
DO	dissolved oxygen
EMS	enforcement management system
EPA	Environmental Protection Agency
GAO	General Accounting Office
mgd	million gallons per day
mg/l	milligrams per liter
NPDES	National Pollutant Discharge Elimination System
O&M	operation and maintenance
SS	settleable solids
TSS	total suspended nonfilterable solids

GLOSSARY

Advanced waste treatment	Processes which remove additional pollutants from wastewater beyond those eliminated by primary and secondary treatment. It includes removal of nutrients, such as phosphorus and nitrogen, and a high percentage of suspended solids.
Biochemical oxygen demand (BOD)	A measure of the oxygen consumed in the biological process of waste decomposition.
Dissolved oxygen (DO)	The oxygen freely available in water. Dissolved oxygen is necessary for the life of fish and other aquatic organisms and for the prevention of offensive odors. Secondary treatment and advanced treatment are designed to protect dissolved oxygen in waste-receiving waters.
Effluent	The wastewater discharged by an industry or municipality.
Effluent limitations	Restrictions established by a State or EPA on quantities, rates, and concentrations of chemical, physical, biological, and other constituents discharged from point sources.
Fecal coliform bacteria	A group of organisms common to the intestinal tracts of man and animals. The presence of fecal coliform bacteria in water is an indication of pollution and of potentially dangerous bacterial contamination.
Nonpoint sources	Sources of pollution that are difficult to pinpoint and measure. Common examples include runoff from agriculture and forest lands, runoff from mining and construction, and storm runoff from urban areas.
Nutrients	Elements or compounds essential as raw materials to organisms for growth and development, such as carbon, oxygen, nitrogen, and phosphorus.

Point sources	Specific sources of pollution that can be readily identified, such as factories and sewage treatment plants.
Pollution (of water)	Contamination or other alteration of the physical, chemical, or biological properties of water, including changes in temperature, taste, color, or odor, or the discharge into the water of any liquid, gaseous, radioactive, solid, or other substance that may create a nuisance or render such water detrimental or injurious to public health, safety, or welfare.
Primary waste treatment	Treatment usually involving screening and sedimentation for removal of the larger solids in wastewater. This process removes about 30 percent of carbonaceous BOD from domestic sewage.
Secondary waste treatment	Treatment using biological processes to accelerate the decomposition of sewage. The process reduces carbonaceous BOD by 80 to 90 percent.
Settleable solids (SS)	Materials heavy enough to sink to the bottom of wastewater.
Total suspended nonfilterable solids (TSS)	Small particles of solid pollutants in sewage that contribute to turbidity (cloudiness) and that resist seperation by convential means.
Waste-load allocation	The maximum daily load of pollutants allowed each discharger of waste into a particular waterway. These discharge limits are required for each specific water quality criterion being violated or expected to be violated.
Water quality criteria	Specific levels of water parameters which, if not violated, are expected to allow a body of water to be suitable for its designated use.
Water quality standard	A legal designation of the desired use for a given water body and of the water quality criteria appropriate for that use.

CHAPTER 1

INTRODUCTION

Billions of gallons of polluted wastewater are generated each day from homes, businesses, and industries across the country. Left untreated, this contaminated waste may enter the Nation's waterways, kill its fish and other aquatic life, and leave the water unfit for human use.

To prevent the continued degradation of the Nation's waters and to restore already contaminated rivers, lakes, streams, and ocean shorelines, wastewater must be treated to remove damaging pollutants. Critical to the success of this removal process are efficiently operated wastewater treatment plants. As of December 31, 1979, approximately 18,000 municipal wastewater treatment plants were either in operation or under construction. These plants represent a Federal investment of about $25 billion plus several billion more from State and local governments. Currently, the Environmental Protection Agency (EPA) estimates that an additional $35.6 billion in Federal funds alone will be needed to plan, design, and construct new wastewater treatment plants through the year 2000.

WHAT IS THE FEDERAL PROGRAM TO CLEAN UP OUR WATERS?

The Federal Water Pollution Control Act, as amended, directs the Nation's water cleanup program.

The primary objective of the act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. The act sets two specific national goals. One goal, commonly referred to as the "swimmable-fishable" goal, is to restore polluted waters, wherever attainable, to a quality that allows for the protection and propogation of fish, shellfish, and wildlife and for recreation use by July 1983. The other goal is to eliminate all discharges of pollutants into the Nation's waters by 1985.

The act requires that, as a minimum, secondary treatment (see p. 3) was to be used by all publicly owned wastewater treatment plants by July 1, 1977, and that by July 1, 1983, these treatment plants are to use the best practicable waste treatment technology available. The Administrator of EPA is authorized to extend the secondary treatment deadline requirements to July 1, 1983, where, through

no fault of the municipality, construction could not be completed in time or where Federal funds had not been made available.

HOW WAS THE CLEAN WATER OBJECTIVE TO BE ACHIEVED?

The construction of wastewater treatment plants is the principal means being used to achieve the Nation's clean water goals. The Water Pollution Control Act amendments of 1956 (Public Law 84-660) created the wastewater treatment construction grants program and authorized Federal financial assistance of up to 30 percent of the cost for constructing municipal wastewater treatment plants. Subsequent amendments increased the Federal share of the construction costs to 55 percent. Between 1956 and 1972, total Federal expenditures for the construction grants program amounted to $5.2 billion. The 1972 amendments increased the Federal contribution to 75 percent and authorized a total of $18 billion for the construction grants program. Finally, the 1977 amendments authorized an additional $25.5 billion through fiscal year 1982.

WHAT TYPE OF TREATMENT IS AVAILABLE?

Treatment plants are classified as either primary, secondary, or advanced depending upon the amount and type of pollutants they are designed to remove.

--Primary treatment removes from wastewater those pollutants that will either settle or float (suspended solids).

--Secondary treatment removes the substances that result in biochemical oxygen demand (BOD) and provides added removal of suspended solids remaining after primary treatment. (BOD is a measure of the amount of oxygen consumed in the biological processes that break down organic matter in the water. Large amounts of organic waste use up large amounts of dissolved oxygen (DO), which is essential for fish and other aquatic life. Thus, the greater the degree of pollution, the greater the BOD.)

--Advanced treatment removes additional pollutants from the wastewater, including nutrients and up to 99 percent of the BOD, and produces a clear, odorless effluent indistinguishable in appearance from drinking water.

Most of the treatment plants operating and proposed for future construction are secondary plants. Primary treatment does not, in most cases, leave water clean enough to meet water quality goals. At the other extreme, advanced wastewater treatment is very costly and generally not necessary, with certain exceptions, to meet the Nation's water quality goals.

HOW DOES A SECONDARY TREATMENT PLANT WORK?

Secondary treatment processes are usually biological in nature, designed to provide the proper environment for the biological breakdown of soluble organic materials. All biological processes depend on bringing micro-organisms into contact with impurities in wastewater so that they can use the impurities as food. Secondary biological treatment requires the availability of many micro-organisms; good contact between these organisms and the impurities; the availability of oxygen; and other favorable environmental conditions, such as the proper temperature and time to work.

The most common methods of providing secondary treatment are trickling filters, activated sludge, and lagoons.

--A trickling filter consists of a bed of coarse material, such as stones, over which wastewater is applied in drops, films, or sprays from moving distributors or fixed nozzles and through which the wastewater trickles to underdrains. Micro-organisms on the stones consume pollutants as wastewater drops through the stones.

--Activated sludge is a process in which a mixture of wastewater and biological sludge (micro-organisms) is agitated and aerated. The micro-organisms clump together to form a mass of activated sludge, which when mixed with wastewater consume the pollutants. Excess activated sludge is removed and disposed of. Variations exist within the process, including conventional activated sludge, extended aeration, and contact stabilization.

--Lagoons, or oxidation ponds, are large shallow ponds designed to treat wastewater through the interaction of sunlight, wind, algae, and oxygen. About 90 percent of these facilities are used in communities of less than 10,000 people.

HOW LARGE ARE TREATMENT PLANTS AND WHAT DO THEY COST?

Treatment plants are expensive. The cost to construct, operate, and maintain a wastewater treatment plant depends on its size and the complexity of the treatment process. Plants generally range in size from a few hundred thousand gallons to several hundred million gallons of wastewater flow per day. Construction costs range from less than $1 million to several hundred million dollars. The following table illustrates 1977 average construction cost figures for selected size plants. With current inflation rates the costs shown would be greater today.

Average Construction Cost
For Wastewater Treatment Plants

Flow	Level of treatment		
	Primary	Secondary	Advanced
(million gallons per day (mgd))	---------- (millions) ----------		
1	$ 0.6	$ 2.6	$ 4.1
5	2.0	10.5	16.0
25	6.2	45.0	70.0
50	10.0	84.0	130.0
100	17.0	155.0	250.0

Note: Figures are in 1977 dollars.

Source: Construction costs for municipal wastewater treatment plants: 1973-1977, performed under contract for EPA by Dames and Moore.

Operation and maintenance (O&M) costs, unlike construction costs which are shared by the Federal Government, are borne solely by the municipality and are paid for over the life of the treatment plant. O&M costs cover normal plant operations such as replacement of minor parts, repair services, personnel, chemicals, and utilities.

According to a 1978 EPA study, the average operating cost per person served (annual O&M cost divided by the service population) for treatment plants, by level of treatment, in 1977 dollars was $7.40 for primary; $9.27 and $14.02 for secondary trickling filter and activated sludge, respectively; and $17.81 for advanced treatment.

HOW IS THE PROGRAM TO BE MONITORED AND ENFORCED?

The National Pollutant Discharge Elimination System (NPDES) permit (hereafter referred to as the permit) is the principal tool used in the water enforcement program. It is a national permit program to control the discharge of pollutants into waterways from all specific point sources, including industrial treatment plants; municipal treatment plants; certain agricultural, forestry, mining, and fishing operations; and other commercial activities. The system is administered by EPA or by an EPA-approved State program.

Under the act, it is illegal to discharge any pollutant into the Nation's waterways without a permit. Any violation of the permit is a violation of the law, and the violator is subject to stiff penalties--fines, imprisonment, or both--enforceable in court. Permits are issued to dischargers by EPA or by a State which has an EPA-approved program. States issuing permits must submit copies of proposed permits to EPA for review and approval. If a proposed State permit does not comply with the law or Federal regulations, EPA may reject it.

The permit specifies which pollutants may be discharged and sets daily average and maximum limits on discharges to meet effluent limits and water quality standards. Limits are generally specified for BOD, settleable solids (SS), total suspended solids (TSS), fecal coliform, and DO, as well as for chemicals and other applicable discharges. (See glossary for definition of these terms.)

OBJECTIVE, SCOPE, AND METHODOLOGY

By letter dated May 24, 1979 (see app. I), the Chairman and Ranking Minority Member of the Subcommittee on Oversight and Review, House Committee on Public Works and Transportation, asked us to initiate a review to assess the degree and severity of problems with municipal treatment plant performance and to review EPA and State policies, programs, and resources directed toward these problems. In addition,

we were asked to evaluate the appropriateness and effectiveness of these actions in relation to the severity of the operations and maintenance problem and to obtain overall statistics on publicly owned treatment plants that were not complying with their NPDES permits.

To answer these questions, we reviewed 15 municipal wastewater treatment plants in 8 States--California, Illinois, Maine, Massachusetts, Michigan, New Hampshire, Ohio, and Rhode Island. The 15 plants ranged in size from less than 1 mgd to 50 mgd and cost from less than $1 million to over $100 million to construct. The 15 treatment plants were selected from listings of worst case situations prepared by the EPA regional office Enforcement Division staffs. The Oversight and Review Subcommittee asked that worst case situations be selected because it believed that EPA and the States should be giving these facilities priority attention.

In addition, we analyzed for a 1-year period, between 1978 and 1979, the monthly discharge monitoring reports for 242 randomly selected, but not statistically projectable, major wastewater treatment plants located in 10 States. The monthly reports show how efficient the plants were in removing pollutants from the wastewater, and the actual amount of pollutant removed can be compared to the amounts their permits required.

The 242 major plants were selected from a universe of 676 facilities classified by EPA and the States as major plants having secondary treatment capability or better. A major municipal treatment plant generally is one where the quantity of wastewater flow that passes through the plant is 1 mgd or greater. The level of treatment--primary, secondary, and advanced--refers to the amount of pollutants removed and remaining after the raw wastewater is processed.

