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Municipal and Industrial Water Conservation: The Federal Government Could Do More. CED-78-06; B-114885. April 3, 1978. 39 pp. + 12 appendices (28 pp.).

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An adequate supply of water is essential to the needs of the Nation's citizens and industries. While the development of some new water supplies may be needed to meet the needs of a growing population, making more efficient use of existing water supplies can help meet these needs. **Findings/Conclusions:** Conserving municipal and industrial water supplies frees additional supplies for other purposes; prevents or delays construction of costly water supply and treatment facilities; decreases the amount of energy needed for pumping, treating, and heating water; and reduces the required capacity of future wastewater treatment facilities. No centralized data bank or clearinghouse on water conservation exists; such a clearinghouse could serve a useful purpose in providing water conservation information. **Recommendations:** The Chairman of the Water Resources Council should take the lead in establishing an interagency task force of the Federal and non-Federal agencies involved in water supply activities which would jointly develop Federal objectives, policies, and action plans for a clearinghouse for water conservation practices involving municipal and industrial water supplies. The task force would also ascertain the current technology, additional research needed, Federal incentives needed, priorities, and additional legislative authority needed for implementing effective water conservation practices. Unless the findings of the task force clearly justify a different approach, the Council should request the necessary authority from the Congress to make the clearinghouse activity operational. Federal agencies including the Department of Housing and Urban Development, the Bureau of Reclamation, the Soil Conservation Service, the Corps of Engineers, General Services Administration, and the Department of Defense, should encourage water conservation techniques in

programs they administer. (Author/SC)

2405

BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Municipal And Industrial Water Conservation--The Federal Government Could Do More

Conserving municipal and industrial water supplies

- frees additional supplies for other purposes;
- prevents or delays construction of costly water supply and treatment facilities;
- decreases the amount of energy needed for pumping, treating, and heating water; and
- reduces the required capacity of future wastewater treatment facilities.

The Federal Government should take the lead in obtaining, evaluating, and disseminating information on conservation techniques, including the establishment of a clearinghouse for such information. Federal agencies should encourage water conservation techniques in programs they administer.



CEG-78-66
APRIL 3, 1978



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

B-114885

To the President of the Senate and the
Speaker of the House of Representatives

This report provides an overview of opportunities
for conserving municipal and industrial water supplies.

Water conservation can play an important part in
meeting our Nation's water needs. We made our review
to assess and report to the Congress on the Federal
Government's role in initiating water conservation
programs.

This review was made pursuant to the Budget and
Accounting Act, 1921 (31 U.S.C. 53), and the Accounting
and Auditing Act of 1950 (31 U.S.C. 67).

Copies are being sent to the Acting Director, Office
of Management and Budget; several congressional committees
and subcommittees; and the heads of the agencies discussed
in the report.

A handwritten signature in black ink, reading "Luther B. Starks".

Comptroller General
of the United States

D I G E S T

An adequate supply of water is essential to the needs of the Nation's citizens and industries. As population and industrial activity continue to grow, the need for water will inevitably increase. While the development of some new supplies may be needed, making more efficient use of existing water supplies can help meet these needs.

More efficient use of water supplies makes sense in both water rich as well as water deficient areas because it:

- frees presently developed supplies for other purposes;
- prevents or delays the construction of costly water supply and treatment facilities;
- decreases the amount of energy needed for pumping, treating, and heating water; and
- reduces the required capacity of future wastewater treatment plants.

Several techniques which can help make more efficient use of municipal and industrial water supplies are domestic water saving devices (see p. 5), metering (see p. 10), pricing (see p. 12), leakage control (see p. 15), water pressure control (see p. 16), education campaigns (see p. 17), and industrial conservation. (See p. 19.)

Each of these techniques must be considered on a case-by-case basis. Although these techniques generally are believed to save water, many have either not been thoroughly studied or had their effectiveness evaluated.

No centralized data bank or clearinghouse on water conservation exists. Such a clearinghouse could serve a useful purpose in providing water conservation information. (See pp. 21 and 22.)

GAO believes there is a need for the Federal Government to intensify its efforts to evaluate the potential benefits of various water saving techniques and devices and to disseminate the results of its work to all Federal agencies, States, and localities which could benefit from implementing proven conservation techniques. (See p. 21.)

Federal agencies have an opportunity to increase their role by encouraging water conservation techniques in the programs they administer involving (1) water resource planning activities; (2) water supply facilities construction; and (3) construction, operation, and financing of offices, hospitals, and housing.

RECOMMENDATIONS

GAO recommends that the Chairman, Water Resources Council, take the lead in establishing an interagency task force of Federal and non-Federal agencies involved in water supply activities. Its purpose would be to jointly develop Federal objectives, policies, and action plans for a clearinghouse for water conservation practices involving municipal and industrial water supplies. In addition, the task force would ascertain the current technology, additional research needed, Federal incentives needed, priorities, and additional legislative authority needed for implementing effective water conservation practices.

GAO also recommends that, unless the findings of the task force clearly justify a different approach, the Council request the necessary authority from the Congress to make the clearinghouse activity operational. (See p. 22.)

GAO also makes recommendations to the heads of various Federal agencies whose activities are related to water resources development or use.

These recommendations relate to:

- The Water Resources Council (1) requiring that State and river basin water resources plans consider water conservation (see p. 24), and (2) revising the Principles and Standards for Planning Water and Related Land Resources. (See p. 32.)

- The Bureau of Reclamation, Soil Conservation Service, and Corps of Engineers, requiring water use plans from purchasers of water supply or storage space in their reservoirs. (See pp. 26,28, and 30.)
- Requiring that water conservation devices be installed in new housing where the Federal Government participates. (See p. 35.)
- Requiring water saving devices in designing, constructing, leasing, operating, and maintaining Federal office buildings by the General Services Administration. (See p. 36.)
- Implementing the use of water-saving devices in the construction and operation of military facilities by the Department of Defense and hospitals by the Veterans Administration. (See p. 38.)

The Federal agencies generally agreed with the report and GAO's recommendations.

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ABBREVIATIONS

bgd	billion gallons per day
DOD	Department of Defense
EPA	Environmental Protection Agency
FmHA	Farmers Home Administration
GSA	General Services Administration
HUD	Department of Housing and Urban Development
MPS	Minimum Property Standards
NEWS	Northeastern United States Water Supply Study
SCS	Soil Conservation Service
VA	Veterans Administration
WRC	Water Resources Council
WSSC	Washington Suburban Sanitary Commission

CHAPTER 1

INTRODUCTION

An adequate supply of water is essential to the Nation's citizens and industries. If the demand continues to increase, the Nation will have to develop new supplies or use existing supplies more efficiently. If neither of these steps is taken, emergency restrictions on water use will have to be imposed if and when shortages occur.

Although it is the policy of the Congress that State and local governments are primarily responsible to supply and regulate water use, various Federal programs offer numerous opportunities for encouraging water conservation and for implementing water conservation programs. (See ch. 3.) For example, Federal agencies (1) provide funds for water resources planning to assure the efficient use of water, (2) construct dams and reservoirs to increase the supply in various sections of the country, (3) construct and operate public buildings and military and civilian housing and finance housing programs where water conservation programs could be undertaken, and (4) provide grants to local entities for constructing wastewater treatment facilities, the size and costs of which could be reduced if conservation were practiced.

WHY CONSERVE WATER?

Conservation is beneficial because it

- frees present supplies for other purposes, such as agriculture, power generation, and instream uses;
- precludes or postpones construction of costly water supply and treatment facilities;
- decreases the amount of energy needed for pumping, treating, and heating water; and
- reduces the required capacity of future wastewater treatment facilities.

Although most water used nationwide is for irrigation, about 75 percent of the Nation's population lives in metropolitan areas constituting less than 2 percent of the Nation's land area, and by the year 2000 as much as 85 percent of the population may live in these areas. In addition, much of the Nation's industries are located in or around these areas. Consequently, these areas must have an adequate supply of water.

While new supplies for many of these areas can be developed, increased emphasis on more efficient use and conservation of existing municipal and industrial water supplies is important because:

- In some areas new supplies may not be readily developable or may be located long distances from these areas, thereby limiting potential future growth.
- The cost of developing new supplies is often high and can be a financial burden to many communities,
- Development of new supplies through constructing dams and reservoirs has often been questioned or opposed for environmental reasons.

Water conservation can also save energy. If less water is used, less has to be pumped through the distribution system and treated before it is used and less wastewater has to be handled by sewage treatment plants. Additional energy is saved from conserving water that has been heated because according to one study, hot water accounts for 41 percent of all household water usage.

In short, the benefits of water conservation, even in water rich areas, are many and may exceed the costs of water conservation techniques.

PURPOSE OF REPORT

This report provides an overview of opportunities for conserving municipal and industrial water supplies. It discusses:

- Conservation techniques, including domestic water-saving devices, metered usage, pricing structure, leakage control, water pressure control, education campaigns, industrial water conservation, the need for further analysis and dissemination of information on these devices, and the experiences of various utilities with one or more conservation measures. (See ch. 2.)
- The potential for increased water conservation through existing Federal programs. (See ch. 3.)

We previously reported on water conservation in "Better Federal Coordination Needed To Promote More Efficient Farm Irrigation" (RED-76-116, June 22, 1976) and "More and Better Uses Could Be Made of Billions of Gallons of Water

by Improving Irrigation Delivery Systems" (CED-77-117, Sept. 2, 1977).

WATER RESOURCE POLICY STUDY

On May 23, 1977, as part of his environmental message to the Congress, the President directed the Secretary of the Interior, as Chairman of the Water Resource Council (WRC), together with the Office of Management and Budget and the Council on Environmental Quality, to conduct a comprehensive review of Federal water resources policy. One issue reviewed was water conservation. The executive summary of the water conservation report, which appears in the December 5, 1977, Water Resource Policy Study, is included as appendix III in this report.

SCOPE OF REVIEW

We talked with and reviewed records and studies developed or supplied by officials of these Federal agencies:

- The Corps of Engineers, Department of the Army.
- The Bureau of Reclamation (Reclamation), Department of the Interior.
- The Soil Conservation Service (SCS) and Farmers Home Administration (FmHA), Department of Agriculture.
- The Department of Defense (DOD).
- The Department of Housing and Urban Development (HUD).
- The Environmental Protection Agency (EPA).
- The Water Resources Council.
- The Veterans Administration (VA).
- The General Services Administration (GSA).

We contacted officials of State water supply agencies in California, Colorado, New Jersey, and New York and selected utilities in those States and in Maryland and Virginia. We also contacted private organizations, including the American Water Works Association. Our review included examination of agency records and water conservation studies.

CHAPTER 2
NEED TO EVALUATE AND DISSEMINATE
INFORMATION ON MUNICIPAL AND INDUSTRIAL
WATER CONSERVATION TECHNIQUES

Municipal and industrial water conservation techniques are relatively new and have potential for saving significant quantities of water. However, more experience and study is needed on some of them to demonstrate their practicality and desirability for various situations and localities.

Because municipal and industrial water conservation is still in its early stages of development, we believe the Federal Government needs to intensify its efforts to evaluate the potential benefits of water-saving techniques and devices. Also the Federal Government should disseminate its findings to all Federal agencies, States, and localities which could benefit from implementing proven conservation techniques.

Contrasted with long-term conservation measures are emergency restrictions on water use, which are put into effect only when a shortage occurs. Emergency measures implemented by New York City during the 1960s drought are discussed in appendix I. This chapter deals with some long-term measures. Although the techniques discussed in this chapter have been employed at various locations, their applicability to any given locality needs further study and should be evaluated on a case-by-case basis.

Domestic, commercial, and industrial water users have a broad range of opportunities to conserve water. Techniques discussed in this chapter include

- domestic water-saving devices,
- metered usage,
- pricing structure,
- leakage control,
- water pressure control,
- community education campaigns, and
- industrial conservation resulting from Federal water pollution control legislation.

Some obstacles to implementing these techniques are also discussed.