We also examined legislation, regulations, instructions, reports, records, and other documents. We interviewed officials knowledgeable in the field of water pollution control, including EPA headquarters and regional officials; State and municipal officials; plant superintendents and operators; design and consulting engineers; and members of professional organizations including the American Consulting Engineering Council, the Water Pollution Control Federation, and the Association of Metropolitan Sewerage Agencies.

We made our review at EPA headquarters, Washington, D.C.; EPA regional offices in San Francisco, California; Chicago, Illinois; and Boston, Massachusetts; and at State water pollution control agencies in Arizona, California, Illinois, Maine, Massachusetts, Michigan, Nevada, New Hampshire, Ohio, and Rhode Island.

The firm of Eder Associates Consulting Engineers, located in Locust Valley, New York, assisted us by reviewing, assessing, and commenting on the adequacy and completeness of the 15 plants selected for detailed review and by providing guidance on the technical aspects associated with the operations and maintenance of wastewater treatment plants. The firm has experience in the design and construction of industrial and municipal wastewater treatment facilities both nationally and internationally.

CHAPTER 2

VIOLATION OF POLLUTION DISCHARGE PERMITS--A MAJOR PROBLEM

Violation of permits is the norm, not the exception. Over the past several years, EPA has reported that somewhere between 50 and 75 percent of municipal wastewater treatment plants, at any given time, are violating their permits. Our random sample of 242 plants showed an even drearier picture. For a 1-year period between 1978 and 1979, 87 percent of the plants in our sample violated the effluent discharge limits of their permit; 31 percent were, in our opinion, in serious violation.

But what do these statistics mean? Do they mean that the Nation's waterways are getting dirtier, or that after investing $25 billion in Federal funds plus several billion more in State and local funds there is no change in water quality? Will the Nation achieve the clean water goals established by the Congress or, to coin a phrase, are we pouring billions of dollars down the sewer?

For a variety of reasons it is almost impossible to relate permit violations to water quality in a specific body of water. But one fact remains clear: wastewater treatment plants that continuously violate their permits are not helping the Nation meet its water quality goals. Federal grants are provided to build wastewater treatment plants that can meet their permit conditions. But we are not getting what we paid for. Instead we are getting something less, which represents a potential waste of tens of millions of dollars in Federal, State, and local funds.

MOST FACILITIES VIOLATE THEIR PERMITS, AND MANY ARE EXPERIENCING SERIOUS PROBLEMS

EPA's statistical reports on plant performance show that between 50 and 75 percent of the treatment plants in operation are violating their permits at any given time. However, these statistics are not a historical compilation of plant performance, but a "snapshot" of the situation at a specific point in time. EPA's statistics also raise many questions about the seriousness of the plant performance problem. For example:

--How long do treatment plants remain in violation of their permits--1 day, 1 month, 1 year, continuously?

--To what degree are plants violating the terms and conditions of their permits--1 percent, 10 percent, 100 percent--and how are violations classified--minor, major, serious?

--What is the impact on the receiving body of water when a plant violates its permit--no impact, minor impact, major impact?

To answer these questions, we selected for review a random sample of 242 municipal wastewater treatment plants in EPA's Boston, Chicago, and San Francisco regions. We analyzed detailed effluent discharge monitoring reports that depicted plant performance efficiency for a 12-month period between 1978 and 1979. The plants were all classified by EPA as being physically capable of providing secondary or better levels of treatment and were generally processing at least 1 mgd of raw wastewater per day.

The following table shows the results of our analysis by region and includes the number of plants reviewed, the number of plants that violated effluent discharge permit conditions at least 1 month during the review period, and a range of months in which these plants were in violation of their permits.

Effluent Violations That Occurred
In Our Sample During
The Period 1978-1979

Region	Sample number	Facilities in violation: At least 1 month	Number of months: 1-3	4-6	7-9	10-12
Boston	100	94	13	20	28	33
Chicago	92	74	23	15	13	23
San Francisco	50	43	17	4	16	6
Total	242	211	53	39	57	62

As the table shows, most of the plants in our sample--211, or 87 percent--experienced at least one violation of an effluent discharge permit limit during the study period. In addition, 119--56 percent--of the violating plants exceeded their effluent discharge permit limits for more than half the year.

These statistics tell only the extent of the problem. What remains unanswered is the degree that permit limits have been exceeded and the impact that permit violations have on water quality. The degree of permit violations can be answered; however, the impact on water quality is, at this time, unanswerable.

To analyze the effect of permit violations on water quality numerous variables would have to be measured, and criteria for each would have to be established in order to determine the impact of a single permit violation. As a minimum, the variables would have to include

--a detailed knowledge of the receiving waters at the time of the permit violations--the quality of the water, its depth, width, flow rate, and temperature (the ability of the receiving water to assimilate the discharged pollutant);

--the number, type, and amount of the discharges from other point sources (other municipal and industrial dischargers) of pollution to the same body of water; and

--the extent, type, and amount of pollutants entering the receiving waters attributable to nonpoint sources (agriculture, forestry, mining, etc.) of pollution.

This kind of information, as it relates to a given treatment plant and its receiving water, is generally not available. However, it can be safely concluded that continuous permit violations are not beneficial to the receiving water.

We were able to measure the degree of permit violations for the plants included in our review. Because EPA has not established criteria to determine whether a permit violation is or is not serious, we developed our own criteria.

We determined how long--in number of months--a plant was out of compliance with its permit by reviewing monthly discharge monitoring reports, and we compared the plants' actual performance against their permit requirements. When a plant was found to be in noncompliance, the degree of noncompliance was determined by computing a percentage that the actual discharge exceeded the permit limits. Three permit characteristics (also called parameters)--BOD, TSS, and fecal coliform--were generally used in making these compilations. We chose these three pollutant parameters because they are generally found in all permits, the degree of violation is measurable, and the effluent limit for BOD is one of two parameters included in Federal regulations.

We classified a plant as being in serious violation when one or more of the three parameters was violated for more than 4 consecutive months during the review period and averaged more than 50 percent above the permit limit during the period of noncompliance. The 4-month period was selected to allow for seasonal changes in climate that could impact on plant operations; for example, high water flows attributable to spring thaws, or conversely, low water flows due to summer droughts. The more than 50 percent criterion was an arbitrary decision. Therefore, for us to classify a plant as a serious violator, both criteria had to be met. EPA officials acknowledged that our criteria were extremely conservative.

Using the above definition, we classified 66, or 31 percent, of the 211 violating plants as being in serious violation of their permits. The following table shows the results of our analysis by permit parameter and includes the number of plants violating the parameters and the percent range that the parameters were exceeded.

Wastewater Treatment Plants Classified As Serious Permit Violators

Parameter violated	Number of plants in violation more than 4 consecutive months (note a)	Percent range parameter exceeded	
		50-100	Over 100
BOD	34	15	19
TSS	42	13	29
Fecal coliform	17	--	17

Note a: Number of plants exceeds 66 because of multiple parameter violations--some plants violated BOD, TSS, and fecal coliform, while others only violated one or two of the three selected parameters.

As the above chart shows, 34 of the 66 plants with serious violations exceeded the permit limits for BOD for more than 4 consecutive months. Fifteen of the 34 plants exceeded the BOD limit by 50 to 100 percent, while the remaining 19 plants exceeded the BOD limit by more than 100 percent. The same types of analysis can be made for the TSS and fecal coliform limits.

FAILURE TO ACHIEVE TREATMENT LEVELS MAY REPRESENT MILLIONS IN WASTED DOLLARS

Wastewater treatment plants are designed and constructed to remove a predetermined amount of the pollutants contained in raw wastewater. The amount of pollutant to be removed is based on water quality standard criteria that correspond to the amount of pollutant that can be contained in the receiving water and still not have an adverse impact on its designated use--swimming, fishing, drinking, etc. Failure to remove the amount of pollutant required may mean not only that the water cannot be used as intended, but that Federal, State, and local governments may have wasted tremendous amounts of money if the level of treatment paid for is not achieved.

For example, if a 2-mgd advanced wastewater treatment plant, which according to EPA's latest statistics costs an average of $7.4 million to construct, consistently operates at a level approximating secondary treatment, which costs about $4.8 million to construct, the potential amount wasted on that one facility alone could be as high as $2.6 million.

How important are these pollutant removal figures and how do they relate to the cost of a treatment plant? According to EPA, the amount of pollutant that must be removed, or conversely, the amount of pollutant that can be contained in the receiving water--depending upon its designated use--is critical, because the balance of nature in terms of sustaining life is extremely delicate.

For example, a permit issued to a wastewater treatment plant generally allows the maximum amount of oxygen demanding pollutant that can be discharged to the receiving water, under the receiving water's worst case condition, and still not harm the aquatic ecosystem. The amount of these pollutants--BOD, TSS, etc.--is usually expressed in milligrams per liter (mg/l). One mg/l of pollutant is equivalent to 1 part of pollutant (by weight) in 1 million parts of water. According to EPA, to put these terms in perspective, 1 mg/l is equivalent to 1 minute of time in 1.9 years or 1 inch in 16 miles.

These figures illustrate that the wastewater treatment process designed to remove a few milligrams per liter of pollutant is similar to sifting a haystack to find the proverbial needle. Yet, the balance of nature is such

that the presence or absence of only 2 or 3 mg/l of oxygen in a stream or lake can mean the difference between life or death to the ecosystem of those waters.

To translate the above figures into dollars, they must be applied to the level of treatment to be achieved--primary, secondary, or advanced. Permits for some treatment plants, for example, may contain discharge limits as stringent as 10 mg/l of BOD. This in effect means that the oxygen demanding pollutant (BOD) contained in the discharged wastewater cannot exceed 10 mg/l when it enters the receiving water, under worst case conditions, without supposedly having an adverse impact if all other factors remain equal. The sophistication of the treatment process--the amount of pollutant to be removed--corresponds to the cost of designing and constructing the plant. As shown in the chart on page 4 of this report, the average cost to construct a 1-mgd primary treatment plant is $600,000, versus a secondary treatment plant with a cost of $2.6 million, versus an advanced treatment plant with a cost of $4.1 million. Therefore, the failure to achieve the level of treatment required may not only have an adverse impact on the receiving water, but also represents a significant dollar investment for which a corresponding return is not being realized.

Although we cannot show the amount of money actually wasted on the plants contained in our sample, consistent noncompliance--especially the 66 plants classified as serious violators--represents the potential waste of millions in Federal, State, and local funds.

CHAPTER 3

WHAT CAUSES LONG-TERM NONCOMPLIANCE WITH PERMITS?

Many municipal wastewater treatment plants, in operation for a number of years, have seldom or never been in compliance with their permits. The over-riding question is: Why? Why aren't the plants working as intended? Usually the cause is not just one but a combination of problems that limit a plant's ability to treat raw waste. These problems can generally be categorized into one or more of the following areas:

--Design deficiencies. The actual design of the plant is inadequate. Tanks, pumps, pipes, etc., are too large or are not large enough, and therefore the plant is unable to operate at an acceptable level to meet the permit conditions.

--Equipment deficiencies. Although equipment placed into the plant meets the minimum design specifications, it has been determined, through actual operations, to be inferior in performance, durability, and reliability.

--Infiltration/inflow overloads. Infiltration is ground water entering a sewer system through defective sewer pipes, joints, connections, or manhole walls. Inflow is water discharged into a sewer system from sources such as cross connections from storm sewers and combined sewers; manhole covers; and cellars, yards, and foundation drains. Overloads of these types produce more flow than the plant can handle so that much of the waste bypasses the treatment process.

--Industrial waste overloads. Waste from industry that contains toxics and/or high organic loads that are not compatible with the plant's treatment system process.

--Operation and maintenance deficiencies. Insufficient or underqualified staff, inadequate budgets, and the lack of operator training programs are but a few of the factors that affect this category.

An EPA consultant study, completed in 1978, showed similar problem areas. This study identified design, industrial waste overload, and infiltration/inflow as the more serious problem categories. Other areas of concern included O&M deficiencies and administrative problems.

Solving a wastewater treatment plant's performance problems is not an easy or a simple task. Resolution generally requires detailed study, the results of which often recommend extensive modifications to the existing plant or major new construction. In either case, the recommended action usually takes years to complete and almost always involves additional Federal and/or State funding.