In recent years some utilities have begun to place increased emphasis on water conservation. Officials of utilities contacted generally were satisfied with the results of their conservation efforts to date and plan to continue them. Due to the multiplicity of factors influencing water use and the short periods the programs have been in effect, it was not possible to firmly quantify the savings or demonstrate conclusively that long-term reductions in consumption can be expected from the measures.

Overall, programs aimed at requiring domestic water-saving devices are receiving much attention. California passed legislation, effective January 1, 1978, requiring installation of toilets which use a maximum of 3-1/2 gallons per flush in new construction and in replacing existing toilets. New Jersey is considering adoption of similar requirements covering toilets as well as other water-using fixtures, including shower heads and faucets.

We selected the following utilities and geographic areas to illustrate one or more conservation measures or concepts

<u>Utility or area</u>	<u>State</u>	<u>Conservation measure</u>
Washington Suburban Sanitary Commission (WSSC)	Maryland	Domestic water-saving devices
Fairfax County Water Authority	Virginia	Pricing structure
Denver Water Department	Colorado	Metered usage
East Bay Municipal Utility District	California	Leakage control and community education campaigns
New York metropolitan area	New York	Industrial conservation

DOMESTIC WATER-SAVING DEVICES

A 1974 EPA study disclosed that 70 percent of household water use was for toilet flushing and bathing, as follows:

	<u>Percent of total use</u>
Flushing	39
Bathing	31
Doing laundry	14
Dishwashing	6
Drinking and cooking	5
Oral hygiene	3
Miscellaneous	<u>2</u>
Total	<u><u>100</u></u>

Devices which could significantly reduce the use of water for flushing and bathing are discussed below. An overall ranking of water-saving devices, prepared by EPA and ranked in order of their perceived acceptability to the public and ease of installation, appears in appendix II.

Devices to make toilets more efficient

Total water usage can be significantly reduced by making the toilet more efficient. Most toilets use about 5 to 6 gallons per flush. Various manufacturers produce and market toilets which use 3-1/2 gallons per flush. In a demonstration project sponsored by EPA, using actual households, 3-1/2 gallon toilets used an average of 25.6 percent less flush water.

Manufacturers of water-saving toilets said there is no significant difference in cost between the standard and water-saving models. However, installation of low flush toilets appears to be cost effective only for new homes or for replacing defective units. A study reported in the American Water Works Association Journal in 1972 concluded that it was not cost effective to replace existing toilets. At least one water supplier, WSSC, now requires that water-saving toilets, which use a maximum 3-1/2 gallons per flush, be used in all new construction and in replacing existing fixtures.

Other types of water-saving toilets are available, but cost and complexity of installation appear to preclude their widespread use. The dual flush toilet is designed to use less water for liquid than for solid wastes (1-1/4 gallons for liquid wastes and 2-1/2 gallons for solid wastes). The vacuum type uses air rather than water as the primary transport medium; however, it requires a special toilet, a separate piping system, and a holding tank, in addition to a vacuum pump. While costly to install in private homes, it may have potential in locations

where many toilets can be connected to a central system. Another type of toilet uses mineral oil in lieu of water and, after each flush, the mineral oil is recycled. Again, however, a separate system must be installed.

An alternative to replacement of existing toilets is to install retrofit devices designed to reduce the volume of water used for each flush in tank type toilets. These devices include plastic bottles (filled with gravel or other weighted material to prevent the bottles from floating) put into the tank to displace water equal to their volume. Valves which can be set for various water levels and flexible panels or dams also reduce the amount used per flush.

One manufacturer questioned whether retrofit devices can be effective, since toilets are designed to use a certain quantity of water and any lesser quantity may result in malfunctions or inadequate flushing. Utilities which have distributed retrofit equipment, however, have generally not received widespread complaints about improper operation and have indicated that their use saved water.

Low flow shower heads and related devices

Low flow shower heads, as well as aerators and spray taps installed on sink and basin faucets, reduce the flow of water per second. These devices are effective, according to one study, because water used for showering is based on a time factor rather than on the need for a specific quantity of water. For example, people take a 5- to 10-minute shower, not a 10- to 20-gallon shower.

Flows from standard shower heads range from 5 to 15 gallons per minute, but the flow can be reduced to 3 gallons per minute or less if the shower head is modified or a flow control device is installed. As a result, a savings of 40 percent and more of the water previously used is possible, as well as the energy required to heat it.

In an actual demonstration in 25 single-family homes conducted by WSSC, shower head flow control devices with a 3-gallon per minute flow reduced total water used per household by as high as 12 percent. A study made for EPA by General Dynamics, however, concluded the total saved by such devices was only about 1 percent. We believe this large difference points out the need for additional evaluation.

Aerators, by mixing air with water, give an appearance of a greater flow than actually is created. Since people

tend to judge a flow by appearance, they tend to adjust it to the point where it looks like they are using the amount to which they are accustomed, while in fact they are using much less.

One type of aerator used in an 80-story office building in Chicago saved an estimated 3 million gallons annually. Although the percentage saved was not available for this building, an EPA study estimated aerators would reduce normal water use by about 25 percent.

Spray taps discharge a fine spray rather than a single stream, as do conventional faucets. They give the illusion that more water is flowing than actually is. Tests conducted in office buildings indicated that spray taps, like aerators, reduced water use substantially.

As in the case of water-saving toilets, the way to insure the use of these devices is to equip industrial plants, office buildings, and houses with them at the time of construction or major renovation. Retrofit programs increase costs for capital outlays for the equipment and require the cooperation and understanding of the public of the benefits to both themselves and the community.

Experiences of WSSC

WSSC is a public agency which provides water and sewerage services to about 1.2 million people in some 1,000 square miles of Montgomery and Prince Georges Counties, Maryland. Water is sold primarily to domestic, commercial, and institutional users. There are very few industrial users. The average daily water use in the service area in 1974 was 129.3 million gallons, or about 108 gallons per person.

The initial motivation for a water conservation program arose from WSSC's desire to reduce wastewater flows, which were exceeding the capacity of the sewage collection and treatment system. WSSC issued a statement of policy in October 1971 which established general program objectives. The first 3 years of the program were devoted to an intensive public education campaign, the compilation and periodic review of water-saving devices, and a program to require or encourage their use.

In 1972 WSSC, which has authority to amend the local plumbing code, adopted the following requirements for new construction and for the installation of new fixtures in existing buildings:

- Tank type toilets installed after July 1, 1973, must be designed to use a maximum of 3-1/2 gallons per flush.
- Faucets must have a flow of about 4 gallons per minute through use of aerators installed on spouts, and shower heads must have flows limited to 3-1/2 gallons a minute.
- Water pressure must be reduced to 50 pounds per square inch with pressure-reducing valves on units where incoming pressure exceeds 60 pounds per square inch.

A retrofit program, which included the following, was also started:

- Door-to-door distribution to customers of a kit that included three quart bottles for reducing toilet tank volume and dye pills for detecting toilet tank leaks, along with followup questionnaires and surveys to determine the degree to which the kits had been used.
- Distribution, free to customers on request, of low flow shower control inserts.
- Implementation of a special test project which involved retrofitting of water-saving devices in about 2,400 customer units, along with a 6-month followup of water use in the test households.

Utility reports on the results of the special test project for single-family homes were encouraging. Where toilet inserts were used in conjunction with water pressure reduction, total home use was reduced by 30 percent or more where water pressure had been high. Low flow shower heads lowered total home water use by as much as 12 percent.

WSSC's analysis of the effectiveness of these measures in the total service area over the period 1972-75 was inconclusive. Total consumption continued to increase about 3 to 5 percent annually. However, per capita water use in the winter, during which demand is least dependent on weather conditions, fell from about 102 to 96 gallons per day. Given the number of persons served by the utility, this decline would represent a total reduction of about 8 million gallons per day.

METERED USAGE

Metering as a means of reducing water consumption has both proponents and opponents. Additional studies are necessary to determine the usefulness of metering as part of any conservation program, and even then its value must be evaluated on a case-by-case basis. For example, while metering may help reduce water use in an area of mostly single-family dwellings, its impact may be less in an area composed of apartment buildings where the individual units are not metered.

Consumers are charged either a flat rate or a metered rate. Under a flat rate system, the charges are based on house and/or lot size without regard to the amount of water used. Where metering is in effect, each structure has a least one water meter and the charges are based on use. Many major cities have universal metering (i.e., at least one meter per residential building) but some, including New York, St. Louis, and Chicago, do not.

Proponents of metered usage believe that it is more equitable than flat rates, since customers pay only for water actually used. Further, they believe it lowers use because consumers try to reduce their water bills by conserving. Metering also assists in managing the overall water system, since it can help to

- locate leaks in a utility's distribution system by identifying unaccounted-for blocks of water;
- identify high use customers, who could be given literature on opportunities for conserving; and
- identify areas where use is increasing, which is helpful in planning additions to the distribution system.

Universal metering is somewhat of a misnomer since, as noted previously, only one meter per building is installed. If an apartment house with many units has only one meter, the water used by each tenant is not measured and, therefore, the tenant is not strongly motivated to conserve. In cities where a large segment of the population lives in multifamily buildings, metering may not lower water use. The effectiveness of metering is also influenced by the rates charged and the frequency with which the meters are read and bills sent. Pricing will be discussed later in this chapter.

It is difficult to analyze a community's historical water use patterns to compare short- and long-term effects of metering on reducing water use with those of other factors. It is also difficult to project potential water savings if metering was adopted in communities which do not currently have it.

As indicated previously cities which have low water rates together with a large portion of their population living in apartment houses may find that metering does not significantly reduce consumption. In other areas, where there are high water rates, a high percentage of single unit dwellings, and large lawn areas, metering would likely reduce water use.

Cost is another factor. Since a metering program involves a sizeable initial capital investment and recurring annual operating costs, it may not be cost effective to undertake such a program in areas where existing buildings are not metered. For example, metering in New York City would cost an estimated \$154 million in total capital expenditures and \$19 million in annual operating costs and debt service on the capital cost. At present about 20 percent of water usage in New York City is metered, represented primarily by commercial and industrial users.

Experiences of Denver Water Department

The department serves a total of about 900,000 persons. Average daily water use peaked at about 198 million gallons per day in 1974. Residential and commercial users account for 52 and 23 percent of total use, respectively; industrial and municipal users account for the remainder.

Since January 1957 meters have been required on all new residential services inside Denver. However, as of 1975, about 88,000 residential customers remained unmetered. Several studies were undertaken to compare metered use to unmetered use in residences and to estimate the water which would be saved by installing meters.

In 1973 a report sponsored by the Denver Board of Water Commissioners was issued which brought together data from several previous studies of metering. Figures on the effectiveness of metering of residential use during various periods were quoted as follows:

Metered vs. unmetered usage

1965-68	13 to 30 percent less
1960-70	29 percent less
1969-72	6 percent less

During our audit Denver officials informed us that meter installation was not being planned for the 88,000 remaining unmetered customers for various reasons, such as costs and consumer preferences. However, in commenting on a draft of this report, Denver informed us that on October 21, 1977, the Water Department had announced that meters would be installed for all unmetered customers.

However, metering may not be a viable alternative for other communities. Metering should be analyzed on a case-by-case basis where it is being considered for implementation.

PRICING STRUCTURE

Another approach to conserving water is increasing its price. The price generally represents the amount necessary to cover the utility's capital and operating costs, including allowance for profit or reserves. The typical rate structure is the declining block rate structure, under which there is a charge per gallon for the first block of use which is greater than the charge per gallon for the next higher use category. Ninety-four percent of the cities reporting in "Modern Water Rates" (1964-65) used this form of pricing. Under this system there apparently is little incentive to conserve.

A number of studies have been performed by the Corps of Engineers, EPA, and others on the effect of price increases on water use. This relationship, indicating by what amount demand will be reduced if prices increase, is known as the elasticity of demand. These studies have indicated that the demand is relatively inelastic and that only massive price increases will significantly reduce usage. Price increases of this magnitude, within an existing rate structure, create two problems of equity. The first involves how a high charge will affect low income groups, and the second involves who should benefit from the profits made by utilities as a result of the increases.