We would not expect complex wastewater treatment problems to be solved immediately. Even so, we believe that EPA, the States and the municipalities have not acted as quickly or as effectively as they might have to bring plants into compliance with their permits. Problems have existed in some cases for more than 8 years. Limited technical assistance, varied and inconsistent enforcement, and lack of financial aid to correct identified problems have prolonged the noncompliance situation at these facilities.

WHAT ARE THE REASONS FOR PLANT NONCOMPLIANCE?

The 15 treatment plants we selected for detailed review all experienced problems as soon as they began operating and have not complied with their permits since they were issued --periods ranging from 2 to 7 years. Each plant had a combination of problems that limited its ability to properly treat waste, as illustrated by the following table.

Reasons For Plant Noncompliance

Major category	Number of plants (note a)
Design deficiencies	10
Equipment deficiencies	2
Infiltration/inflow problems	3
Industrial waste overloads	5
O&M deficiencies	9

a/Figures total more than 15 plants because most plants have more than one major problem.

Design deficiencies

A design deficiency is one of the more critical problems affecting a treatment plant's ability to meet permit conditions. Such deficiencies result from one or more causes including: limited state of the art during the design phase, insufficient monitoring and sampling of influent prior to plant design, lack of design firm expertise, and time and funding constraints on the part of the municipality. Following are examples of plants with design deficiencies.

South Paris, Maine

The treatment plant in South Paris, Maine, which provides secondary treatment for 1.85 mgd of waste, has been consistently out of compliance with its permit since it began operating in 1975. During the period May 1978 to April 1979, the facility continually violated its monthly average discharge permit limits for BOD, TSS, and SS by over 100 percent.

Built at a cost of $6.8 million ($3.5 million Federal grant, a $2.9 million Federal loan from the Farmers Home Administration, and $0.4 million coming from State and local funds), the plant treats both domestic and industrial waste. It receives 60 percent of its average daily flow from the principal industry in the area, a leather company and tannery. According to the various parties involved with this facility--the consulting engineer and municipal, State, and EPA officials--the problems go back to an inadequate, flaw-ridden pilot study made by one engineering firm and used by a second engineering firm as the basis for the plant design.

One of the major design deficiencies identified by the consulting engineer is the inadequate control of the hazardous chromium (tryvalent) waste used by the tannery to process hides. The plant's treatment process does not allow the chromium to trickle through the primary treatment stage at an even rate, and so it leaves this stage in a "slug." As this large mass of chromium passes through the secondary treatment stage, it destroys the plant's bacteria and ends up in the final effluent.

The initial study also failed to recognize large chunks of leather as significant tannery waste. The pilot study labeled the chunks that appeared in the waste sample as "nonrepresentative." However, when construction of the plant was completed and it began accepting the tannery waste, the chunks clogged pumps and other equipment.

Attempts to catch the chunks by installing screens has not always been effective, and clogging continues to occur.

The pilot study also failed to correctly estimate the levels of flow and the organic content of the waste discharged by the tannery. The design criteria for the plant specified that the tannery waste would comprise 75 percent of both the flow and other pollutants, such as BOD. The actual discharge from the tannery, however, provides 60 percent of the flow and over 90 percent of the other pollutants.

Finally, the plant as designed lacks adequate aeration unit capacity and has an improper sludge return operation, which returns sludge to the incoming flow rather than to the aeration tanks.

Costs to modify the facility have been estimated at $1.2 million.

Deerfield, Massachusetts

Another example of design deficiencies is the South Deerfield, Massachusetts, treatment plant. This plant, one of two within the city of Deerfield, began operating in 1971 and provides secondary treatment to both domestic and industrial waste. Waste flow through the plant is about 1 mgd. A pickle processing firm (the principal industrial discharger) contributes, depending upon the season of the year, between 25 and 35 percent of the total waste flow.

The treatment plant has failed to consistently meet its permit condition since it was issued in 1974. During the period May 1978 to April 1979, the plant continuously violated its permit conditions for BOD, TSS, and SS. The discharge for each of these pollutants exceeded monthly allowable limitations by over 100 percent.

In 1976, 5 years after the plant started operations and during which time it was continuously experiencing operational problems, the State regulatory agency, in consultation with EPA and local officials, instructed Deerfield to hire an outside consulting engineer to study the plant's performance problems, determine the causes for the problems, and make recommendations to bring the plant into compliance with its permit.

In his November 1977 report, and in our subsequent discussions with him, the consulting engineer identified the following design deficiencies:

--The product line from the pickle processing firm changes four times a year--relish in the spring, pickles in the summer, peppers in the fall, etc. Each product line produces a change in the alkalinity of the waste flowing to the treatment plant and affects its ability to process this waste. The consulting engineer found that during the original design phase, only one seasonal discharge from the pickle firm was considered.

--State-of-the-art treatment to process pickle waste was limited during the original design phase--late 1960s. Since that time technology for processing pickle waste has been significantly improved.

--In the original design, rectangular secondary clarifier tanks were recommended and installed. Current technology stipulates circular clarifiers as far superior.

--The community was unable to match funds in the amount needed to construct the plant as designed. In reducing the scope of the project, grit removal and mechanical sludge dewatering processes were eliminated from the design. Both processes were later determined to be essential for proper plant operation.

To correct these deficiencies, the consulting engineer has recommended the restructuring of nearly every component of the system, including replacing the aeration equipment clarifiers and sludge return pumps and adding grit removal and mechanical sludge dewatering processes. Cost of these changes is estimated to be $1 million. (The original cost of the South Deerfield plant was $574,000.)

Equipment deficiencies

Municipal O&M practices often contribute to equipment breakdowns. However, many municipal officials and design engineers believe that unreliable and inferior equipment is the major reason that O&M problems lead to inadequate plant performance. What the local officials and engineers specifically object to is the portion of the Federal procurement regulation commonly referred to as the "or equal" clause, which allows construction contractors to install lower cost equipment from a manufacturer other than the

one designated by the design engineer. Substitution is allowed as long as the equipment meets the minimum specifications approved in the design plan.

The municipality or the design engineer, as an agent of the municipality, may object to the equipment substitutions and may petition EPA or the State to disallow the low bid equipment. To do so, however, requires proof that the substituted equipment (1) does not meet minimum design specifications or (2) is an inferior quality product. In discussions with design engineers and the Directorate of the Water Polllution Control Federation, several reasons were given for not objecting more often to substitution of equipment. For example:

--Performing tests on equipment to determine its quality and reliability takes time, and time to a design firm means money. Such tests are not generally grant eligible or cost reimbursable items for a design engineering firm. Therefore, the entire cost of the tests would have to be paid by the municipality or the design firm.

--In many instances, the substituted equipment has not yet been manufactured. The successful low bidder may have been determined to be responsible and qualified to produce the equipment, and the shop drawings may be available to show that the equipment design meets the minimum specifications. However, the actual piece of equipment has not been manufactured and therefore no performance history built up on its reliability and durability.

--The design engineer who objects and attempts to overturn the low bid could be subject to legal action by the low bidder if the bid protest is not successful.

Regardless of the validity of these arguments, a number of treatment plants are experiencing operational problems caused by equipment failures. For example, at the Massillon, Ohio, treatment plant, equipment breakdowns are considered to be a major reason why the plant is not able to meet its permit. The Massillon plant--classified as an advanced secondary facility treating 12.5 mgd of waste--has been in constant violation of its permit limits for BOD, TSS, and several other pollutant parameters since the expanded system began operating in May 1976. During the period January through October 1979, the facility violated its monthly average discharge permit limits for BOD and TSS

for 7 and 6 months, respectively, and in each case by over 100 percent during the noncompliance periods.

According to all parties involved--EPA, State, and local officials and the consulting and design engineers--the constant noncompliance is attributable to the plant's problems with treating, removing, and disposing of sludge. Shortly after the plant became operational, heat treatment equipment breakdowns caused the plant's primary and secondary treatment units to become overloaded with solids. When solid buildups become too high, concentrated supernatants (concentrations of digested sludge and a clear liquid) are recycled through the plant. This recycling results in an excessively concentrated influent coming into the plant, which cannot be treated to the levels prescribed in the permit.

This problem is caused by the constant breakdown of the heat treatment equipment and the unavailability of spare parts to keep the equipment working properly. Massillon officials said that at one point they had to wait several months for spare parts in order to repair the equipment. A representative of the design engineering firm explained that the plant was originally designed to include a "Brand A" heat processing system but the construction contractor under the "or equal" clause substituted "Brand B" equipment which met only the minimum design specifications. Based on the actual performance of the "Brand B" equipment, the design engineer advised that the "Brand A" equipment would have been, in his professional opinion, more reliable as it had withstood the test of both time and durability.

EPA and State enforcement officials told us that enforcement action has not been taken against the municipality because they are aware of the equipment problems at the plant and felt that city officials were taking all the reasonable action they could short of replacing the heat processing equipment.

Infiltration/inflow problems

Infiltration and inflow of water to a waste treatment plant, caused by combined stormwater and sewer lines and/or defective sewer piping, can overload a treatment plant's tanks and components. For example, a treatment plant with a significant inflow problem may, for a brief time following a rainstorm, be subject to more flow than it is designed to handle. The increased flow may surge through the plant with such force that it carries the bacterial solids out

of the plant with the effluent. Bacterial solids feed on the incoming waste to remove pollutants; when disrupted or destroyed, the bacteria must be regrown before the plant can adequately treat additional waste. Regrowth can take weeks. During the bacteria regrowth process, the plant is generally not capable of treating the waste to the level required in the permit.

EPA regulations require that applicants for construction grants demonstrate that each sewer system discharging into the treatment works is not, or will not be, subject to excessive infiltration/inflow. Generally a sewer system is evaluated to determine whether or not excessive infiltration/inflow exists. If excessive infiltration/inflow exists, corrective action must be taken. Corrective action can be taken in one of several ways--which include increasing the capacity of the plant or repairing the sewer lines.

Consulting engineers indicated that infiltration/inflow problems are always considered when designing a treatment plant; however, replacement of sewer lines can be a massive, time-consuming, and costly task. Therefore, despite EPA regulations, existing sewer systems, even with significant defects, are often used to reduce both the time to construct and the cost of a proposed project.

Three of the 15 plants selected for detailed review--Adams and Deerfield, Massachusettts, and Flint, Michigan--have significant problems with infiltration/inflow. Although this was only one of several problems at these plants, it did contribute toward permit noncompliance. Both Massachusetts municipalities have replaced defective sewer lines during road reconstruction; but much more needs to be done to further reduce or eliminate the problem.

Infiltration/inflow is a much more serious problem in Flint. In addition to equipment and construction problems, the Flint wastewater treatment plant has been plagued with high flows and flooding for years. The Flint plant is a 34-mgd secondary treatment facility with activated sludge and trickling filter capacity. Expansion is currently underway and when completed will provide advanced waste treatment for 50-mgd design average flow and 84-mgd maximum daily flow. To date, the Flint plant has received approximately $94.6 million in Federal funds.

EPA awarded Flint a facility planning grant in February 1976 to study the infiltration/inflow problem. Based on the

study results, EPA awarded a construction grant to the city in January 1978 for $40 million. This was later raised to $59 million. The grant will pay for construction of

--a 10 million gallon retention facility, a 40-mgd pump station, and other modifications to the existing wastewater treatment plant;

--a 26-mgd flow pumping station;

--modifications to the existing pumping stations throughout the collection system;

--trunk sanitary sewers providing 10 million gallons of inline storage; and

--installation of sanitary relief sewers.

As of December 1979, construction was not yet completed; therefore, it was too early to tell if the $59 million expenditure will solve the infiltration/inflow problem.

Industrial waste problems

Industrial waste caused problems in five of our cases. Industrial flow contributes to permit noncompliance either when toxics disrupt bacterial solids within the treatment plant or when the high level of organic pollutants, such as BOD, in the industrial waste exceeds the plant's capacity to treat the waste at the required level.

Toxic solutions cannot be treated by the biological process and are generally prohibited by sewer ordinance from entering the system. In these cases, industries must pretreat the waste or find other means of disposal. However, if the industry violates the sewer ordinance or toxics do escape the pretreatment process, the impact on the plant's performance capability is devastating.

On the other hand, organic pollutants are considered compatible with the biological treatment process, but the amount of the pollutants must be properly estimated and considered when the plant is designed. Disruptions to the treatment process occur when the plant's design is inadequate to treat the amount of organics received. Plant design can be inadequate because (1) improper flow and/or organic level estimates were used by the design engineer, either because

of insufficient sampling of the waste or inaccurate information provided by the industries, (2) the amount of industrial waste has significantly changed--increased or decreased--since the plant was designed, or (3) industries discharging into the system changed their product lines which in turn changed the organic makeup of the waste.