An EPA study on demand for water made the following estimates of demand elasticity for various uses:

Sprinkling use in dry western areas--0.7-percent use decrease per 1-percent price increase

Sprinkling use in humid areas--1.6-percent use decrease per 1-percent price increase

Domestic use overall--0.23-percent use decrease per 1-percent price increase

The study also stated that demand appears sufficient to warrant careful attention to pricing policy.

Several studies have attempted to determine which, if any, of the many uses of water are elastic and, if one or more are, to revise pricing structures in those areas. Some utilities have begun to charge for water at the same cost per gallon rate irrespective of the quantity used. Others have instituted an increasing block pricing structure under which the cost per gallon increases as higher quantities are used. Both systems are designed to use the pricing structure to encourage conservation among high volume users.

A promising approach involves peak level pricing, or charging significantly more for use above a certain level during periods when demand is the highest. One application of peak level pricing attempts to reduce high summer time water use, such as for lawn sprinkling. This can be done through increasing the rate per gallon for the amount of water used in the spring and summer in excess of average winter time use.

In one area where peak level pricing is being tested, the rate structure assumes that winter time use cannot be significantly reduced by increasing prices. In the spring and summer, winter time use plus some additional allowance is charged at normal rates. Any use above this quantity is priced at a substantially higher rate. Since lawns are sprinkled in the spring and summer and since sprinkling tends to be more price sensitive than other water uses, total use is expected to decrease.

Peak level pricing is not designed primarily to raise additional revenue but to reduce overall consumption and to charge high volume users for facilities needed only on peak demand days in the hope that these peaks can be reduced. This approach appears to be productive since new facilities are often constructed to meet

periods of peak demand as compared to periods of average demand.

Utilities visited have not had enough experience with this pricing system to make a final judgment about its effectiveness, although initial data indicates it has reduced overall use.

Additional studies or demonstrations of the effects of pricing policies on water use are needed to determine the actual impact or effects of such pricing policies.

Experiences of Fairfax County Water Authority

The authority services the majority of the population within the county, which is in the Washington, D.C., metropolitan area. Average daily demand is about 52 million gallons. About half this water is sold directly to residential, commercial, and some light industrial users, and the remainder is wholesaled to several other utilities.

In 1974 Fairfax County began to consider changes in its policies with regard to water use in order to make charges under the system more equitable and to reduce peak demand so as to postpone the need for new plant facilities. A major feature of the program which was adopted was a revised pricing structure. The county also modified its plumbing code to require water-saving devices in new and remodeled construction.

A peak pricing policy was adopted in November 1974. A utility official said the change had been made to make the rate structure more equitable, with water conservation as a byproduct. According to this official, it was designed to charge people who contribute the most to increased consumption during peak demand periods for facilities required to meet that demand.

Fairfax's revised pricing system was structured as follows. First, the winter use for each customer was computed. Summer use which exceeds this winter use by the greater of 6,000 gallons or 30 percent was made subject to a surcharge of \$1 per 1,000 gallons in 1975 and \$2 per 1,000 gallons in 1976 and succeeding years. Basic charges for water use have ranged from \$0.60 to \$0.68 per 1,000 gallons. For example, after 1976, a customer that does not exceed winter use by 6,000 gallons in a summer quarter or by more than 30 percent of winter usage (whichever is greater), must pay \$0.60 per 1,000 gallons. If these limits are exceeded, however,

the customer must pay \$2.60 per 1,000 gallons, or a 333-percent surcharge, for that part of total usage exceeding the limits.

Initial data indicates that customers have reduced usage during peak periods. While the utility had expected that 35 percent of its customers would be subject to the surcharge in 1975, the first year of operation, only 23 percent fell into this category. In addition, peak day use in June 1976 was 144 percent of average demand as compared to 162 percent of average demand in July 1974; about the same amount of rain fell during both months. Although it may be too early to draw final conclusions for this program, Fairfax officials were encouraged by these initial results and plan to continue the program.

LEAKAGE CONTROL

Some water is lost through leakage while it is being conveyed from the source of supply to the ultimate user. The amount of losses in the distribution system may be significant, but these losses can be reduced by an increased effort in locating and eliminating leaks and, in the case of older systems, by replacing or relining pipes.

There is, in most cases, no direct way of measuring leakage, especially where flat rates are charged. But in a metered system, the difference between the amount of water put into the distribution system and the amount billed to customers is referred to as unaccounted-for water. Such water includes water used in public buildings, for firefighting, and for other municipal purposes, as well as losses from leakage. Various utility officials cited as acceptable unaccounted-for water ranging from 10 to 20 percent of all water put into the system.

The cost effectiveness of a leakage detection program depends on the amount of assumed leakage, the time the leak would go unnoticed without a detection program (in some areas leaks may surface quickly), hydrological conditions, local wage rates, and the cost of finding and repairing the leak versus the value of the lost water. In areas where ground water is the source of supply, leaked water may reenter the aquifer where it again becomes part of the source. In these areas, although the cost of treatment and pumping is lost, leak detection may not be considered useful or cost effective.

Experiences of East Bay Municipal Utility District

The district is a public utility providing water and sewerage services to a metropolitan area east of San Francisco Bay with a population of over 1 million. Of the utility's customers, 55 percent are residential, 12 percent are commercial, 22 percent are industrial, and 10 percent are public authorities. Average daily water use in fiscal year 1976 was 220 million gallons.

East Bay developed a water management plan in 1972 which indicated that, based on population and consumption projections, a supplemental water supply would be required by the mid-1980s. The plan included a water conservation program, which was initiated in 1972. The major aspects of the program were leakage control and public education.

The leakage control program employs electronic equipment to locate leaks in the water distribution system. An East Bay official stated that the survey had been started in June 1974 and had had as a goal reduction of unaccounted-for water from the 1974 high of 9.5 percent to 5.5 percent by the year 2,000.

As of March 1975, the unaccounted-for water had been reduced to about 8 percent. By October 1, 1977, more than 800 leaks totaling an estimated 7 million gallons per day had been identified while examining about 95 percent of the utility's 3,300 miles of water mains.

WATER PRESSURE CONTROL

Proper control over water system pressure may also conserve water. Adequate pressure is necessary to deliver water to the higher floors of buildings, for example, but excess pressure wastes water. Most city systems are pressurized to about 50 pounds per square inch. Above this pressure threaded connections tend to leak and water may be wasted at the tap since more water is delivered than is needed. In areas where pressure is too high, pressure-reducing valves can be installed on each floor of commercial buildings or in individual residences.

In a demonstration conducted by WSSC, pressure-reducing valves were installed in 83 single-family homes where incoming water pressure ranged from 70 to 120 pounds per square inch. With pressure reduced to

50 pounds per square inch and use of toilet inserts, water use was reduced by 30 to 37 percent.

COMMUNITY EDUCATION CAMPAIGNS

Public education campaigns may be short or long term. The effectiveness of long-term campaigns is difficult to measure. Education campaigns have reduced demand significantly during extreme droughts, when newspapers and other media have informed the public of a serious situation and the imposition of emergency restrictions on water use. Emergency campaigns do not seem to have a permanent effect, however, since after the end of the shortage, water use usually returns to previous levels.

Long-term education in nonshortage times has been directed toward changing water use habits, encouraging public participation in the conservation programs, or making the public aware of various water-saving policies or proposals. It may consist of bill inserts; public service television, radio, and billboard advertising; and visits to and presentations at meetings of local organizations. The campaign may also involve providing materials such as workbooks and films to schools as well as sending lecturers to speak on conservation.

To be effective this material should be attractive and well designed and contain specific water-saving ideas, as well as explain the benefits of lower water use to the consumer, the community, and the utility. Officials of one utility stated that past campaigns, which had not been adequately financed or supported by utility management, had not produced effective materials.

Experiences of East Bay Municipal Utility District

East Bay's conservation program focuses on public education. The campaign is directed to the general public, students, and major water users. Actions to create public awareness include:

- A 16-page water conservation handbook was given to every customer and additional copies were given to landlords and propertyowners for their tenants.

- Dye pills used for detecting leaks in toilet tanks were offered in a billing insert and were provided upon request.
- Plastic bottles for toilet tank capacity reduction were offered to customers.
- Public information materials, such as posters, lapel buttons, key chains, matches, litter bags, and slogan stickers, were distributed.
- The use of bill inserts promoting water conservation was increased.
- A 60-member speakers' bureau composed of East Bay personnel showed films and gave speeches on conservation and the utility's operations.
- Audiovisual materials, such as a film and programmed slide show, were shown to schools, community service groups, and clubs.
- Mass media spots were produced for radio and television public service announcements.
- Information booths at county fairs stressed conservation.
- A demonstration garden to promote use of native and/or low-water-using plants in landscaping is being planned, and literature on this subject is available.
- Information releases were published in a west coast family magazine.

An East Bay official stated that the campaign focuses on students, the utility's future customers. Along with materials mentioned previously, a water conservation curriculum is being developed for use in school systems throughout the service area.

Major water users, which included industries, were approached as follows:

- Meetings were held with trade groups, public agencies, and individual customers where specific recommendations were made.
- Billings of major water customers were analyzed

to locate the high users, which were then advised on ways to conserve.

To date the early stage voluntary conservation program's effectiveness has not been thoroughly evaluated. An East Bay official informed us that, even though the education campaign has been ongoing for several years, it is only recently that it seems to have become effective. This, he suggested, was possibly due to media coverage of the imposition of emergency water use restrictions in nearby Marin County, necessitated by a severe shortage.

By May 1977 the voluntary program was replaced by a 25-percent and later 35-percent mandatory cutback or allocation program. East Bay officials told us that the voluntary program had made the mandatory program easier to administer since customers had several months to obtain free water-saving devices from the utility.

East Bay officials believe that most of the approaches created conservation awareness. East Bay plans to continue its education efforts and hopes for a long-range change in public attitudes toward water conservation.

INDUSTRIAL WATER CONSERVATION

The primary impetus for increased industrial water conservation is expected to come from Public Law 92-500, October 18, 1972, as amended by the Clean Water Act of 1977, December 27, 1977, which requires industry to treat its wastewater to meet certain standards before discharging it to the local sewer system or to rivers, lakes, and streams. It is anticipated that to meet these standards at minimum costs, industry will try to reduce the amount it uses or recirculate the water, to reduce the amount that must be treated before being discharged. As a result, industrial water conservation is expected to result in substantial reductions in water use over the long term.

Six typical major water-using industries are the food, textile, petroleum, chemical, primary metals, and paper products industries. Water use can be divided between process water, that is, water used as part of the manufacture of the product, and water used for other purposes, such as cooling water. The ability of an industry to reduce its fresh water consumption depends on the potential for recirculation and reuse of process water and devices such as cooling towers or other water uses. Additional savings are possible through good housekeeping and waste control programs within the plant.

EPA has participated with industry in demonstrating recycling and reuse of water. These demonstrations indicate

that substantial amounts can be saved. For example:

- A cooling tower system at a papermill reduced the mill's total water requirements by about 45 percent.
- A fiber plant successfully reused 30 percent of its wastewater for cooling tower and other uses.
- At a fiberglass insulation plant water was reused 4-1/2 times in the fiberglass-manufacturing process before it was evaporated from the system.
- At a tomato-processing plant a combination of water-saving techniques is expected to reduce water use from 930 to about 120 gallons per ton of tomatoes processed.

Title I of Public Law 89-298, dated Oct. 27, 1965 directed the Corps of Engineers to prepare plans to meet the long-range water needs of the Northeastern United States. The Northeastern United States Water Supply Study (NEWS) was begun in 1966, and the final report was issued November 1977. One of the three areas identified as having the most critical water supply needs was the New York metropolitan area.

A January 1977 draft of the NEWS study projected that the demand on the public system for industrial water would increase to an equivalent use rate of about 6.6 billion gallons per day (bgd) in the year 2,020. Of this amount, 5.7 bgd would be provided by improved recirculation and reuse and 0.9 bgd would be supplied by the public systems. Current levels of recirculation and reuse would result in a savings of 2 bgd in demand on the public system in the year 2,020.

These advanced processes can save water, but they can also be costly; industry will have to be convinced of their cost effectiveness before they are implemented full scale. Lower water costs or the fact that it may be less costly to recirculate or reuse water than to treat it adequately to meet pollution discharge limitations are the kind of incentives necessary to reduce industrial water use.

The potential water savings resulting from the effluent limitation provisions of Public Law 92-500, as amended, assume that the act's requirements will remain unchanged and that it will be fully enforced. The act requires that industry use the best available control technology to treat its wastewater by July 1, 1984. Any relaxation of the requirements will affect not only pollution control but also industrial water use.

CONCLUSIONS

Some utilities have instituted water conservation programs within the last few years with varying degrees of success. Yet the experiences of the utilities and others which have instituted water conservation programs need to be systematically evaluated and the findings widely disseminated. This would help other utilities to learn of not only the water conservation methods which achieved results, but also those which did not, and the factors which contributed to such results.

Federal agencies as well as local water suppliers have developed information on and analyzed some of the water conservation techniques discussed in this chapter and their effectiveness. These studies are, however, incomplete in many instances. Additional work is needed to identify, evaluate, coordinate, and disseminate information on the methods, their effectiveness, and the degree to which they have been studied or proven. The need for this type of information is further demonstrated in chapter 3 concerning water conservation activities of various Federal agencies.

There is no clearinghouse on water conservation available to Federal agencies, States, municipalities, and utilities attempting to develop a water conservation program. Such a clearinghouse would be useful, however, because of the numerous water conservation devices and techniques available. Also the feasibility and the effectiveness of each device and measure depend on various factors, and there is not general agreement regarding their effectiveness. Additional research and demonstration projects are therefore needed.

No one agency has overall responsibility for all the areas on which the Federal Government has the opportunity to implement, mandate, or encourage more efficient water use. (See ch. 3.) Federal, State, and local agencies and water suppliers must contact numerous agencies, utilities, or industry associations, for concepts, information, experience, and research on proven and emerging approaches to water conservation.

As population and industrial activity continue to grow, the Nation's water needs also grow. As a result there is a growing need to make the most efficient use of and to conserve this vital resource.

One agency should be designated as the clearinghouse and should take the lead role in this area. That agency should be responsible for gathering, organizing, and

analyzing information on water conservation and disseminating it to Federal, State, and local users.

Several Federal agencies, including EPA, Interior, WRC, and GSA, could logically perform this function because of their past involvement in the area or because the agency's mission is closely related to water resources issues.

WRC has participated heavily in the water conservation task group of the Water Resource Policy Study and has expressed an interest in taking the lead on the water conservation task force and clearinghouse function. In addition, WRC's role in water resources is related primarily to planning and coordination, similar to the functions necessary to carry out our recommendations. Consequently, we believe that WRC is the most logical choice to take the lead on the water conservation task force and clearinghouse function.

RECOMMENDATIONS TO THE CHAIRMAN, WRC

We recommend that the Chairman assume the lead in establishing an interagency task force of Federal and non-Federal agencies involved in water supply activities. The task force should develop Federal objectives, policies, and plans for establishing a clearinghouse for water conservation practices involving municipal and industrial water supplies. In addition, the task force should ascertain the state of the art, additional research needed, Federal incentives needed, priorities, and additional legislative authority needed for implementing effective water conservation practices. We recommend also that--unless the findings of the task force clearly justify a different approach--WRC request authority from the Congress to establish and operate this clearinghouse.

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WRC (see app. IV) agreed with our conclusions and felt the Federal Government could make a substantial contribution in this area by preparing an annual report summarizing the evaluation of agency experiences with water conservation techniques. WRC said it could provide such a service effectively and that it would pursue appropriate congressional support for the required authority, staff, and funding.

CHAPTER 3

FEDERAL AGENCIES CAN DO MORE

TO ENCOURAGE WATER CONSERVATION

The Federal Government can do more to encourage and implement water conservation techniques through the activities of Federal agencies which relate directly or indirectly to water resources development and use.

Some actions toward water conservation have been taken through simple changes in the agencies' regulations; others may require changes in WRC's Principles and Standards for Planning Water and Related Land Resources; still others may require Executive orders or modification of legislation.

The various Federal agencies can change water conservation practices through water resources planning, water supply facilities construction, water pollution abatement programs, and building construction programs.

Although the Water Supply Act of 1958, as amended (43 U.S.C. 390b), states that State and local interests are primarily responsible for domestic, municipal, and industrial water supplies, the Federal Government can do much to encourage increased conservation.

The matters discussed in this chapter and the recommendations should be coordinated with activities recommended to WRC in chapter 2 for establishing a water conservation clearinghouse.

WATER RESOURCES PLANNING

Under titles II and III of the Water Resources Planning Act of 1965 (P. L. 89-80, July 22, 1965), WRC reviews water plans prepared by river basin commissions and States. River basin commissions were established to (1) coordinate plans for developing water and related land resources in their areas, river basins, or groups of river basins, (2) prepare and keep a plan up to date for water and related land resources development, including consideration of all reasonable alternatives of achieving optimum development of water and related land resources, (3) recommend schedules of priorities, and (4) study water and related land resources in their areas. State plans are funded by WRC to help States develop and participate in developing comprehensive water and related land resources plans.

These plans could provide a framework for designing and implementing comprehensive water conservation programs, but WRC has no requirement that they address the potential for reducing the demand for water through conservation.

WRC officials believe it would be good to require that river basin commission and State water plans consider water conservation. They told us, however, that there might be some problems in implementing such a concept because in the past grantees have resisted conditions being attached to their grants and have questioned WRC's legal authority to add such conditions.

Section 204(3) and 303(1) of the Water Resources Planning Act of 1965 provide that both river basin commission and State plans be comprehensive. We believe that to be comprehensive, plans must consider water conservation thoroughly in evaluating all reasonable alternatives for achieving optimum development of water resources in the study area.

Recommendation to the Chairman, WRC

River basin commission or State plans would be incomplete if they don't comprehensively address the potential impacts water conservation could have on the plans. Consequently, we recommend that WRC do whatever is necessary--such as issuing new regulations and guidelines or proposing legislative modifications--to require that water conservation be comprehensively addressed in all water plans submitted to WRC for review or approval.

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WRC (see app. IV) concurred with this recommendation and is developing guidelines with water conservation as an integral element for comprehensive coordinated joint plans.

WATER SUPPLY FACILITIES CONSTRUCTION

The Bureau of Reclamation, the Soil Conservation Service, and the Corps of Engineers construct dams and reservoirs which include such features as water supply, flood control, navigation, and recreation. If these facilities include municipal and industrial water supply features, water or storage space in the reservoirs is sold to municipal and industrial customers.

When these agencies plan construction of such new facilities, local water suppliers may request that additional storage capacity be added to meet present and future needs. Officials of all three agencies told us they analyze requests by municipalities and industries for water supply from their reservoirs to ensure that the requests are based on reasonable projections. But only Reclamation requires that detailed water use plans be submitted and approved before water supply contracts are executed.

Bureau of Reclamation

Reclamation builds dams and reservoirs to supply water in 17 western States. Most of the water supplied is used for agricultural irrigation. For example, in 1975 only about 2 million acre-feet of water were used by municipal, industrial, and miscellaneous users, compared to about 27.4 million acre-feet supplied to farms.

Nonetheless, Reclamation officials are concerned that water for municipal and industrial purposes is used efficiently. Over the last 2 years Reclamation has revised its procedures on the sale of such water, to assure that water conservation is considered. In a July 1976 memorandum to Reclamation's regional directors, the Commissioner of Reclamation stated that in an effort to conserve and manage water resources, Reclamation must continue to observe certain policy guidelines, including:

"The quantity of water allocated to a particular purpose should be no more than can be put to beneficial use for that intended purpose, taking into account sound water management practices."

To implement this policy Reclamation requires contractors to furnish water use plans, which Reclamation must approve, as a precondition to extending existing water supply contracts or initiating new ones. Reclamation does not prescribe water-saving devices or techniques which must be included in the plans, but rather allows the contractor latitude in preparing their plans. Reclamation reviews and evaluates the plans and allocates for sale only that amount which it calculates would be needed if sound water management is practiced.

In addition, contractors must annually submit water diversion requests for the amount of water they will require. A Reclamation official told us that if these requests appear high, particularly during a dry year, Reclamation discusses the request with the contractors

in an effort to get them to reduce the amount requested. For years when there are water shortages, Reclamation has water shortage provisions in its water supply contracts. Reclamation said that these provisions vary by individual project from equal sharing of shortages by irrigation and municipal and industrial uses.

We believe the requirement for water use plans could lead to more efficient use of municipal and industrial water which Reclamation sells, but there is a problem which may preclude universal application of this approach in the near future. All new municipal and industrial water supply contracts will have the water use plan requirement, but existing contracts, normally running for 40 years, will only come under this requirement when

- a contract comes up for renewal,
- a new water use is proposed,
- an option for water supply is executed,
- a contractor proposes assigning its water to a third party, or
- a contractor proposes to modify an existing contract.

A Reclamation official told us that because of some of these situations, most municipal and industrial water supply contractors will likely be required to submit detailed water use plans before the end of the 40-year contract periods.

According to Reclamation officials, the alternative to waiting for contract expiration or one of the other situations would be a legislative amendment requiring modification of existing contracts to require water use plans demonstrating good water management practices.

Recommendation to the Secretary of the Interior

Reclamation's new program of requiring that its municipal and industrial water supply contractors submit water use plans and allocating only that amount of water for sale which would be needed if sound water management is practiced can contribute to water conservation practices, if effectively implemented by Reclamation. However, the original contracts were signed generally for 40 years and do not include water use plans. Reclamation officials said most contracts

would be required to include water use plans well before 40 years.

Until such plans are required for these existing contracts, we recommend that the Bureau of Reclamation encourage its existing water supply contractors to prepare water use plans and to adopt the use of proven water saving devices and techniques.

Interior told us (see app. V) that a requirement for water use plans is sound and is in accord with present procedures and that a more explicit and comprehensive rule would be issued. Reclamation officials informally told us that they agreed with our recommendation to encourage existing water supply contractors to prepare water use plans and to adopt the use of proven water saving devices and techniques.

Soil Conservation Service

SCS builds small watershed projects to prevent floods and soil erosion. The dams and reservoirs built also provide other benefits, such as recreation and increases in water supplies which can be used for agricultural, municipal, and industrial purposes.

When an SCS project includes a municipal and industrial water supply feature, it sells storage space in the reservoir to local interests, which have up to 50 years to pay for that feature. From the time the program began in 1954 until June 30, 1976, SCS had completed 425 small watershed projects. Municipal and industrial water supply was included in about 112 projects.

SCS said that local interests are responsible for (1) providing all lands, easements, and rights-of-way for small watershed projects, (2) providing the engineering services necessary to design the facility, and (3) paying for the allocated costs associated with water supply features. When the projects are completed, the local interests own the facility and are responsible for operation and maintenance. SCS views these projects as local and its role as simply to help the local interests to achieve their objectives.

SCS agreed with the concept of making the most efficient use of water supplies, but because of the local nature of their watershed projects, they were skeptical about requiring municipal and industrial water supply purchasers to prepare plans on the most efficient use of water supplies. Such a requirement, SCS said, would detract from the local control

of the projects and might discourage some local interests from participating in small watershed projects.

SCS said that, unless required by an Executive order or changes in WRC's Principles and Standards, it does not plan to revise its procedures on small watershed projects to require local interests to prepare these plans.

Recommendation to the
Secretary of Agriculture

Water conservation techniques and devices can substantially reduce municipal and industrial water use. Federal agencies whose programs relate to water supply or use should encourage or require program beneficiaries to promote the most efficient use or conservation of water.