The treatment plant in Merrimack, New Hampshire, is an example of a plant with a serious problem with organic overloading. This plant, a 5-mgd secondary treatment facility, began operating in 1970 at a cost of $5.4 million with a Federal contribution of $2.7 million. The plant has failed to consistently meet its permit since it was issued in 1974. According to local officials, high organic loads in the discharge from a brewery located within the city has continually overloaded the plant's capacity to treat the waste.

When the treatment plant was designed, the brewery, although planned for the area, had not yet been built. As a result, the design firm relied on brewery officials to provide estimates of what the total discharge flow would be and its organic makeup. These loading figures were used by the engineer to design the plant's internal systems process and were also incorporated in a 1968 agreement between the brewery and the city. Soon after the plant began operations in May 1970, problems occurred in treating the brewery waste. Charges and countercharges were made by the city and the brewery over interpretation of the agreement--the amount of flow authorized and its organic makeup.

Over the next 5 years--1970-1975--EPA inspected the facility several times and finally concluded that the operating problems were definitely caused by organic overloads from the brewery. These organic overloads not only decreased the plant's operating efficiency, but the discharges of spent grain, wood chips, and various straw used in the brewery process had created a solids-handling problem.

EPA further concluded that because the plant could not be operated more effectively as designed, the only way to improve effluent quality was to resolve the waste-handling problems. EPA therefore instructed the city to apply for a facility improvement grant. Modifications to the plant would include adding a floatation thickener, vacuum filters, and an incinerator. These modifications were completed in 1977. The Federal contribution to these changes amounted to $3.7 million, or approximately $1 million more than the Federal grant to build the plant.

In 1976, while the plant modifications were underway, the city and the brewery entered into another agreement. This agreement was intended to eliminate the ambiguities contained in the 1968 agreement. The new agreement authorized an increase in the amount of flow from the brewery as well as an increase in the organic makeup of the flow. However, problems continued to plague the plant even after the modifications were completed. According to city and brewery officials, the 1976 agreement was also being violated and the plant was again experiencing organic overloads.

During the same period that the construction modifications were being made (1976-77), the city hired another consulting engineer to indentify other plant problems and to make recommendations to improve plant operations. This engineer concluded that to adequately handle the brewery waste, further modifications were needed. He recommended the installation of two new secondary clarifiers, an intermediate settling tank, a new sludge pumping station, and associated piping and yardwork. Cost of these modifications was estimated to be $2.6 million.

The city applied for another Federal grant of $2 million and was placed on the State priority list with construction scheduled to begin in late 1980. 1/ With this latest round of improvements pending, in 1979 the city and the brewery signed another agreement, permitting a further increase in the amount of flow and organic makeup of the waste. The new agreement is to become effective when the latest round of construction modifications is completed.

Operational deficiencies

Inadequate local operating budgets and undertrained staffs is a big problem at wastewater treatment plants. As with the other problem areas, numerous recommendations have been made to improve this situation, including more technical assistance, training programs, O&M inspections, and enforcement. As a result, startup cost provisions, which authorize the design engineering firm to train treatment plant staff for periods ranging from an average of 90 to 300 work days after the plant begins operation, were made a grant-eligible cost item in November 1976. Despite these efforts, day-to-day O&M deficiencies are still prevalent.

1/In late 1979, the State of New Hampshire notified the city of Merrimack that it was being removed from the State priority list. No Federal funds will be available for plant improvements until at least fiscal year 1983.

At 9 of the 15 plants we reviewed, operational deficiencies were considered to be a major problem. For example, at the Petaluma, California wastewater treatment plant--a 5.5-mgd secondary treatment facility costing $4.2 million--it was found that the secondary digesters were inoperative due to poorly trained staff and ineffective maintenance; the centrifuge and the chlorinators were inoperative; the plant had no system for scheduled maintenance and no operator training programs; and the treatment plant staff was periodically diverted for a part of each week to work on other city projects.

To remedy the problems at this particular plant, in February 1979 Petaluma hired an independent firm to operate and maintain the facility. The independent contractor brought in its own plant manager, and all staff at the plant became employees of the contractor with no responsibilities outside the facility. An on-the-job training program in wastewater process control was established, preventive maintenance schedules were instituted, and repairs to the facility were made. According to city officials, as of November 1979 the plant was operating, for the first time, within permit effluent guidelines.

EPA AND STATE ACTIONS TO CORRECT PROBLEMS ARE NOT ALWAYS TIMELY OR EFFECTIVE

EPA and the States have tried to correct problems at municipal wastewater treatment plants by providing technical assistance, taking enforcement action, and providing additional funds. In the 15 plants we reviewed, however, EPA and State efforts to improve plant performance did not seem to follow any pattern. The actions taken were not timely or effective in bringing plants into compliance. While we did not expect to find immediate solution to these complex problems, especially where construction modifications were involved, more timely and consistent action by EPA and the States would seemingly have achieved faster results. We found that:

--Technical assistance is limited and not effective in resolving problems.

--Enforcement action varied from none to minimal and followed no consistent pattern.

--Funding required for plant modifications was not readily approved or available.

EPA and the States provide
limited technical assistance

Under EPA's present policy little if any direct onsite technical assistance is given to municipalities whose treatment plants are having operational problems. The Agency's rationale for this policy is twofold: First, it lacks resources--money, manpower, and expertise--to assist the thousands of communities who need help and second, providing onsite technical assistance could jeopardize enforcement actions if EPA's recommendations did not actually improve plant performance. Apparently, the States have followed EPA's lead and have adopted a similar policy. State officials told us that, like EPA, they do not have the money, manpower, or expertise to establish comprehensive onsite technical assistance programs. Thus, communities are placed in a "catch 22" position. If they don't solve their plant performance problems, EPA or the State will take enforcement action. Yet when they turn for help to the agencies that should be the most knowledgeable, they are told that no help will be provided since it might jeopardize future enforcement actions.

Assistance to the municipalities has therefore been limited primarily to (1) periodic training programs conducted by the States and (2) suggestions made by either EPA or the State staffs during O&M or compliance inspections. However, EPA and State officials said that suggestions are made only when no enforcement action is pending against the municipality.

In a prior report entitled "Continuing Need For Improved Operation And Maintenance of Municipal Waste Treatment Plants" (CED-77-46), dated April 11, 1977, we pointed out that because of the overriding need to protect the large Federal investment in municipal treatment plants, we believed that technical assistance should be available to a municipality when it seeks help in solving operational problems.

In commenting on that report, EPA stated that a study conducted in 1976 showed that municipal compliance problems were much greater than originally believed. Consequently, EPA and the States decided that they lacked the resources to address all technical asistance problems. EPA believed that it must (1) stimulate development in the private sector to meet most of this need and (2) focus on aggressive enforcement of municipal permits and insist that municipalities seek the necessary technical and training assistance outside the Federal and State governments to induce the

private sector to develop the needed capability. EPA also stated, however, that until the private sector developed this capability, it and the States should continue to offer technical assistance.

EPA, contrary to its response, deemphasized its technical assistance program before the private sector capability was adequately developed. 1/ For example, within EPA headquarters, the Municipal Operations and Training Division was disbanded in 1979, with its personnel transferred to either the Construction Grants or Enforcement Divisions. In EPA's Boston, Chicago, and San Francisco regional offices, the decreased emphasis is also apparent. The Boston office reduced its operation and maintenance and training (technical assistance) force from 8 staff-years to 3 staff-years between fiscal years 1978 and 1980. As a matter of policy, the Chicago and San Francisco regions provide no technical assistance.

State emphasis on technical assistance has also decreased. For example, Ohio officials told us that a program was started several years ago that was originally intended to provide technical help to municipal treatment plants. However, because the manpower and funding for the program never materialized, the program never got off the ground.

On November 1, 1979, the Administrator of EPA, testifying before the Subcommittee on Oversight and Review, House Committee on Public Works and Transportation, reemphasized EPA's position on technical assistance. He stated that communities should look to the private sector rather than to the Federal and/or State governments when they need help in identifying and solving problems with plant operations.

Three years after commenting on our prior report, EPA is still attempting to establish the link between the private sector and municipalities for technical assistance. In the interim, until the private sector capability is developed, it appears that EPA and the States will continue to conduct O&M and compliance inspections, which will likely identify the same problems year after year, but no corrections will be made.

1/EPA is currently using a series of demonstration grants to attract more private firms into the business of providing technical service capabilities.

EPA's enforcement action is inconsistent

In amending the act in 1972, the Congress clearly made the discharge of any pollutant into the Nation's waters or the violation of any permit condition by a discharger illegal. According to the act, violators are subject to severe penalties, including fines, imprisonment, or both, enforceable in a court of law. It was equally clear in the legislation that EPA was to enforce these requirements. In the 15 cases we reviewed, however, enforcement action varied from none to minimal, followed no particular pattern, and was not as timely or effective as it could or should have been.

EPA officials told us that although the act was clear in stating its objectives, goals, and requirements, it left EPA with several major decisions to make about how to implement it. For example, the act required that by July 1, 1977, point source dischargers (primarily industrial), other than publicly owned treatment works, were to attain the best practicable control technology available. Publicly owned treatment works (municipal dischargers) were to treat their wastes to at least the secondary level. This requirement meant that literally thousands of point source dischargers across the Nation--public and industrial--were going to have to upgrade the physical capability of their plants to meet the act's requirements.

EPA planned to use its permit program as the tool for forcing these dischargers into complying with the law. As previously stated (see p. 5), the permits set stringent limits on the amount of pollutant that can be contained in waste when it is discharged. If the plant was not physically capable of treating waste at the level required, it was to be placed on interim effluent limits and on a time schedule in which to upgrade its physical capability--a schedule of compliance.

According to EPA officials, following passage of the 1972 amendments, two key decisions were made with regard to the enforcement program. First, EPA would concentrate on bringing plants up to the physical capability required by law--schedules of compliance--for both industrial and municipal dischargers. Second, the majority of its enforcement actions would initially be directed toward industrial violators.

EPA has followed through with these two key issues as is evident from statistics indicating that as of July 1, 1977, about 40 percent of all major municipal dischargers had achieved secondary treatment capability, while about 80 percent of all major industrial dischargers were using the "best practical control technology."

In October 1977 EPA implemented the Enforcement Management System (EMS) program, which in effect shifted enforcement emphasis away from industrial violators and toward municipal plants. The primary objective of the program was to ensure compliance with all applicable permit conditions--construction schedules of compliance as well as effluent discharge limitations.

Although the EMS guide advocated enforcement of all permit conditions, it emphasized bringing municipal plants up to the physical capability required by law--secondary treatment levels. In effect, enforcement action against those municipalities whose physical plant capability was already at the secondary treatment level, but whose actual performance was not satisfactory, took a secondary position.

The 15 plants selected for detailed review illustrate this program direction. As previously stated, all the facilities included in our review were classified as having the physical capability to treat waste at the secondary level or better. However, in actual performance, the effluent discharged was significantly violating the permit. The limited enforcement action taken not only varied among the EPA regions but also within the same region. For example, in EPA's Boston region, enforcement action taken by either the States or EPA for five of the plants selected for detailed review was limited to the following:

--The Merrimack, New Hampshire, plant, a 5-mgd secondary treatment facility costing $5.4 million, has experienced problems since it began operations in 1970. Since 1972 the EPA enforcement staff has held several meetings to discuss the plant's performance problems with municipal officials and officials from the principal industry contributing waste to the plant.

In 1974 EPA sent an enforcement letter--notice of violation--to the municipality and the industry advising them that the plant was not meeting its effluent discharge permit limits and requesting information from both parties about what was being done to improve the plant's performance.

In 1975 EPA issued an administrative order to Merrimack, again pointing out that it was in violation of the permit. This order requested specific information about what the municipality planned to do to improve plant performance. As a result of the administrative order and EPA's instruction, the city applied for a facility

improvement grant. Construction modifications were made to the plant in 1976 and 1977 at a cost to the Federal Government of $3.7 million.

Although the plant continues to violate the permit, no further enforcement action has been taken.

--The South Deerfield, Massachusetts, plant, a 1-mgd secondary treatment facility costing $574,000, began operating in 1971. The plant has never worked as intended. EPA and the States refrained from taking enforcement action during the first 5 years after the plant started operating while the design engineer and municipal officials experimented with various processes.

Finally, in 1976 the State regulatory authority ordered the municipality to hire a consulting engineer to evaluate the plant's performance problems and recommend solutions. The State in 1976 also imposed a sewer moratorium until corrections were made.

EPA took action for the first time in 1979 when it sent an enforcement letter--notice of violation--to the municipality, advising it that it was in violation of the permit effluent limits and requesting information about efforts to improve plant performance pending planned construction modifications.

--The South Paris, Maine, plant, a 1.85-mgd secondary treatment facility costing $6.8 million, has had problems since it began operating in 1975. Neither EPA nor the State has taken any enforcement action. A consulting engineer is currently evaluating the plant.

--The Wilbraham, Massachusetts, plant, a 0.6-mgd secondary treatment facility costing $3.2 million, began operating in 1974. The plant has had continuous problems since it began operation. EPA enforcement actions include three notices of violation in 1975 and two in 1979. Each letter advised the city that it was in violation of the permit and requested information about what was being done to improve plant performance. In 1979 EPA issued an administrative order to the city requiring that it comply with the permit.

Currently, the plant needs major modifications; however, the detailed analysis and recommended action is being held up pending a decision by a major contributing industry to the plant as to whether or not it plans to connect to a neighboring city's treatment plant. If this occurs, EPA and State officials have indicated that the Wilbraham plant may be abandoned and all waste sent to the neighboring city.

--The Adams, Massachusetts, plant, an 8.2-mgd secondary treatment facility costing $3.5 million began operating in 1971 and problems were immediately evident. After EPA technical assistance failed to improve plant performance, the State required the municipality to hire a consulting engineer to evaluate problems and recommend solutions. The consultant recommended considerable modifications to the plant.

In 1979 EPA took its first enforcement action when it sent a letter--notice of violation--to the city advising that it was violating the permit and requesting information about when it planned to begin and how long it would take to complete construction of the modifications recommended by the consultant.

EPA regional officials agreed that the enforcement action taken against the five municipalities has not been consistent or necessarily appropriate.

In November 1979 EPA once again announced a new plan for bringing thousands of municipalities into compliance with Federal water pollution control regulations. Agency officials stated that the new "National Municipal Policy and Strategy" plan was prompted by the findings in an analysis of public treatment works, which showed that more than 10,000 municipalities were not complying with the July 1977 requirement for treating wastewater at the secondary level. Under the new policy, EPA will separate noncomplying municipalities into six categories. Municipalities placed in the following three categories could be subject to enforcement action.

--Municipalities that have contributed significantly to the delay in building sewage treatment facilities needed to comply with the law.

--Communities that have constructed sewage plants but either are failing to adhere to Federal limits on discharges or otherwise are violating the terms of their permits.

--Jurisdictions that are endangering public health or creating significant pollution problems and have not built plants because of their low ranking on the State's construction project priority lists.

The three remaining categories will be comprised of communities that have neither built nor contributed to the delay in constructing adequate sewage treatment facilities. Generally, they will be issued administrative orders or permit extensions and given specific timetables for complying with Federal regulations. These three categories are:

--Communities that can obtain construction grant funds and construct new plants by July 1983.

--Jurisdictions that have construction funds available to them but cannot meet the July 1983 deadline.

--Municipalities that cannot obtain construction funds and therefore cannot build new plants by July 1983.

The primary emphasis of this new enforcement program --evident in five of the six categories--again appears to be on upgrading the physical capability of treatment plants. We agree with EPA that this area still needs attention. However, we believe that EPA and the States should also recognize and enforce the performance standards of plants that have already received billions in Federal funds but whose actual performance is something far less than required. Since the program was not fully implemented at the time of our review, we were unable to evaluate the effectiveness of the one category that addressed poor performance.

Funding problems

The time it takes to resolve complex and extensive wastewater treatment plant problems extends beyond merely identifying problem causes and deciding on solutions. Corrections generally are expensive--sometimes costing more than the plant's original costs. Municipalities that cannot afford the expense turn to EPA or the States for financial assistance. Because the funding process is lengthy, corrective action may be delayed for several years.

The Merrimack, New Hampshire, treatment plant is a case where corrections are being delayed by the funding process. The plant must be modified to operate within permit limits. A second set of modifications (the Federal Government

contributed $3.7 million to modify the plant in 1976) is estimated to cost about $2.6 million and is eligible for a $2 million Federal grant. However, the State has lowered the municipality on the State's priority list, which means funds for the second set of modifications will probably not be available until 1983. Meanwhile, the plant will continue to operate in noncompliance with its permit.

State funds are sometimes available to make corrections, but acquiring them may require special State legislation--another lengthy process. For example, two of our cases--Adams and Deerfield, Massachusetts--have been working 2 years for State funds even though solutions were recommended and approved by EPA and the State. Meanwhile, the plants' problems continue. Corrections at the Adams plant, originally constructed at a cost of $3.5 million, will cost over $500,000; corrections at the Deerfield plant will cost at least $600,000 and may reach $1 million or more. The original cost to construct the Deerfield plant was $574,000. Both plants began operating in 1971.

Four other plants selected for detailed review were being evaluated by consulting engineers. It appears that each of these plants will require major construction modifications to achieve permit compliance. If the communities seek Federal or State funds, the corrections will not likely be made for several years.

CHAPTER 4

BETTER ACCOUNTABILITY NEEDED TO IDENTIFY PARTIES RESPONSIBLE FOR TREATMENT PLANT DEFICIENCIES

When wastewater treatment plants "don't work," who is responsible for "fixing" them? Technically, the municipality, as the grantee is responsible; however, in practice no one party seems to be accountable. Therefore, when treatment plants require modifications--fixes--beyond those that a municipality can easily afford, financing has generally been provided by either EPA or the State. In some cases another party--design engineers, construction contractors, industries, etc.--could be held legally responsible for correcting problems at a plant. But EPA has been reluctant to encourage or become involved in legal action. As it stands now, Federal and State governments spend millions of dollars to "fix" treatment plants they originally paid for in order for the plant to perform at an acceptable level.

IDENTIFYING WHO IS RESPONSIBLE FOR CORRECTING PLANT PERFORMANCE PROBLEMS IS OFTEN UNCLEAR

Categorizing treatment plant performance problems into one or more of the major areas discussed in chapter 3--design, equipment, infiltration/inflow, industrial waste, or operational--was generally not difficult. However, when attempting to identify who caused the problem and therefore who is responsible for correcting it, the picture becomes murky.

Accountability under EPA's construction grants program is complicated by the many parties involved in the design and construction of a treatment plant--EPA regional officials, State regulatory officials, municipal (grantee) officials, design engineering firms, industrial contributors, and finally, construction contractors and subcontractors. We could not easily identify what occurred during the entire process--planning, design, and construction phases--by either reviewing the records at EPA, State, and local levels or discussing the issue with all the parties involved. Many questions about accountability remained unresolved, including:

--What impact did the EPA and State review and approval process have on the final design and construction of the plant?

--If design changes were ordered by either EPA or the State that ultimately impacted on the plant's ability to perform, why were they accepted by the design firm and the municipality?

--How complete was the design firm's modeling of the influent characteristics prior to the actual design?

--Did industrial contributors withhold data during the design phase about the volume or influent characteristics of their discharge, or did they significantly change either of these factors without notifying the municipality and the design firm?

According to EPA's implementing regulations, the grantee is responsible and accountable for the design, construction, and operation and maintenance of its treatment plant. Grantee officials, on the other hand, state that they generally have neither the expertise nor the technical staff to deal with the diverse, complex issues involved in the design and construction of wastewater treatment plants. Therefore, they rely on the regulatory agencies--EPA and the States--to assure that the systems proposed by the design firms will, once constructed, operate as intended and will comply with the effluent discharge permit.

Section 203 of the act states in part that

> "Each applicant for a grant shall submit to the Administrator for his approval, plans, specifications, and estimates for each proposed project for the construction of treatment works * * *."

However, EPA, in its implementing regulations stipulates that its approval of project plans and specifications is for administrative purposes only and does not relieve the grantee of its responsibility. This means in effect that EPA generally will review only the treatment process proposed, and then only in a limited manner. It will satisfy itself that components are properly sized to adequately treat anticipated waste flows. EPA does not critically review the electrical or mechanical aspects of a design, its structural soundness, or the quality of the materials to be used. EPA believes that these details are the responsibility of the design engineer.

The following example, in our opinion, demonstrates the confusion surrounding the accountability issue. This example is not unique; it could virtually be applied to each of the 15 plants selected for detailed review.

Adams, Massachusetts

The Adams, Massachusetts, wastewater treatment plant is an 8.2-mgd facility which cost about $3.5 million to construct. The plant is designed to treat both domestic and industrial waste. Domestic waste is primarily from the residents of Adams and accounts for about 20 percent of the daily flow. Two major companies contribute industrial waste which accounts for most of the remaining 80 percent of flow.

The treatment plant has had problems since it began operating in the fall of 1971. Requirements for processing and disposing of sludge are significantly exceeding both the time and volume estimates. This extra sludge created the need to expand the labor force from 9 to 15 people and to close the rapidly depleted landfill adjacent to the plant. Several studies were made to analyze the plant's problems and, if possible, to help the municipality in improving plant operations. Two of the more important studies were made by EPA and a consulting engineering firm which was retained by the municipality at the State regulatory authority's insistence.

EPA study

The EPA study was performed by staff from the National Field Investigation Center, Cincinnati, Ohio, during January and February of 1974. The report, issued in February of 1975, concluded that sludge was being produced in such volumes that the plant could not adequately dispose of it. The excess sludge was being carried over in the treatment process and eventually was ending up in the final effluent discharge. EPA recommended that:

--Sludge handling facilities should be increased or alternative sludge dewatering methods should be used.

--More effective sludge disposal should be provided.

Municipal officials did not believe that these recommendations were specific enough to solve the plant's sludge problem.

Consulting engineer's study

In December 1974 the municipality retained the services of a consulting engineer. The consultant was instructed to conduct an indepth engineering evaluation of the plant's sludge processing operations to determine the adequacy of these facilities and to devise ways to guarantee an acceptable effluent discharge and reduce operational costs.

The consultant found two important items in researching the Adams plant. First, the sludge processing system used in the final design was contradictory to the pilot study. The consultant was unable to find out why the study and the design so contradicted each other. Second, the design was changed in "midstream" by order of the State regulatory authority to include the industrial waste from another company. This change increased the overall proportion of industrial waste from 70 to 80 percent, increased suspended solids loadings by nearly 40 percent, and significantly altered the concentration of BOD.

The consultant's report described the sludge processing system problem as follows:

> "The final treatment plant design included two stage sludge processing, consisting of flotation thickening followed by vacuum filtration and landfilling of the final product. The choice of vacuum filters is contradictory of the [pilot study] findings, which indicated poor operating efficiencies for filtering concepts...The final design criteria do not specifically state any figures for sludge wasting predictions."

At the time of the EPA study--1 year earlier--the vacuum coil filters used in the sludge processing operation were running 120 hours per week to keep up with the amount of sludge being produced. They were designed, however, to operate only 40 hours per week.

The consultant's report goes on to state:

> "We could not even begin to assess the Design Engineer's methods in determining the amount of solids wasting required at the Adams treatment facility. As stated before, the design criteria did not include any development data for this aspect of the operation and we have, in fact, had to establish a design solids wasting

figure on 60,000 pounds weekly, by working from data furnished in the operation and maintenance manual prepared for the facility. In actual practice, we have determined that as much as 100,000 pounds of solids must be wasted per week, during peak industrial production periods. This produces a 40,000 pound per week discrepancy between design figures and actual experience."

The consultant's report also stated that the design engineer apparently intended the flotation thickening units to have 250-square-foot surface areas. The construction plans and specifications, however, only called for units which measured 150 square feet. This reduction in size also reduces the plant's ability to process sludge. According to the consulting engineer, a typographical error apparently caused this mistake. 1/

The consultant has concluded that the solids problem is caused primarily by the plant's inability to treat waste sludge as required. He has recommended, as a minimum, that the sludge removal equipment be replaced. The estimated cost to complete this modification phase alone is $500,000.

Opinions of the various parties

EPA believes that modifications to the sludge processing operation are necessary. However, it is letting the State decide what modifications should be approved.