We recommend that the Secretary of Agriculture instruct SCS to require its future purchasers of municipal and industrial water storage space, as a prerequisite to including such storage in the project, to give SCS a plan which SCS must approve, demonstrating that good water conservation practices will be used and showing the techniques considered.

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SCS told us (see app. VI) our report correctly expresses its views about making water conservation measures a requirement for including municipal and industrial water supply storage in its small watershed projects. Essentially, SCS believes that water conservation requirements should not be included in SCS small watershed projects.

SCS also said, however, that if conservation measures are to be a requirement, they should be required in all Federal programs. The Corps of Engineers, Reclamation, and SCS construct dams and reservoirs from which local entities purchase water supply or storage space. Reclamation already requires water use plans of those that purchase water from Reclamation projects. We have recommended that the Corps also require such plans. To achieve conservation and to maintain some consistency among Federal programs with the same purpose (water supply), we believe SCS should also require water conservation plans from local users of water supplies provided by projects in which SCS participates.

Although SCS projects are local, SCS does participate, and we believe Federal agencies should encourage water conservation in all their programs. We believe SCS should

not look to reasons why it should not encourage water conservation, but rather should seek and implement alternatives on how it can encourage water conservation in its small watershed program.

Corps of Engineers

The Corps builds multipurpose dam and reservoir projects, which may include municipal and industrial water supply as a project feature. When water supply is included as a project feature, the Corps sells storage space in the reservoir to local interests and the costs of that feature are paid for by the local interests, normally over a period of 50 years.

We discussed with Corps officials the possibility of requiring purchasers of municipal and industrial storage space to prepare and provide a plan, acceptable to the Corps, demonstrating that the water to be supplied will be used efficiently.

Corps officials agreed in principle with this concept since making efficient use of water makes good sense. They told us, however, that without legislative or executive guidance to do so, they believe that such a requirement should be applied only to those projects where a water supply feature had not yet been authorized and projects were still in the early stages of development. The Corps provided the following breakdown of project categories to which it felt such a requirement could or could not be added:

<u>Project category</u>	<u>Status of water supply</u>	<u>Action</u>
Completed	Signed contract	1
	Local assurances provided	2
	Not authorized	3
Authorized for or under construction	Signed contract	1
	Local assurances provided	2
	Not authorized	3
Authorized for study	Signed contract	1
	Local assurances provided	3
	Not authorized	3
Not yet authorized	Signed assurance	3
	Assurance required	3

- NOTE:
1. Signed contracts would be excluded from the requirements.
 2. Projects completed or authorized for construction would be excluded from the requirements unless the Water Supply Act of 1958 is amended or there is specific guidance, such as an Executive order or revision in WRC's Principles and Standards.
 3. Requirements could be added by the Corps to items of local cooperation and would remain a requirement if so authorized by the Congress.

The Corps said that although nothing in the Water Supply Act of 1958 precludes it from adopting water conservation requirements for projects, it believed that a revision of the Water Supply Act, an Executive order, or revisions of the WRC's principles and standards would be desirable before they took such action unilaterally. They also said that such guidance would help ensure consistency in the application of such a requirement by all Federal water resources development agencies.

Recommendations to the
Secretary of the Army

The Corps of Engineers sells storage space for municipal and industrial water at many of its projects. The Corps thus has a mechanism through which it can encourage the efficient use and conservation of water. The Corps should use that mechanism to encourage water conservation by those that purchase water supply storage space at its reservoirs.

Therefore, we recommend that the Secretary instruct the Corps to require, as an item of local cooperation, that purchasers prepare and provide plans, acceptable to the Corps, demonstrating that the water to be supplied will be used efficiently, including use of water conservation techniques and devices. This requirement should apply to all projects not yet authorized for construction, as well as those authorized for construction or completed where water supply contracts have not yet been authorized as an approved project purpose.

We also recommend that the Army instruct the Corps to encourage preparation of water use plans, including consideration of water conservation, by its existing water supply contractors and those entities which have options allowing them to enter into future water supply contacts.

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The Department of Defense originally told us (see app. XII) that the role of the Federal Government in encouraging or requiring water conservation by State and local agencies is unclear and that specifically the Corps of Engineers was reluctant to incorporate a water conservation requirement in water supply contracts because of the uncertainty of its authority in this area.

In subsequent discussions with Corps representatives, they indicated that they could require, as an item of local cooperation, that purchasers of municipal and industrial storage space prepare and provide plans, acceptable to the Corps, demonstrating that the water to be supplied will be used efficiently. The Corps indicated, however, that such a requirement could only apply to those projects: (1) which have not yet been authorized for construction and (2) which, although authorized, do not presently include water supply as an authorized project purpose. They further believed that because the plans for many projects in the preauthorization stage are advanced to the point where including such a requirement would delay the projects, this requirement, if implemented, should apply only to projects which will be submitted to the Congress for its review and approval for construction after January 1, 1979.

The Corps concurred with our recommendations but stated that water policy, including the appropriate Federal role to be played in water conservation, is under review by the administration and could affect the implementation of our recommendation.

REVISIONS OF WRC'S PRINCIPLES AND STANDARDS

Representatives of the Corps and SCS believe that incorporating water conservation in their water resources development projects makes good sense. Nevertheless, they were reluctant to incorporate a water conservation requirement in all or part of their planned projects without executive direction or a revision of WRC's Principles and Standards requiring them to do so. Because it would be desirable to have all Federal water resources development agencies apply water conservation requirements in their projects consistently, we believe there is a need to develop water conservation guidelines at a level which would apply to all such agencies.

The Corps, SCS, Reclamation, and WRC said the Principles and Standards would be appropriate mechanism to require the agencies to incorporate water conservation requirements in their programs.

Recommendation to the Chairman, WRC

We recommend that the Chairman, in conjunction with the Federal water resources development agencies, revise the Principles and Standards, subject to the President's approval, to require that before including a water supply feature in any project, the local interest purchasing the water prepare and provide a plan, consistent with the Principles and Standards and acceptable to the development agency on water use. Such plans should include a schedule for implementing proven conservation techniques and devices or explain why any specific technique will not be implemented.

The Principles and Standards should also be revised to require that all future water supply contracts allow the Federal Government to modify the contracts to reduce the amount of water or storage space available to the contractors if planned conservation techniques are not implemented on schedule as indicated in the contractors' water use plans.

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WRC (see app. IV) agreed that it would be desirable to have all Federal water resources development agencies apply water conservation requirements in their projects consistently. WRC said implementation using WRC Principles and Standards, with additional emphasis on water conservation, could be an effective mechanism. In subsequent discussions WRC said the Principles and Standards would be revised in conjunction with the President's Water Resource Policy Study. (See app. III.)

WATER POLLUTION ABATEMENT PROGRAMS

EPA administers various water pollution control and water quality laws. One of its major programs provides grants for planning and constructing municipal wastewater treatment plants. Under this program EPA funds 75 percent of the cost of constructing the plants and non-Federal interests pay the other 25 percent.

The size of a plant, and therefore the costs of constructing it, is directly related to the amount of

wastewater which is or will be flowing to it. If the amount can be reduced, both EPA and local interests could save money by adjusting the size of any particular facility needed.

EPA estimated that household water use could be reduced by 19 percent by retrofitting existing homes with water-saving devices and by 35 percent when such devices are installed in new homes.

We discussed with EPA officials the possibility of requiring its grantees to revise their building codes requiring that water-saving devices and techniques be used in any new construction. This action would reduce water use and the size of the treatment plant needed as well as the money needed to build it. EPA agreed with this concept and believes it would be beneficial to the Federal Government as well as local interests, but was not sure that it had the legal authority to add such a condition to municipal wastewater treatment grants.

EPA said section 212(2) of Public Law 92-500 might be a valid mechanism through which EPA could require grantees to implement techniques leading to wastewater flow reductions, but that a more specific legislative requirement would be desirable to require use of water-saving devices and techniques. Section 212(2) requires that applications for wastewater treatment grants contain adequate data and analysis demonstrating such proposal to be the most cost effective alternative.

After our discussion EPA testified before the Senate Subcommittee on Environmental Pollution, Committee on Environment and Public Works on June 30, 1977, and recommended consideration of legislative measures to encourage water conservation in the communities receiving construction grant awards. Specifically EPA recommended that the full Federal share of the construction grant be available to only those communities that indicate they are taking the initiative to reduce water use. On July 12, 1977, the Administrator wrote to the Congress suggesting legislation to accomplish his recommendation.

Under the proposed legislation, grants for sewage treatment plants would be reduced from 75 percent to 70 percent if the applicant had not taken action to reduce existing and projected wastewater flows entering the treatment works by at least 15 percent during the dry weather period.

BUILDING CONSTRUCTION AND HOUSING PROGRAMS

The Federal Government could use water-saving devices and other conservation measures more extensively in the buildings it owns, constructs, and operates. These devices could also be required in privately owned residential buildings constructed or rehabilitated under Federal mortgage insurance and guarantee programs. Several agencies have begun to develop water conservation programs, but more could be done.

Federal mortgage insurance programs

The Department of Housing and Urban Development, Veterans Administration, and Farmers Home Administration insure or guarantee loans for purchasing, rehabilitating, or improving privately owned residential structures. In 1975 these agencies were involved in about 240,000 of the 1.2 million new housing starts in the United States. Homes constructed under these programs must meet HUD-developed Minimum Property Standards (MPS). These standards encourage but do not require installation of water-saving devices. (See section 615-5.1 of the MPS.) HUD, FmHA, and VA believed the current provision on water conservation had not resulted in installation of water-saving devices in homes covered by their programs.

They had no major objection to revising the MPS to require that such devices be installed in properties covered by their programs, provided that

- the additional cost of the devices over standard models does not substantially increase the prices of homes,
- the devices were generally available, and
- their effectiveness had been proven.

HUD said it does not have the staff or expertise to develop detailed requirements for water-using fixtures and would look to specifications developed by others which could be incorporated into its standards. HUD believed, however, that the reduced operating costs resulting from decreased water use might overcome any objection to the increased initial costs of the devices, if the cost reductions could be demonstrated.

Recommendations to the Secretary of HUD

HUD should modify and enforce MPS which require that proven water-saving devices be used in new construction and substantial rehabilitations.

We recommend that the Secretary:

- Establish a liaison with WRC, EPA, the General Services Administration, and other agencies involved in water conservation, to keep informed of the latest water-saving devices available, their effectiveness, the degree to which their effectiveness has been demonstrated, and their general availability.
- Regularly revise the MPS to incorporate specifications on proven water-saving devices.
- Require, through the MPS, that these devices be installed as a prerequisite to HUD, VA, or FmHA financial assistance, as opposed to the current language, which simply requires "consideration of water volume conservation."

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HUD, FmHA, and VA all agreed (see apps. VII, VIII, and IX) with the recommendation on establishing the above-mentioned liaisons.

HUD did not anticipate any difficulty in adopting requirements for proven water-saving devices in its MPS. FmHA uses HUD's MPS and is willing to establish liaison with HUD to incorporate specifications for proven water-saving devices in the MPS.

Regarding the third recommendation above, HUD said that the language and requirements of the MPS for water conservation would be strengthened and expanded to reflect advances in water conservation technology.

Federal office buildings

GSA is responsible for designing, constructing, leasing, operating, and maintaining most Federal office buildings. GSA attempts to conform to local plumbing codes when it constructs new buildings although it is not required to. Where those codes require water-saving devices, GSA complies.

GSA also develops procurement specifications for use by the Federal Government. These include a standard for a water-saving toilet, requiring that it use no more than 3-1/2 gallons per flush. To date it has not developed standards for other water-saving devices. GSA standards are also used by some States, municipalities, and private industries. For example, the absence of GSA standards for devices other than toilets has been cited as one reason California's new water use statute did not include specifications for fixtures other than toilets.

GSA is conducting an environmental demonstration project in Saginaw, Michigan, in which it is testing various energy and water conservation techniques. Two of the water-saving ideas being tested involve capturing rainwater for irrigation uses and the reuse of flushing water after removal of wastes. GSA informed us that testing on this project will continue until May 1978 and a published report of the results should be available in January 1979.