The State believes that the proposed sludge processing system modifications will allow the treatment plant to operate within its permit limits and has recommended that they be made.

The municipality, at the time of our review, had already approved the construction modifications suggested by the consultant and was waiting for grant funds so that the work could begin. It chose not to take legal action against the design firm because the evidence was apparently inconclusive as to who was at fault. While the sludge processing operations were in fact inadequate, the industries may not have given accurate estimates of the flow volumes and discharge characteristics.

1/In discussions with the design engineer, we were told that no such typographical error was made and that the 150-square-foot figure was correct.

Neither of the industries favors any changes that would increase their contributions to the plant's operating costs. Both industries have encouraged city officials to secure a State grant for modifying the plant. Under a Federal grant, EPA would require capital cost sharing, which the companies claim would hurt them economically.

One of the two companies currently recovers part of its waste and recycles it. This practice is a form of pretreatment, which helps the plant by removing some of the solids. The other company does not pretreat. Neither firm would favor any imposed pretreatment requirements; in fact, the company that does not pretreat claims that such a requirement would force it out of business.

Both companies claim that the design engineering firm sampled their waste and that it was accurately informed of both the total volume and the discharge characteristics of the waste.

The design engineering firm was unaware of the continuing problems at the plant or of the planned modifications to the sludge processing system. It thought the plant was operating efficiently and that it had resolved all of the initial operation problems. It attributed the initial operation problems to the plant staff's need of training and on-the-job experience.

The design firm officials admitted that a problem was created when the State ordered the inclusion of waste from one of the two major industries. This order was made after they had completed their pilot studies. However, they believed that they had adequately considered the industrial waste in the final design.

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The question still remains. Who is accountable and therefore responsible for correcting the deficiencies at the Adams wastewater treatment plant? If we used EPA's strict interpretation, the municipality is responsible. However, what effect did the State's order to include waste from another industrial discharger have on the plant? Should the State now be held accountable? The design firm acknowledged that the State's order did create a problem. However, the firm believed that it had adequately considered the additional industrial waste in the plant's final design. If this is true, should the design firm be held accountable? The municipality chose not to take legal action against the design firm because, according to city officials, evidence was not conclusive about who was at fault.

While sludge processing at the plant proved inadequate, city officials believed it was possible that the industries did not give the design firm accurate estimates of the flow volume and other discharge characteristics. If this is true, should the industries be held accountable? Industry officials said that the design firm had sampled their waste and they had accurately informed the engineers of the waste flow volume and characteristics.

The end result in this case is that accountability is confused and perhaps lost. The municipality is currently seeking another grant to correct the plant's deficiencies.

EPA is not providing technical and legal assistance to grantees

EPA and the States generally assume financial responsibility for correcting plant deficiencies. Funds are usually provided to the municipalities without attempting to identify who was accountable and responsible for correcting such plant problems. It is therefore rare when a municipality attempts to take legal action against a design firm or a construction contractor for damages; and when such attempts have been made, EPA has not provided either technical or legal assistance in support of these cases.

For example, one community, not included in the 15 plants selected for detailed review, is in the process of seeking damages from the architect and engineering firm, the construction contractor, and the equipment supplier. This plant, an 0.8-mgd secondary treatment facility, costing $3.7 million to construct, began operating in July 1976, and has experienced continuous problems in meeting its permit conditions.

After several attempts by the town to obtain EPA technical assistance, the agency responded by sending in a team to evaluate the plant's operations. The team concluded that there were apparent design deficiencies that were adversely affecting the ability of the plant to produce a satisfactory effluent. EPA continued its investigation by conducting an indepth study of the plant, first to identify what the design deficiencies were and second to evaluate the overall performance capability of the facility. In its final report, EPA recommended that the town retain the services of an impartial engineering firm to verify the design deficiencies they identified. The town complied with the EPA recommendations and hired a consulting engineer to restudy the plant. The consultant's report substantiated virtually all of the EPA findings.

Based on the studies, the town decided to take legal action against the design firm, the construction contractor, and the equipment supplier and requested EPA's assistance--legal and technical. No assistance was provided. In discussions with EPA Region I Office of General Counsel, several reasons were given as to why no assistance was provided to the town, including the lack of legal staff resources--one attorney is available on a part-time basis to address technical and legal assistance issues and the uncertainty as to what type of assistance could be provided; under what circumstances assistance would be provided; and the extent of assistance, if it was provided.

Recognizing the need for legal and technical assistance, the Congress, in its 1977 amendments to the act, provided in section 203(e), that the Administrator of EPA, at the request of the grantee, was authorized to provide such assistance in the administration and enforcement of any contract in connection with treatment works built under the construction grants program. According to EPA's Assistant General Counsel, any such assistance provided to a grantee would be at the discretion of the appropriate EPA Regional Administrator or authorized State agency. He further stated that no instruction or policy directives have been issued to the EPA Regions on how the regulation was to be implemented.

The Assistant General Counsel also stated, however, that the Office of General Counsel, in conjunction with the Construction Grants Division is working on a Program Requirements Memorandum (EPA policy directive) that will address the technical and legal assistance question. Time frames for issuing and implementing the memorandum have not been established.

CHAPTER 5

CONCLUSIONS, RECOMMENDATIONS, AGENCY COMMENTS, AND OUR EVALUATION

CONCLUSIONS

The hard, cold facts are: After investing $25 billion in Federal moneys and several billion more in State and local funds to construct wastewater treatment plants, EPA statistical samples show that 50 to 75 percent of these plants are, at any given time, violating their discharge permit limits. Our random sample of 242 plants in 10 States showed an even more dismal picture. For a 1-year period between 1978 and 1979, 87 percent of the plants in our sample violated their discharge permit limits for at least 1 month during the year, and many--31 percent--were, in our opinion, in serious violation. In addition, 119--56 percent--of the violating plants exceeded their discharge permit limits for more than half the year.

We recognize that EPA can point to many examples of wastewater treatment plants that are operating and performing as they were designed to do and that have dramatically improved severely polluted waterways. However, the above statistics clearly show that numerous plants, in which billions of dollars have been invested, are not treating wastewater at the levels they were supposedly designed to achieve.

The question is WHY? Why aren't the plants working as they should and who is accountable and responsible for fixing them? We found that the causes for long-term permit violations are usually not just one but a combination of problems that limit a plant's ability to treat raw waste. These problems often overlap, but generally can be attributed to design deficiences, equipment deficiencies, infiltration/inflow problems, industrial waste overload problems, and operation and maintenance problems.

Solving these performance problems is not an easy or a simple task. Generally, a detailed study is required, the results of which often recommend extensive modification to the existing plant or major new construction. In either situation, the recommended action usually takes years to complete and almost always involves additional Federal and/or State funds.

Although it cannot be expected that these complex problems would be solved immediately, EPA and the States have not acted as promptly or effectively as they could

have. As a result, serious performance problems have existed in some cases for over 8 years. Limited technical assistance, varied and inconsistent enforcement, and unavailable financial aid to correct problems have prolonged the noncompliance situation at these facilities.

When wastewater treatment plants don't work properly, who is accountable and responsible for fixing them? Technically the municipality, as the grantee, is responsible. However, in the day-to-day world, this accountability and responsibility issue has become confused. Under current practices, modifications to treatment plants beyond those which can be easily assumed by the municipality are generally financed by either EPA or the State. Even when the potential exists to legally hold another party responsible for correcting problems, EPA has been reluctant to encourage or become involved in legal action. The bottom line is that Federal and State governments spend millions of dollars to fix treatment plants they originally paid to have built.

We believe that providing clearer lines of accountability within the construction grants program and holding accountable parties responsible for correcting identified deficiencies would be a more efficient use of the limited Federal dollars available for this program. The problem is to identify and define accountability. We believe the issue must be separated into two broad areas.

First, there are the existing plants--the type discussed in this report--that have seldom or never worked as intended. For these plants, accountability has been lost. Charges, countercharges, innuendos, and finger pointing by all parties involved in construction permeate the history of these projects. Numerous questions concerning this issue can be raised, including:

--How many plants nationwide--both major and minor--that have already received Federal grant funds to meet the 1977 secondary treatment requirements are experiencing serious performance problems?

--What are the total estimated costs associated with fixing these plants and how long will it take--weeks, months, years?

--Who will pay for making these repairs?

Regardless of the answers, one fact remains clear: Unless these plants are fixed, the clean water goals for which they were built will, in all likelihood, not be reached.

Second, there are the future plants--a whole generation of new plants yet to be planned, designed, and constructed. These plants will also require billions of dollars in Federal, State, and local funds to build. We believe that duplicating the current funding practices to construct these plants will perpetuate the problems we identified--plants being constructed at tremendous cost with no assurance that they will perform as intended. To break this cycle, we believe that accountability within the construction grants process must be clearly defined and that accountable parties must be held financially responsible for their actions.

In several of our prior reports, we recommended that EPA provide additional front-end planning and technical assistance to the grantees--expecially when the grantee was a small community or when the necessary engineering staff and expertise was not available in-house--to deal with the multitude of problems surrounding the construction of a wastewater treatment plant. EPA responded that (1) it did not have the necessary manpower and funds to work with the thousands of communities that need such assistance and (2) the communities should seek assistance from the private sector--the architect-engineering firms.

As recently as August 29, 1980, in response to another GAO report entitled "EPA Should Help Small Communities Cope With Federal Pollution Control Requirements" (CED-80-92, May 30, 1980), EPA again stated that unfortunately it does not have the necessary resources to provide technical assistance to the 3,000 to 4,000 small projects currently in the planning phase.

We recognize that there is no one clear, concise answer to this accountability/responsibility issue. However, we believe that several alternatives to the current situation should be considered and tested. These include:

--The turnkey concept, whereby one party, preferably the architect-engineering design firm, would be legally responsible under contract for constructing a wastewater treatment plant--the planning, design, and construction phases--and demonstrating that the plant will operate and be capable of meeting the discharge permit limits before turning the plant over to the municipality for operation.

--EPA and/or the States could assume a full partnership role with the municipalities by becoming a party (signatory) to the contracts negotiated for the planning, design, and contruction phases.

Currently, EPA and State legal agreements extend only to the grantee. When problems occur with the treatment plant, EPA and the States contend that they have no vested interests in the plant beyond the agreement with the grantee. Therefore the grantee alone is responsible for seeking damages for nonperformance from the various contractors.

Under this alternative, EPA and/or the States would also be required to fully review the design specifications rather than merely giving administrative approval, as is the current practice. Changes or modifications to any portion of the proposed project would require the approval of all vested interest parties. With a full vested interest, EPA, the States, and the municipalities should be in a stronger position to ensure acceptable performance under the contracts.

--EPA and/or the States could assume an advisory role to the grantees. This alternative would be feasible in cases where EPA determines that the grantee has the necessary staff and expertise in-house to assure contract performance.

We recognize that numerous obstacles and operational details would have to be identified and resolved before any contract/grant alternative could be tested and that specific approval would be needed from the Congress to require testing these alternatives. Yet we believe that a method is clearly needed for assuring that wastewater treatment plants, once constructed and paid for, will operate as intended.

In view of the Nation's fiscal constraints and the desire for a cleaner environment, it is imperative that our limited dollars be used as efficiently as possible. As a Nation, we simply cannot afford to build wastewater treatment plants that do not work. We are not abandoning the concept of providing more technical assistance to grantees during the planning, design, and construction phases. However, we believe, in light of EPA's reluctance to provide such assistance, that a new approach, or at least a modified approach, to the current construction grants funding program is needed so that both issues--clean water and limited funds--can be addressed more efficiently.

RECOMMENDATIONS TO THE CONGRESS

While the following recommendations are not by themselves a solution to the wastewater treatment plant performance

problems identified in this report, we believe they are a necessary first step in bringing accountability to the construction grants program.

Because of the magnitude of the problems, we believe there is a need for congressional oversight of those wastewater treatment plants already constructed that have cost billions of Federal dollars to build but are in serious violation of their permit conditions; recognition of the enormous costs required to repair these facilities; and identification of who--Government or the private sector--will bear the financial burden for making such repairs.

Therefore, we recommend that the Congress require the Administrator, EPA, to:

--Report to the Congress annually on (1) the number of municipal wastewater treatment plants--both major and minor--that have already received Federal grant funding to meet the 1977 secondary treatment requirements but are in serious violation of their permit conditions and (2) what is being proposed and done to ensure that the necessary repairs to these facilities will be made.