In January 1977 GSA formed a task force to develop a drought contingency and water conservation program for its facilities. The task force is conducting a mail survey of the plumbing industry to develop a list of water-saving devices. After testing the devices at GSA-managed buildings, GSA plans to revise its purchasing specifications to require that those devices deemed effective be used in new construction. GSA estimates it would take 12 to 18 months to revise the standards. GSA sees the need for an ongoing information-gathering effort to keep the agency knowledgeable of the latest available water conservation devices.

Recommendations to the GSA Administrator

GSA has taken the initiative to undertake several water conservation projects. The measures undertaken thus far are a good start toward promoting and implementing sound water use policies in buildings GSA administers. GSA should continue its efforts, but more should be done to further improve their usefulness.

We recommend that the Administrator:

- Give high priority to developing information on the water- and energy-saving capability, cost, and effectiveness of currently available water-saving devices.

- Undertake a regular, continuing program of identifying and evaluating new water-saving devices and techniques.
- Modify GSA specifications to require installation of effective devices in new construction and, where feasible, in existing facilities.
- Establish liaisons with WRC, EPA, FUD, and other Federal agencies to assure timely dissemination of new information on the effectiveness of water-saving devices which GSA identifies and tests for use by other agencies' programs.

- - - -

GSA (see app. X) basically agreed with our findings and has already started to implement our recommendations. Specifically, GSA told us it periodically reviews and revises specifications to maintain the state of the art; for example, three specifications on water-using devices either have been revised recently or are being revised. In addition, recommendations by a GSA Water Conservation Task Group are being compiled for modification of specifications to require installation of effective devices in new construction and, where feasible, in existing facilities.

GSA also told us that it has established a liaison with Federal agencies and private industry to assure timely dissemination of new information on the effectiveness of water-saving devices.

Military housing and hospitals

The Department of Defense (DOD) constructs and operates many different kinds of facilities, including administrative and residential units. Commercially available techniques could minimize water use in these facilities.

DOD constructs residential housing for members of the Armed Forces. The size of this program has been small in recent years. In fiscal year 1977 about 640 such units were being constructed. Many of the other facilities funded under the \$2.8 billion military construction budget allocate a portion of the space for administrative uses. DOD officials contacted did not have an estimate of the total space constructed annually for administrative purposes.

DOD has a construction criteria manual which provides guidance to the Army, Navy, and Air Force. These services write detailed implementing regulations based on this manual. The manual generally does not specify the maximum number of gallons for various water-using appliances, and where maximums are cited, there is not always consistency among the services. For example, while the Navy has a requirement that shower flows be limited to 3 gallons per minute, the Air Force has a limit of 3 to 5 gallons per minute, and the Army has a 4-1/2-gallon per minute maximum.

Although water-saving devices have been installed in several recently constructed DOD facilities, DOD officials are not fully convinced that they save water since users may shower longer or flush twice. DOD officials contacted believe that before revising its manual to require water conservation techniques on an agency wide basis, more research on their effectiveness is necessary.

VA has a master specification which is generally used for constructing or rehabilitating its hospitals. Over the last several years, the section on plumbing fixtures has been revised to require water-saving devices. The new standards were based on information obtained from plumbing supply catalogs and manufacturers' representatives. The revised specifications require installation of urinals using a maximum of 1-1/2 gallons per flush, showers heads having a maximum flow of 3 gallons per minute, and maximum faucet flows of 2 gallons per minute.

No studies have been performed on the efficiency, cost, or energy savings of these devices, however VA decided to revise its criteria for faucets from 1-1/2 to 2 gallons per minute due to inadequate flows and an inability of contractors to meet the current specification. VA has also installed low flow shower heads in all its 172 existing hospitals and expects to save about 3 million gallons per year in each hospital.

Recommendations to the Secretary of DOD and the VA Administrator

We recommend that the Secretary and the Administrator, to further implement the use of water-saving devices in building programs administered by DOD and VA, establish liaisons with WRC, EPA, GSA, and other Federal agencies to identify and keep up to date on the full range of water-saving devices available, their effectiveness, and availability.

We also recommend that the Secretary and Administrator regularly review and modify their construction criteria and specifications to incorporate requirements for using proven water-saving devices.

In addition, we recommend that the Secretary require that construction implementation manuals prepared by the Army, Air Force, and Navy are kept up to date regarding use of water-saving devices and that more consistency is achieved and maintained among the services in their construction implementation regulations.

VA agreed (see app. IX) with the recommendations that it establish liaison with EPA, GSA, and other Federal agencies to identify and keep up to date on available water-saving devices. VA told us that an official of its Office of Construction would be appointed to serve in this capacity.

VA also plans to continue to regularly review and modify construction criteria and specifications to incorporate requirements for the latest proven water-saving devices.

DOD told us (see app. XII) that it is continually searching for improved methods and products and that it has installed and will continue to install water-saving devices whenever an engineering analysis shows the device is cost effective and practical.

EMERGENCY MEASURES IMPOSED BY NEW YORK CITYTO RESTRICT WATER USEDURING THE 1960s DROUGHT

The drought which began in 1961 and ended in 1966 culminated with a severe water shortage in 1965. On January 1, 1966, reservoirs serving New York City were at 26 percent of capacity compared to a normal level for January of nearly 75 percent. Rainfall for the first quarter of calendar year 1965 was 16 percent below normal.

Although some actions were taken to temporarily augment supplies, the basic response to this drought (as it had been for a prior drought) was a campaign to reduce water consumption. The campaign included mandatory restrictions on certain water-using activities as well as appeals to the public to voluntarily conserve. Through these measures water use was reduced significantly and New York City avoided severe social and economic hardships. The specific emergency measures imposed during the drought are described below.

On April 7, 1965, all city agencies were directed to strictly conserve water, as follows:

- Lawn sprinkling in municipal parks and golf courses was stopped.
- Street flushing was suspended although, in some instances, chlorinated river water was used.
- Fire hydrant harnesses were installed and laws against illegal hydrant openings were more strictly enforced.
- An educational campaign began in the city's schools.
- Water used for cleaning subway cars and buses was reduced.

Beginning on April 19th the following water use restrictions were imposed on the general public:

- Watering lawns and gardens was restricted to certain hours of the day, the use of hoses was banned, and filling private swimming pools was prohibited. (On June 16 watering lawns and gardens was banned entirely.)
- Ornamental fountains were shut down.

- Restrictions were placed on car washing.
- The use of water for cleaning buildings or other structures was banned.
- Water used by air-conditioning units of 2 tons or more was limited, and the number of hours during which air-conditioners could be operated was limited.

In addition, an intensive educational campaign was initiated through the press, radio, and television to make the public aware of the seriousness of the situation so that individuals would conserve. Posters and leaflets were also distributed. The importance of the public education campaign was indicated in the Report of the New York City Board of Water Supply for 1965, which stated, in part:

"The appeal to the public was undoubtedly the most important part of the campaign, for without their voluntary cooperation the campaign would falter. Although restrictions were imposed on water usage, this type of restriction is difficult to enforce in a city the size of New York. The success of the campaign depended on the public's voluntary cooperation."

Industrial and commercial establishments which used large quantities of water were also requested to conserve. These included barbers, hairdressers, bottling plants, department stores, laundries, breweries, the photo-processing industry, landscapers, general contractors, hotels and motels, the food industry, restaurants, and many others. Suggestions were made to these establishments on various methods of conserving.

Both the voluntary and mandatory aspects of the conservation campaign were continued in 1966, but due to increasing storages in the late spring of 1966, some restrictions were relaxed.

The effect of the conservation program is indicated in the following table. While average daily consumption for 1965 was more than 12 percent less than the 1964 level, the drop in consumption for the second half of the year--when the conservation campaign was in full force--was 19 percent, compared to the similar period of the previous year. While there were complaints about the campaign, especially from businesses whose livelihood depended on water use, the willingness of a well-informed public to cooperate in a water-saving effort was amply demonstrated.

Average Water Consumption In New York City 1961-67
(million gallons per day)

	<u>Water use</u>	<u>Percent change from previous year</u>
1961	1,167.2	+1.7
1962	1,151.0	-1.4
1963	1,158.0	+0.6
1964	1,131.0	-2.3
1965	994.0	-12.1
1966	987.3	-0.7
1967	1,078.3	+9.2

RANKING OF DOMESTIC WATER SAVING DEVICES

<u>Ease of Installations</u>	
<u>New Systems</u>	<u>Retrofit</u>
<u>Social Acceptability</u>	<u>Overall Ranking</u>
Faucet aerator	Sink faucet aerator
Pressure-reducing valve	Single-home pressure-reducing valve
Water-saver toilet	Flow-limiting shower head
Level control for clotheswasher	Multiple-home pressure-reducing valve
Reduced-flush device	Brick in the toilet tank
Batch-flush valve	Reduced-flush device
Flow-limiting shower head	Water-saver toilet
Vacuum flush toilet - 100 homes	Dual-cycle toilet insert
Washwater recycle for toilet flushing	Flow-limiting valve on shower
Dual-cycle toilet	Dual-cycle toilet
Dual-cycle tank insert	Flow-limiting valve on sink
Dual-batch flush valve	Multiple-home vacuum flush toilet system
Dual-batch flush valve	Single-batch flush valve on toilet
Vacuum flush toilet - single home	Level control on clotheswasher
Recirculating mineral oil toilet	Restrictions on garbage disposal
Urinal	Dual-batch flush valves on toilet
Washwater recycle for toilet flushing	Washwater recycle toilet flushing system
Recirculating mineral oil toilet	Toilet plus urinal with batch-flush valve
Urinal	Urinal with batch-flush valve
Restrictions on the use of garbage disposal	Single-home vacuum flush toilet system
Restrictions on the use of automatic dishwasher	Restrictions on automatic dishwasher

Source: Environmental Protection Agency

Water Resource Policy Study
Water Conservation Task Group Report

EXECUTIVE SUMMARY

December 6, 1977

The importance of water conservation has been demonstrated by the 1977 Western drought emergency and by the Second National Assessment of Water Resources which identified 29 critical areas where current available water supplies are almost entirely committed. Growing public recognition of the need for water conservation has been matched by a strong concern by the President. However, past Federal involvement in water resources generally has been oriented toward increasing water supplies and adequate attention has not been given to the demand reduction element in water conservation. In contrast, some State and local governments have made significant advances in developing innovative water conservation programs.

A commitment to water conservation challenges the Federal Government with three questions:

- Where are the most significant opportunities for achieving water conservation?
- What can be done best by local entities, States, and Federal agencies?
- What are the Federal agencies doing now and what should they be doing?

To provide a common base for analysis, the objective of water conservation has been set as saving water at one place and time to make it available for more beneficial uses. By this objective, conservation is focused on the total resource potential and demand management is placed on a par with the more traditional practices of supply management. Furthermore, saving water is not an end in itself, but is justified by its contribution to making water available for the more beneficial uses.

Opportunities for water conservation are summarized for each of the four major uses of water by estimating goals technically achievable. However, these estimates assume that possible water storage and legal constraints can be overcome and that each increment of savings is economically justified, socially acceptable, and environmentally sound.

- Irrigation, which includes over 80 percent of the Nation's water use and occurs largely in the West, offers opportunities to save 20 to 30 percent of the water withdrawn through improvements in delivery systems, water application, cropping practices, and water reuse.

- Steam-electric generation water withdrawals could be reduced by 25 to 30 percent through use of dry cooling towers with the possible bonus of energy conservation and reuse of heated effluents.
- Manufacturing water withdrawals already are being reduced significantly by in-plant treatment and recycling, and the use of processes and equipment that require less water. Because of the rapid rate of progress and the diversity of manufacturing processes, an estimate of savings has not been made for this report.
- Domestic (household) and commercial water withdrawals can be reduced by 20 to 30 percent through: (a) installation of water saving plumbing in residential, public and commercial buildings; (b) adoption of landscaping with less water consuming plants; (c) correction of leaks in delivery systems; and, (d) water meter installation.

Major impediments to water conservation must be overcome.

- Costs of conservation measures may deter water users from accepting or adopting conservation measures, especially when users cannot readily see the economic benefits or when the benefits are passed to other users that have not shared in the costs.
- Rate structures must contain an incentive for conserving water and current rate structures and contract obligations must be reviewed to determine if they promote wise use of water.
- Disjointed management of water resources must be replaced by comprehensive local/State/Federal management to assure that water conservation is an evaluation criterion of all water resource decisions affecting surface and ground water quantity, quality, waste water discharges, withdrawals, and consumption.
- Adoption of water conservation measures may lag because of uncertainty by legislators, water resource planners and users about actions that they personally might take and benefits they might gain from water conservation.

In recognition of these conservation opportunities and impediments, approaches to the objectives of water conservation must incorporate:

- A complete assessment of surface and ground water quantity, quality, waste water discharges and withdrawal and consumption patterns for those critical areas identified by the Second National Water Assessment.

- A complete assessment of water resource related Federal and State policies and programs for compatibility with water conservation.
- Clear recognition of the constitutional allocation of primary water resources management authority to the States. The Federal Government will encourage and facilitate State water conservation efforts and resort to sanctions only when the failure of State water conservation programs affects the national well-being.

Utilizing these approaches, the three issue papers presented deal with the extent of the Federal role, water rate structures (pricing), and comprehensive water management. While water rate structures and comprehensive management could be discussed within the Federal role, they are believed to be of such significance as conservation tools that additional detail and separate sets of options are warranted. An abstract for each of the issue papers follows:

ISSUE NO. 1. WHAT SHOULD BE THE ROLE OF THE FEDERAL GOVERNMENT IN WATER CONSERVATION?

- Option 1. Establish a unified water conservation policy among Federal programs.
- Option 2. Establish a new Federal/State program to facilitate development and implementation of State water conservation programs.
- Option 3. Establish a new Federal/State program to support and induce State water conservation programs.

Analysis of Options: Option 1 establishes a coherent and consistent Federal water conservation policy to encourage conservation practices, eliminate conflicts among existing policies and programs, and set water conservation priorities for Federal lands and facilities. Implementation would be phased into the FY 1980 and 1981 budgets and utilize administrative action to: require an assessment of all programs and policies for water conservation implications and, where appropriate, adoption of modifications; provide training to Federal employees in the utilization of conservation assessment and incentives; establish or designate an interagency entity to coordinate, monitor and report to the President on conservation activities; and set a policy that strives to achieve comprehensive water management with water conservation as a major component. About 20 percent of the Nation's water withdrawals would be directly affected by Federal programs at an annual cost of \$1.4 to \$2.8 million.

Option 2 extends the water conservation program to include water users not directly affected by Federal programs. States would be encouraged to develop and carry out a basic water conservation program integrated with existing regional and comprehensive water resource management plans, including all water supplies and users. If there is widespread State response to the program, it would be technically feasible to achieve reductions in water withdrawals by 20 to 30 percent. Formula grants would be provided to support development of State water conservation programs. Federal incentives, conditioned upon a federally approved conservation plan, would include administrative and educational grants, matching grants to encourage low interest loans for adoption of conservation technology and technical assistance. Program funding costs could be around \$70 to \$150 million the first year and \$45 to \$100 million annually thereafter. These costs amount to approximately 1 percent of the annual Federal water resources budget and could be financed by including the cost of water conservation administration in the pricing of water provided by Federal projects, revenues from revolving funds and funds for water supply projects made unnecessary by conservation.

Option 3 encourages States to adopt and operate at least the minimum water conservation program of Option 2. Financial sanctions would include withholding of conservation program incentive funds and withholding or deprioritizing Federal funds for water supply projects within the State. Sanctions would serve to insure action, but most important, would serve to support State water conservation officials in setting of State priorities when there is conflict with other State goals or special interest group pressures. Additional Federal cost of implementing sanctions would be \$1.0 million annually, but with greater assurance that the technically feasible goal of water savings of 20 to 30 percent would be achieved.

ISSUE NO. 2. WHAT CHANGES IN FEDERAL POLICIES AND PROGRAMS CAN PROMOTE RATE STRUCTURES (PRICES) FOR WATER USE THAT WILL ENCOURAGE CONSERVATION?

- Option 1. Revise charges for water storage and supply from existing and new Federal projects.
 - a. Improved status quo.
 - b. Development of a water exchange.
- Option 2. To promote a national conservation goal, develop programs to encourage and assist implementation of water conservation rate schemes by non-Federal entities.
 - a. Require evaluation of water pricing as a conservation tool in Federal water resource planning activities.
 - b. Establish an assistance program for implementation of water pricing mechanisms by non-Federal entities, as a conservation tool.

Analysis of Options: When prices paid by a water user are set to reflect appropriate costs of providing water to that user, conservation can be achieved. Unfortunately, Federal subsidies inherent in repayment provisions for Federal project storage capacity and distribution systems result in non-Federal entities paying only 20 percent of Federal irrigation storage costs and 64 percent of storage costs for domestic water systems. This results in rates charged to water users that are too low to promote conservation. However, water stored in Federal projects represents less than 20 percent of total water withdrawal. Appropriate pricing for the other 80 percent of national water use must be instituted by non-Federal entities. If a national goal of water conservation is to be achieved, the Federal Government must work with non-Federal entities to achieve appropriate pricing for all water. At the heart of each of the options is the need to require all water users to bear the appropriate costs of their use in the interests of conservation.

Option 1 results in new approaches for setting charges for Federal project storage and/or water stored behind Federal projects. The Improved Status Quo Sub-option (Option 1a) seeks to eliminate subsidies inherent in Federal repayment provisions. The Water Exchange (Sub-Option 1b) establishes a joint State/Federal mechanism where: (a) appropriate payments for Federal storage and distribution systems are made by users; and, (b) under State auspices, water itself is exchanged through sale between willing sellers and willing buyers. The water exchange facilitates the beneficial movement of water between uses. Changes in Federal legislation are required for both sub-options.

Option 2 represents the Federal concern over the national need to have appropriate pricing for all water uses.

Sub-option 2a would require evaluation of pricing as a demand management tool by Federal participants in water resource planning. It would not require implementation of pricing plans by non-Federal entities. However, it would provide prominence for water pricing as a conservation tool and evaluation requirements could be implemented within existing agency authority.

Sub-option 2b would offer funds and technical assistance, as well as committing the management of Federal projects to successful operation of water pricing mechanisms, to non-Federal entities which develop conservation pricing mechanisms. This sub-option would encourage conservation pricing for all water uses. It would require establishment of a new Federal program within an existing agency and be implemented by the States with Federal assistance.

ISSUE NO. 3. HOW CAN COMPREHENSIVE WATER RESOURCES PLANNING BE IMPROVED TO IMPLEMENT WATER CONSERVATION?

- Option 1. Improve the current situation by making regional comprehensive management plans more effective and require that the water resources programs and projects of Federal agencies be consistent with river basin commission, interagency committee or other regional entity plans, including the incorporation of conservation measures in planning, implementation and operations.
- Option 2. In addition to Option 1, implement nationwide coverage of regional comprehensive plans with emphasis on conservation measures.
- Option 3. In addition to Options 1 and 2, provide financial assistance to States and local entities for participating in development of regional comprehensive management plans and require that State and local programs and projects be consistent with regional comprehensive management plans which include techniques and other measures to achieve conservation.

Analysis of Options: Option 1 provides for improved management plans for the Nation's water resources systems, to attain the potential of an effective water conservation program. The plans would have to establish legal, administrative, and organizational relationships among public and private agencies to coordinate elements of each region's water resources system. The strength of these plans would depend on the degree to which all Federal, State, regional, local and private programs, priorities, policies and projects have to be consistent with adopted comprehensive management provisions for the region's water resources. Option 1 could be implemented by the Water Resources Council under Public Law 89-80 by prescribing Federal procedures for participation in regional or river basin planning and establish water conservation as an objective for Federal projects.

Option 1 would result in some reduction in costs from increased operating efficiencies and reduced investments in Federal and State facilities and decreased water treatment costs. Some increase in costs will occur due to capital investments for conservation technologies and operating equipment. No increased budget costs or legislation would be required. Improved consideration of environmental factors would occur along with more explicit identification of environmental and other non-monetary tradeoffs.

Option 2 can be implemented under the existing authority of the Water Resources Council. This option could cost approximately \$6 to \$12 million annually. Impacts are the same as Option 1 except on a significantly larger scale due to nationwide coverage.

Option 3 would require a modification of duties of the river basin commissions and other regional entities. Economic assistance to the States could be provided under Public Law 89-80. The Water Resources Council could prescribe rules and procedures to assure that funds allocated to the States are utilized to develop water management plans that include conservation objectives, technologies and procedures. Legislation or an Executive Order may be required for implementing State and local agency consistency with comprehensive management plans and grant increases.

A large reduction in costs of the same nature as Option 1 would occur from Option 3 because of increased assurance that State and local projects and programs would include conservation and they would be included in regional plans. Budgetary cost could be up to \$20 million annually for the first 5 years with a slight reduction in direct Federal programs. This level of funding would assure the highest probability of achieving the technically feasible 20 to 30 percent reduction in water withdrawals, relative to decisions on Issues 1 and 2.



UNITED STATES WATER RESOURCES COUNCIL

SUITE 800 • 2120 L STREET, NW WASHINGTON, DC 20037

Mr. Henry Eschwege
Director
Community and Economic
Development Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Eschwege:

This is in response to your September 29, 1977, letter requesting comments on the draft report entitled, "Municipal and Industrial Water Conservation--The Federal Government Could Do More."

The Water Resources Council staff reviewed this report and has the following comments:

1. The survey of local water programs used to illustrate the application and effectiveness of water conservation techniques is small; however, the analysis and results do appear to be representative of the many local programs that currently exist across the Nation.
2. We concur with the report conclusions that there is presently little or no comprehensive examination to quantify effects of the existing practices. As a result, the Federal Government could make a substantial contribution in this area by preparing an annual report summarizing the evaluation of agency experience with water conservation techniques. Water conservation activities cut across several agencies programs, and we believe the Council, in its coordination role with all Federal water related agencies, could provide this service effectively. If the recommendation is made that the Council initiate such an activity, we will pursue appropriate congressional support for the required authority, staff, and funding.

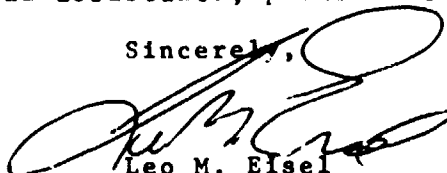
MEMBERS: SECRETARIES OF AGRICULTURE, ARMY, COMMERCE, HOUSING AND URBAN DEVELOPMENT, INTERIOR, TRANSPORTATION; ADMINISTRATORS, ENVIRONMENTAL PROTECTION AGENCY, FEDERAL ENERGY ADMINISTRATION, CHAIRMAN, FEDERAL POWER COMMISSION - OBSERVERS: ATTORNEY GENERAL; DIRECTOR, OFFICE OF MANAGEMENT AND BUDGET; CHAIRMEN, COUNCIL ON ENVIRONMENTAL QUALITY, TENNESSEE VALLEY AUTHORITY, BASIN INTERAGENCY COMMITTEES; CHAIRMEN AND VICE CHAIRMEN, RIVER BASIN COMMISSIONS

3. We concur with the report conclusions that: (1) various Federal agencies could make improvements in domestic and industrial water conservation by encouraging conservation in programs they administer and, (2) that it would be desirable to have all Federal water resource development agencies apply water conservation requirements in their projects consistently. Implementation using WRC Principles and Standards, with additional emphasis on water conservation, could provide an effective mechanism; however, unless provisions are made to increase P&S coverage, to include federally assisted programs, the scope will be limited to only the direct Federal programs.
4. We concur with the report recommendation that State and River Basin Commission water resource plans should address the potential impact of water conservation. The Council is currently developing guidelines for Comprehensive Coordinated Joint Plans (CCJP's). These guidelines are scheduled for Council of Members approval on March 1, 1978, and water conservation is included as an integral element in the preparation of these plans.
5. Since water conservation is a major element in the President's water policy review many of the issues raised in the report are presently being analyzed in preparation of the final policy review report. To ensure effectiveness of this GAO report, it would be advantageous to include relevant findings of the Water Conservation Task Force.