--Advise the Congress annually on the progress being made to repair the above identified facilities and who is being held financially accountable/responsible for making the repairs. If Federal funds are being used to make the repairs, advise the Congress of the amount being spent.

To begin the process of finding an acceptable solution to the plant performance problems in the construction grants program that can be applied to the billions of dollars yet to be spent for future wastewater treatment plants, we recommend that the Congress require the Administrator, EPA, to:

--Test various alternatives to the current construction grants funding program concept including (1) turnkey, (2) becoming a signatory to the various contracts, and (3) assuming an advisor only role.

We will assist the committees in preparing any necessary legislation, if requested. Such an effort on our part, however, would require the assistance of EPA in gathering necessary technical and factual background material.

RECOMMENDATIONS TO THE ADMINISTRATOR, EPA

In order to provide clearer lines of accountability within the construction grants program and to hold accountable parties responsible for correcting identified deficiencies, we recommend that the Administrator, EPA:

--Reemphasize to all involved parties that clear lines of accountability/responsibility must be established in contracts and that changes and modifications to the proposed systems during each of the three phases--planning, design, and construction--must be clearly documented.

--Develop and issue policy directives and instructions to the EPA Regional Administrators and appropriate State agencies on providing legal and technical assistance to grantees who wish to take legal action for identified contract deficiencies.

--Require all EPA regions and strongly encourage the States to reinstitute a technical assistance program to help grantees identify, evaluate, and solve operational problems at their treatment plants. In view of the large number of treatment plants experiencing operational problems, this program could be an essential factor in protecting the Nation's huge investment in treatment plants and in helping to achieve its water quality goals.

AGENCY COMMENTS AND OUR EVALUATION

In a letter dated September 2, 1980 (see app. II), commenting on our draft report, EPA advised that the report accurately describes the severity of the continuing compliance problem and that our analysis on the lack of accountability as a principal cause of noncompliance is on target with EPA's own findings.

The letter also stated that EPA has previously recognized many of the issues we raised and is currently conducting a series of studies as part of its "1990 Strategy" to identify problems, define alternative solutions, and recommend policies and directions to improve programs which affect publicly owned wastewater treatment plants.

In commenting on our specific recommendations, EPA provided the following:

GAO recommendation: Report to the Congress annually on the number of municipal wastewater treatment plants--both major and minor--which have already received Federal grant funding to meet the 1977 secondary treatment requirements but are in serious violation of their permit conditions and what actions are being proposed and taken to ensure that the necessary repairs to these facilities will be made.

EPA response: EPA at the present time reports annually to Congress on the performance of wastewater treatment plants. These reports are required under sections 210 and 516 of the Clean Water Act. These reports statistically describe the status of municipal treatment facilities, but the information provided is not as detailed as GAO suggests it should be.

In order to provide the information suggested by GAO, EPA would have to require significant changes in delegated State data management systems and, to a large degree, impose additional requirement on the States for deployment and management of their staffs. The Agency is examining methods for coordinating data needs with the States, and a number of initiatives are underway to assure that POTWs in serious violation of their permit are soon brought into compliance.

As the Agency's goal is to cleanse the Nation's waters, provision of grant funds is used in conjunction with enforcement procedures as the most common measure to bring a municipal permit violator into compliance. Punitive measures, including State prohibitions on future connections until corrections to the treatment systems are made, are also utilized. Enforcement alone, however, delays needed treatment system improvements until litigation is conclusively resolved. The Agency's strategy is to correct the deficiency by providing a grant and, as a condition to receipt of the grant, require grantees to undertake legal action against the responsible entity.

It should be noted that most grantees will not expend local funds to correct treatment system malfunctions if the option to secure Federal funds is available. This option is available under current legislative authorities, even in cases where enforcement action is initiated and successfully concluded.

GAO comment: In responding to this recommendation, EPA stated that at the present time it reports annually to the Congress on the performance of wastewater treatment plants and that such reports are required under sections 210 and 516 of the Clean Water Act. (EPA acknowledged that the information in the reports is not as detailed as GAO recommended.) While those reports are required, we found that the latest report submitted to the Congress was

for the period 1975-76. Statistical data in the report was based primarily on 1975 information. In addition, the statistical data collected reflects only the operations of facilities classified as major. Performance data on minor facilities was generally not gathered by EPA or the States.

EPA further stated that in order to provide the information we suggested, it would have to require significant changes in delegated State data management systems and, to a large degree, impose additional requirements on the States for deployment and management of their staffs. We do not see what additional requirements EPA would have to impose on the States. In its monitoring role of State programs, EPA should be receiving data on the efficiency of plant performance. If, however, contrary to EPA's policy statements, that data is not being developed, our recommendation appears to be all the more valid to keep the Congress apprised of the construction grants program and the enormous expenditure of Federal funds.

GAO recommendation: Annually advise the Congress on the progress being made to repair the above identified facilities and who is being held financially accountable/responsible for making such repairs. If Federal funds are being used to make such repairs, advise the Congress on the amount of funds being expended.

EPA response: As noted above, EPA is examining various data management options to determine which are useful to the Agency and delegated States. In cases where legal action is initiated and Agency assistance is requested by a State or grantee, information concerning accountability is readily available. In delegated States EPA does not act as a direct project manager. The States manage the program and data concerning individual projects. Preparation of another annual report, as suggested by GAO, would impose additional Federal requirements on the States at a time when they are experiencing difficulties staffing adequately to satisfy the demands imposed by existing program requirements.

GAO comment: In our opinion, EPA has not addressed the recommendation. EPA has acknowledged that there are several thousand treatment plants constructed with millions of Federal dollars that are not performing as intended and that many of these plants are experiencing serious operational problems. However, its response centers primarily around imposing additional Federal reporting requirements on the States rather than examining whether or not there is a need for such information. As previously stated, information on plant performance should already be available. The purpose of this recommendation is to identify those plants that require repairs; who is going to be held financially responsible

for making the repairs; and finally, if the Federal Government is going to pay to have the plants fixed, we believe the Congress should be made aware of the cost of the repairs and the amount of funds being spent annually for this purpose.

GAO recommendation: We recommend that the Congress require the Administrator to test various alternatives to the current construction grants funding program concept including (1) turnkey, (2) becoming a signatory to the various contracts, and (3) assuming an advisor-only role.

EPA response: In response to point one, EPA is now examining advantages and disadvantages associated with use of the "turnkey" concept. The option is attractive because it would make a grantee's consulting engineer clearly responsible for designing and ensuring construction of operable treatment facilities. Accountability would be clarified and it would provide an incentive for improving the quality of consulting engineering services. EPA is concerned, however, that use of design-construct contracts would lead to significant cost escalation in the construction grants programs, that overly constructive design specifications would be utilized, and that innovative or alternative treatment techniques would not be actively pursued.

In response to point two, the general direction of the EPA grants program is toward less direct control and more delegation to the States and grantees. At the present time 33 States have signed delegation agreements with 10 more States and one Territory actively negotiating agreements. The transfer of functions from EPA to the delegated State is occurring in a timely manner. Also, the "1990 Strategy" is looking at ways to streamline and improve the construction grants program to save time and money. One method being developed is a formal "certification" concept to delegate to qualified grantees certain reviews now performed by EPA and the States. The larger, more sophisticated grantees do this now. In contrast to the delegation program and certification concept, the resources required for "becoming a signator to the various contracts" are enormous and EPA could not operate the grants program in this manner.

In response to point three, EPA is moving in the direction of advisory role rather than that of a signator role.

GAO comments: Although EPA does not completely endorse any one of the alternatives we suggested, it does generally concur with the recommendation concept of testing various alternatives to the current construction grants funding program.

GAO recommendation: Reemphasize to all involved parties that clear lines of accountability/responsibility be established in contracts and that changes and modifications to the proposed systems during each of the three phases--planning, design, and construction--are clearly documented.

EPA response: Under the construction grants program the grantee is the first line of accountability. The Agency emphasizes this point, but some grantees do not recognize their responsibilities in the expenditure of Federal funds. Although some grantees are capable and willing to oversee complex construction activity, others are overly dependent upon their Architect/Engineer (A/E) consultants. In the absence of clear, enforceable professional responsibility standards for the A/E community, EPA is examining a number of options to assist small, unsophisticated, or disinterested grantees. One option is development of "centers of expertise" which, upon request, would be available to provide specialized advice and services. Also, use of grant-eligible project managers to work directly with certain grantees appears to be a viable option.

EPA recognizes that the lines of accountability are often blurred, but the agency expects that under delegation the States will assume a much more active role in overseeing the quality of contract negotiations, design, and construction.

GAO comment: EPA generally concurs with our recommendation.

GAO recommendation: Develop and issue policy directives and instructions to the EPA Regional Administrators and appropriate State agencies on providing legal and technical assistance to grantees who wish to seek damages through the courts for identified contract deficiencies.

EPA response: EPA is presently developing Agency guidance to help grantees rehabilitate plants built by Federal funds which are subsequently failing where it is very difficult to determine the liability for the failure. This guidance will generally require investigations and legal action against the responsible parties by the grantee. The exact procedure will vary depending upon the circumstances of the case. For example, in one recent case, EPA determined that (1) the cost to investigate these material failures, (2) subsequent engineering costs for redesign, and (3) the costs to remove and rebuild the failed portion of the facility should be approved. However, this funding must be incorporated into an amendment to the grant agreement which requires that all possible legal remedies be pursued to their fullest extent by the grantee in order to recover whatever cost of engineering, redesign, demclition, construction materials

and equipment is determined to be the liability of the designer, builder, material supplier, equipment supplier, or others. The grant amendment also contains a clause which gives EPA the right to join in any such legal action. The money recovered by this action, up to the amount of the grant amendment, will be returned to EPA for State allotment.

GAO comment: EPA generally concurs with our recommendation.

GAO recommendation: Require all EPA regions and strongly encourage the States to reinstitute a technical assistance program to help those grantees who seek such assistance in identifying, evaluating, and solving operational problems at their respective treatment plants. In view of the large number of treatment plants experiencing operational problems, such a program could be an essential factor in protecting the huge dollar investment and in helping to achieve the Nation's water quality goals.

EPA response: The reinstitution of previously provided O&M technical assistance services from EPA and State agency personnel will probably not occur because of two major difficulties.

1. Personnel shortage in the Public Sector

   EPA concluded that the best solution was to develop a market for the private sector through more intensive enforcement efforts and, thus, the expertise would become concentrated and more readily available to municipalities through regular established marketable relationships.

2. Private Sector vs. Public Sector

   Private Sector consultant firms brought intense pressure against EPA to remove itself and State agencies from a profitmaking enterprise which rightfully belonged to the business community. They suggested that EPA do its job through enforcement against noncomplying facilities and the money would be forthcoming to enable the private sector to staff their firms with operations and management experts.

EPA's Office of Planning and Evaluation in conjunction with the Municipal Construction Division formulated a policy after an intense study of this problem. The policy reaffirmed that municipalities are responsible for the operation and management of their own facilities and for promoting a stronger cooperative effort between enforcement and

construction grants. This will create the possibility of concentrating a limited amount of day-to-day expertise in the open marketplace.

This study also found that if EPA or the States were to pull operationally oriented people out of the private sector in sufficient number to mount their own internal technical assistance program, it could disrupt the private sector's capability to design and operate plants, a capability which is not overly strong even now.

Therefore, EPA believes that it is in its best interest to leave these qualified people where they are and continue to build a solid private sector design and assistance capability. EPA notes that of the nine case studies used as specific examples in the GAO study, seven are described as having received private sector technical assistance. EPA believes that it is to both its and the grantee's advantage to maintain and promote this private sector capability without competition from EPA.

EPA has been conducting training programs to reinforce private sector technical assistance and design capabilities. The Agency has supported a series of lectures, workshops, special training courses, and manuals, aimed primarily at the private sector, to strengthen its accountability in the area of maximizing plant operational efficiencies. EPA proposes to continue and strengthen these programs in the future.

The Agency will encourage the use of this capability by example, by persuasion, and by increased enforcement action.

EPA believes that the use of private sector consultants will result in close, continuous relationships between operators and consultants and the competitive nature of the work will result in a reduced cost to the government and the municipality.

GAO comment:

While we do not disagree completely with EPA's position, the point remains that until the private sector capability is developed, who is going to protect the $25 billion Federal investment in wastewater treatment plants, many of which are not performing as intended?

EPA has acknowledged that the private sector capability has not, as yet, been adequately established and that many of the grantees--especially the smaller unsophisticated or

disinteresed communities--who have neither the financial nor technical resources, are in need of some type of assistance. One option EPA is considering is the development of "centers of expertise" where grantees, upon request, would be provided specialized technical advice and services. This, in our opinion, is a step in the right direction.

Therefore, while we strongly endorse and encourage EPA to continue its program to reinforce private sector technical assistance and design capabilities, we still believe that until this capability is developed, EPA should devote additional in-house resources--staff and funds--for technical assistance to those communities who need its help.

APPENDIX I

Committee on Public Works and Transportation

Congress of the United States
House of Representatives
Room 2165, Rayburn House Office Building
Washington, D.C. 20515
TELEPHONE: AREA CODE 202, 225-4472

May 24, 1979

Honorable Elmer B. Staats
Comptroller General of the United States
General Accounting Office
441 G Street, N. W.
Washington, D. C. 20548

Dear ~~Mr. Staats~~ Elmer:

Studies and reviews by the General Accounting Office, the Environmental Protection Agency, and others over the last ten years have repeatedly indicated that as many as half of the existing wastewater treatment facilities in the country, in which billions of dollars of public funds have been invested under recent federal programs, do not operate properly.

As you may recall, this matter was discussed at our July 1978 oversight hearings on the Municipal Construction Grants Program, at which time you advised the Subcommittee that:

> EPA, the States and the local communities must place a higher priority on O&M...Unless this happens, the problems noted will continue to adversely affect the high capital investment that has been made and is continuing to be made in treatment facilities. This area of the program must be better managed.

Indeed, this O&M problem is a very serious and massive one, and we share your concerns. As many as six thousand existing plants across the country may not be providing the full benefits for which they were designed. There are also three thousand projects actively under construction, representing a total public investment of $20 billion, for which the performance capability and, hence, their expected water quality benefits, are uncertain.

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Honorable Elmer B. Staats
Page Two
May 24, 1979

Obviously, the Congress cannot accept the incongruity of providing several billion dollars a year in federal grant assistance for the construction of new treatment works with the foreknowledge that only a fraction of them will work as designed and intended.

The studies and reviews to date have explored some of the various and multiple factors which contribute to plant operational deficiencies. Unfortunately, neither these studies nor the EPA's past responses to this problem adequately indicate the degree and severity of treatment works performance shortfalls, and the adequacy of present EPA and state policies, programs and resources which have been put forth to protect this significant public investment to clean up the nation's waters.

For these reasons we ask your cooperation and assistance in initiating a selective review to assess the degree and severity of this treatment plant performance problem. Additionally, we ask that GAO review EPA and state policies, programs, and resources which have been directed to this problem over the past several years and evaluate the appropriateness and effectiveness of these in relation to the severity of the O&M problem.

We understand that Subcommittee and GAO staff have already discussed some of these matters and they expect to continue to meet regularly to work out the details. We have asked Bob Prolman and Steve Abrams to handle these for the Subcommittee.

We thank you for your cooperation in this matter and look forward to a comprehensive and worthwhile contribution on the part of your office.

Sincerely,

NORMAN Y. MINETA
Chairman
Subcommittee on
Oversight and Review

JAMES C. CLEVELAND
Ranking Minority Member
Subcommittee on
Oversight and Review

APPENDIX II

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

SEP 2 1980

OFFICE OF
PLANNING AND MANAGEMENT

Mr. Henry Eschwege
Director, Community & Economic Development Division
United States General Accounting Office
Washington, D.C. 20548

Dear Mr. Eschwege:

The Environmental Protection Agency (EPA) has reviewed the General Accounting Office (GAO) draft report entitled "Billions Of Dollars Spent On Wastewater Treatment Plants-- But Many Are Not Providing Expected Results." This GAO report accurately describes the severity of the continuing compliance problem. Its analysis that a lack of accountability is a principal cause of noncompliance is on target with our findings in studies on operation and maintenance (O&M). While some of the recommendations are worthwhile, we do not believe the call for more EPA and State technical assistance will improve compliance. Review of operator performance by State certification agencies would also help. Moreover, recognition by local governments that adequate revenues, staffing, maintenance, and influent controls must be applied to wastewater treatment programs would in many cases solve noncompliance problems. EPA provides technical assistance to grantees whenever possible, but assistance alone will not dramatically improve the rate of noncompliance. Engineering talent, influent control, staffing and funds are all needed to produce operable treatment facilities.

EPA has previously recognized many of the issues raised by the GAO in this report. Over a year ago, the Agency began a major study to identify problems, define alternative solutions and recommend policies and directions to improve the EPA programs which affect publicly owned wastewater treatment plants (POTWs). These studies, which are referenced in our comments, are being performed as part of the EPA "1990 Strategy." Under this major review and reassessment of our programs, EPA identified and developed solutions to many of the issues mentioned in the GAO report. As an example, I have enclosed

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a draft background paper on compliance which develops a strategy to ensure that municipal treatment facilities built with the aid of the construction grants program will meet their effluent quality goals.

General Comments

O&M Deficiencies: The operation and maintenance deficiencies section (pp. 24) does not reflect a complete analysis of the underlying issues. The reasons for inadequate local operating budgets and undertrained staffs are not addressed. Although grantees are required to develop user charge systems and collect revenues adequate to operate and maintain federally assisted treatment facilities, many POTWs have inadequate operating budgets. There are many reasons why inadequate funds are provided for POTW operations and maintenance. In some cases, POTW operations are a low priority, and user charge revenues are diverted to road construction, education, or other local programs. Local pressures to keep costs down encourage grantees to postpone needed rate increases or to provide inadequate salaries for POTW operators. Also, local prohibitions in some areas on retainage and carryovers of surplus user charge revenues can leave a POTW unprepared for equipment failures, capacity expansions, and plant modifications. Recently, the Agency testified before Congress on the need to create a "self-sustaining" philosophy for federally funded POTWs. The Agency is prepared to assist grantees in the development of adequate revenue and staffing programs, but grantees must recognize that these elements of POTW operations are needed and be willing to put them in place.

Accountability: Grantees have the prime responsibility for the successful operation of their treatment plants. However, during the design and construction phases, the grantee accomplishes this through contracts with other parties. The primary representative of the grantee is the engineering community.

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GAO's recommendations, specifically encouraging the use of design/contract grants, might help remedy some future noncompliance problems, but they will not solve them all. Incentives for joint grantee-industry planning, influent management, and treatment system operation must be developed. EPA's experience indicates that having the Agency become a signator to grantee contracts, as GAO proposes, would be viewed by local and State government as an unwarranted intrusion and, due to the large number of projects involved, would delay contract negotiations and completion of the program. Moreover, a direct EPA-grantee relationship as proposed by GAO is contrary to the delegation philosophy adopted by Congress in the 1977 Clean Water Act Amendments. However, there are benefits associated with GAO's proposal, and under delegation, a State could participate in grantee contractual agreements. Some States, such as New Hampshire, are undertaking a number of tasks to assist grantees in contract negotiations.

Inadequate Influent Data: The GAO discusses design deficiencies at least partially caused by inadequate influent data on pages 16-18, 22, and 35 of the report. Task III, of the 1990's study is addressing this issue of inadequate data. The GAO report makes no recommendations to address this problem.

Recommendations to the Congress

GAO Recommendation

We recommend that the Congress require the Administrator, EPA, to report to the Congress annually on the number of municipal wastewater treatment plants--both major and minor--which have already received Federal grant funding to meet the 1977 secondary treatment requirements but are in serious

violation of their permit conditions; and, what actions are being proposed and taken to ensure that the necessary repairs to these facilities will be made.

EPA Response

EPA at the present time reports annually to Congress on the performance of wastewater treatment plants. These reports are required under sections 210 and 516 of the Clean Water Act. These reports statistically describe the status of municipal treatment facilities, but the information provided is not as detailed as GAO suggests it should be.

In order to provide the information suggested by GAO, EPA would have to require significant changes in delegated State data management systems and, to a large degree, impose additional requirements on the States for deployment and management of their staffs. The Agency is examining methods for coordinating data needs with the States, and a number of initiatives are underway to assure that POTWs in serious violation of their permit are soon brought into compliance.

As the Agency's goal is to cleanse the Nation's waters, provision of grant funds is used in conjunction with enforcement procedures as the most common measure to bring a municipal permit violator into compliance. Punitive measures, including State prohibitions on future connections until corrections to the treatment systems are made, are also utilized. Enforcement alone, however, delays needed treatment system improvements until litigation is conclusively resolved. The Agency's strategy is to correct the deficiency by providing a grant and, as a condition to receipt of the grant, require grantees to undertake legal action against the responsible entity.

It should be noted that most grantees will not expend local funds to correct treatment system malfunctions if the option to secure Federal funds is available. This option is available

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under current legislative authorities, even in cases where enforcement action is initiated and successfully concluded.

GAO Recommendation

We recommend that Congress require the Administrator to annually advise Congress on the progress being made to repair the above identified facilities; and, who is being held financially accountable/responsible for making such repairs, advise Congress on the amount of funds being expended.

EPA Response

As noted above, EPA is examining various data management options to determine which are useful to the Agency and delegated States. In cases where legal action is initiated and Agency assistance is requested by a State or grantee, information concerning accountability is readily available. In delegated States EPA does not act as a direct project manager. The States manage the program and data concerning individual projects. Preparation of another annual report, as suggested by GAO, would impose additional Federal requirements on the States at a time when they are experiencing difficulties staffing adequately to satisfy the demands imposed by existing program requirements.

GAO Recommendation

We recommend that Congress require the Administrator to test various alternatives to the current construction grants funding program concept including (1) turn-key, (2) becoming a signator to the various contracts, and (3) assuming an advisor-only role.

EPA Response

In response to point one, EPA is now examining advantages and disadvantages associated with use of the "turn-key" concept. The option is attractive because it would make a grantee's consulting engineer clearly responsible for designing and ensuring construction of operable treatment facilities. Accountability would be clarified and it would provide an

incentive for improving the quality of consulting engineering services. We are concerned, however, that use of design-construct contracts would lead to significant cost escalation in the construction grants programs, that overly constructive design specifications would be utilized, and that innovative or alternative treatment techniques would not be actively pursued.

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In response to point three, EPA is moving in the direction of an advisory role rather than that of a signator role.

Recommendations to the Environmental Protection Agency

GAO Recommendation

Re-emphasize to all involved parties that clean lines of accountability/responsibility be established in contracts and that changes and modifications to the proposed systems during each of the three phases--planning, design, and construction--are clearly documented.

EPA Response

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others are overly dependent upon their Architect/Engineer (A/E) consultants. In the absence of clear, enforceable professional responsibility standards for the A/E community, EPA is examining a number of options to assist small, unsophisticated, or disinterested grantees. One option is development of "centers of expertise" which, upon request, would be available to provide specialized advice and services. Also, use of grant-eligible project managers to work directly with certain grantees appears to be a viable option.

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such legal action. The money recovered by this action, up to the amount of the grant amendment, will be returned to EPA for State allotment.

GAO Recommendation

Require all EPA Regions and strongly encourage the States to reinstitute a technical assistance program to help those grantees who seek such assistance in identifying, evaluating , and solving operational problems at their respective treatment plants. In view of the large number of treatment plants experiencing operational problems, such a program could be an essential factor in protecting the huge dollar investment and in helping to achieve the Nation's water quality goals.

EPA Response

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Therefore, we believe that it is in our best interest to leave these qualified people where they are and continue to build a solid private sector design and assistance capability. We note that of the nine case studies used as specific examples in the GAO study, seven of them are described as having received private sector technical assistance. We believe that it is to both our and the grantee's advantage to maintain and promote this private sector capability without competition from EPA.

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We will encourage the use of this capability by example, by persuasion and by increased enforcement action.

We believe that use of private sector consultants will result in close continuous relationships between operators and consultants and the competitive nature of the work will result in a reduced cost to the government and the municipality.

Background paper and technical and general comments are enclosed.

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We appreciate the opportunity to comment on the contents of the draft report.

Sincerely yours,

William Drayton, Jr.
Assistant Administrator for
Planning and Management

Enclosures

NOTE: EPA provided technical comments which were considered. These comments resulted in no revision to the conclusion and recommendations in our report

(089070)

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