I have enclosed a copy of the final Water Resource Policy Study Task Force report. This report discusses specific issues dealing with water conservation that may be of interest to you.

We appreciate the opportunity to review this report and if we can be of additional assistance, please let me know.

Sincerely,



Leo M. Eisel
Director

Enclosure [See GAO note 1, p.67.]



United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

Dec 21 1977

Mr. Henry Eschwege
Director, Community and
Economic Development Division
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Eschwege:

We have reviewed your draft report to the Congress entitled "Municipal and Industrial Water Conservation--The Federal Government Could Do More." Our responses to the particular recommendations are presented below. In addition, we enclose more detailed comments of the Bureau of Reclamation on the report.

There is no doubt of the desirability of water conservation in general. The President has stated in his Environmental Message of May 23 to the Congress that ". . . we need comprehensive reform of water resources policy, with water conservation as its cornerstone." The national water resources policy review now being completed in response to the President's request has focused on conservation and will provide recommendations to the President to meet this conservation objective. A copy of the policy review task group report on conservation is attached for your information.

The effect of certain requirements of the Federal Water Pollution Control Act, P.L. 92-500, particularly the permits necessary under section 402, the "National Pollutant Discharge Elimination System," is well noted. It is of interest also that the pending changes in the pollution control act evident in the Conference Report on H.R. 3199, dated December 6, include requirements in section 21 on "Reserve Capacity" and in section 23 on "Water Conservation" for reduction in "unnecessary consumption." Therefore, EPA's essential role in the conservation effort is apparent. However, because of your later recommendations involving the Water Resources Council's planning guidelines, evaluation criteria, and the inclusion of water use plans, it may be well to assign the WRC the lead role in obtaining and disseminating conservation information. That effort would fit well with the planning and coordination role of the Council, and EPA is one of the members.

Though there have been numerous studies and analyses of the effect of pricing on water consumption with the general conclusion that the proper prices or rate structures do induce more efficiency in use, there must be



Save Energy and You Serve America!

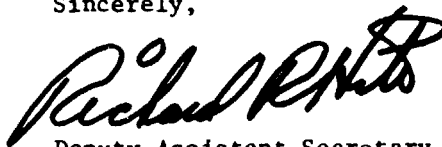
recognition that many large industrial users are self-suppliers and consequently are beyond the reach of usual water marketing and price-levying entities. The self-suppliers are the ones apparently who would have to be reached by the EPA waste discharge permit system to obtain the desired conservation effect.

The discussion on pricing as a means to obtain conservation through reduction in quantity used should acknowledge that municipal water rates are often tied to the repayment of revenue bonds for financing the water works. Therefore, the conservation-inducing rates or price system must meet this financial test first and with recognition of an equitable distribution of the costs among classes of users.

Explicit discussion of the use and management of ground water is missing in the report. Yet ground water is the source of about 25 percent of the fresh water use in the United States. A previous GAO draft report this year entitled "Ground Water: An Overview" provides an ample survey of this situation with particular reference to conservation and management. Implicit in the recommendations for water use plans in the current municipal and industrial water conservation draft report is the consideration of ground water and its conjunctive use with surface water. Although ground water is virtually entirely a matter of state jurisdiction, your recommendations for inclusion of conservation practices and water use plans within the WRC comprehensive river basin state-federal planning guidelines could certainly be effective.

The recommendation that the Department of the Interior incorporate a requirement for a water use plan as a condition for any applicant for contractual water service from an Interior project or facility is sound and in accord with present procedures. However, a more explicit and comprehensive rule in this regard will be issued.

Sincerely,



Deputy Assistant Secretary -
Policy, Budget and Administration

Enclosures [See GAO note 1, p.67.]

DUPLICATE

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE, P.O. Box 2890

Washington, D. C. ~~20013~~ 20013

Mr. Henry Eschwege
Director, Community and Economics
Development Division
U.S. General Accounting Office
Washington, D.C. 20548

OCT 18 1977

Dear Mr. Eschwege:

This is to provide the views of the Soil Conservation Service on your draft of a proposed report entitled Municipal and Industrial Water Conservation -- The Federal Government Could Do More. The discussions of the Soil Conservation Service (SCS) in chapter 3 of the proposed report are essentially accurate. They also correctly express our views about making water conservation measures a requirement for including municipal and industrial water supply storage in small watershed projects.

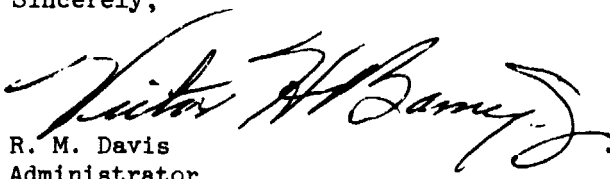
We believe that, if conservation measures are to be a requirement, they should be required in all of the Federal programs discussed in the report. If the Secretary of Agriculture unilaterally instructed SCS to adopt requirements, it would impose on rural communities additional controls and constraints that are not imposed on other areas of society. Also, it would tend to encourage "shopping" for Federal program assistance that offers the best deal to the local community.

The General Accounting Office should give further consideration as to how water conservation can best be incorporated into all appropriate Federal programs so as to be equitable and effective. It should be recognized that the programs of Housing and Urban Development, Veterans Administration, and Environmental Protection Agency are not covered by the Principles and Standards (P&S). Thus, incorporating water conservation in the P&S would not affect the Federal housing and water pollution control programs which affect far more municipal and industrial water users than all of the water development and conservation programs combined.

We believe that changes in the P&S for this purpose would be desirable. However, if water conservation considerations are to be an effective part of Federal programs, legislative or Executive direction naming agencies and programs would be needed, in addition to P&S changes.

If the cost sharing authority for municipal and industrial water provided in the 1972 Rural Development Act were fully implemented, it would serve as encouragement to local interests to cooperate in identifying and implementing water conservation measures.

Sincerely,



R. M. Davis
Administrator

Acting





DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, D.C. 20410

NOV 21 1977

OFFICE OF THE ASSISTANT SECRETARY FOR
HOUSING-FEDERAL HOUSING COMMISSIONER

IN REPLY REFER TO:

Mr. Henry Eschwege
Director
Community and Economic Development Division
U. S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Eschwege:

Your letter of September 29, 1977, addressed to the Secretary of Housing and Urban Development transmitting a draft report to the Congress entitled, "Municipal and Industrial Water Conservation - The Federal Government Could Do More" has been referred to me for reply.

I have reviewed the material contained in Chapter 3 of the report and would like to present the Department's comments on the recommendation that the Secretary require that HUD:

- Establish a liaison with EPA, GSA, and other agencies involved in water conservation, to keep informed of the latest water saving techniques available, the effectiveness of the devices, the degree to which the use of the devices has been demonstrated and their general availability;
- regularly revise the MPS to incorporate specifications on proven water saving devices; and
- require, through the MPS, that these devices be installed as a prerequisite to HUD, VA, or FmHA financial assistance, as opposed to the current language which simply requires "consideration of water volume conservation."

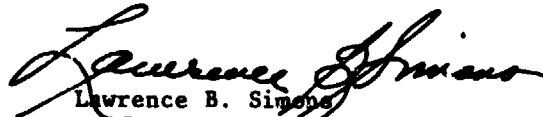
Your recommendation to establish a liaison between EPA, GSA and other agencies involved in water conservation is acceptable. I will be glad to cooperate with the other agencies and to assure that HUD keeps current with the evolving technology of water conservation.

Since we revise the MPS routinely, I do not anticipate any difficulty in adopting suitable requirements for proven water saving devices.

Although the housing programs of FmHA and VA are quite similar to HUD's, we do not control their programs. They have voluntarily elected to adopt most of the requirements in the HUD MPS and have on occasion taken exceptions to suit their specific needs. However, the MPS language and requirements for water conservation will be strengthened and expanded to reflect the advances in knowledge and technology of water conservation as they become available.

I appreciate the opportunity afforded me by your request to comment on your report.

Sincerely,



Lawrence B. Simon
Assistant Secretary

UNITED STATES DEPARTMENT OF AGRICULTURE
FARMERS HOME ADMINISTRATION
WASHINGTON D.C. 20250

OFFICE OF THE ADMINISTRATOR

Oct 29 1977

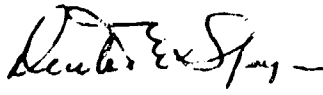
SUBJECT: General Accounting Office Draft of a Proposed Report, "Municipal and Industrial Water Conservation -- The Federal Government Could Do More"

TO: R. M. Davis, Administrator
Soil Conservation Service
Room 5103, South Agricultural Building

In accordance with a request by the General Accounting Office (GAO), we have reviewed the subject Draft Report and make the following comments for inclusion in your response to GAO:

1. We concur in the recommendations contained in the Digest, pages III and IV. [See GAO note 2, p. 67.]
2. With respect to water conservation in Community Facility loans, our procedures contained in FmHA Instruction 1933-A recognize the need for conservation techniques such as meters, education, pricing structures, water pressure control, etc.
3. With respect to water conservation in our housing programs, pages 53 and 54, FmHA utilizes the HUD Minimum Property Standards (MPS), and we would be willing to establish liaison with HUD relative to incorporating specifications for proven water saving devices in the MPS.

Please advise us if we can offer any further assistance in this matter.


GORDON CAVANAUGH
Administrator



VETERANS ADMINISTRATION
OFFICE OF THE ADMINISTRATOR OF VETERANS AFFAIRS
WASHINGTON, D.C. 20420

NOVEMBER 25 1977

Mr. Gregory J. Ahart
United States General
Accounting Office
Human Resources Division
441 G Street, N.W.
Washington, DC 20548

Dear Mr. Ahart:

The Veterans Administration (VA) appreciates the opportunity to review and comment on the September 29, 1977, draft report, "Municipal and Industrial Water Conservation -- The Federal Government Could do More." This report states that although various water conservation techniques are in use, more experience and study is needed to demonstrate their practicality and desirability for a variety of situations and localities. It recommends that various Federal agencies take a larger role in encouraging water conservation techniques in programs they administer.

We concur in the recommendation that the VA, together with the Department of Defense, establish a liaison with the Environmental Protection Agency, the General Services Administration, and other Federal agencies to identify and keep up-to-date on all available water saving devices. A representative from our Office of Construction will be appointed to serve in this capacity. The VA will continue to regularly review and modify construction criteria and specifications to incorporate requirements for the latest, proven water saving devices.

Sincerely,

A handwritten signature in black ink, appearing to read "Max Cleland".

MAX CLELAND
Administrator

UNITED STATES OF AMERICA
GENERAL SERVICES ADMINISTRATION
WASHINGTON, D.C. 20405



November 10, 1977

Honorable Elmer B. Staats
Comptroller General of the United States
General Accounting Office
Washington, D.C. 20548

Dear *Elmer*:

Thank you for the opportunity to review and comment on your draft report to the Congress entitled "Municipal and Industrial Water Conservation--The Federal Government Could Do More," which was transmitted to the General Services Administration (GSA) by Mr. Shafer's letter dated September 29, 1977.

We are in basic agreement with the findings of the report and have already taken actions to implement the recommendations directed to this agency. Our comments on the recommendations are contained in the attached fact sheet. However, we feel that the portion of the report referring to the environmental demonstration project building in Saginaw, Michigan, needs to be revised in order to clarify the findings of the water savings tests. This portion of the report is discussed in the attached fact sheet under the heading, "General Comments."

If you have any questions concerning our comments on the report, please do not hesitate to contact us.

Sincerely,

A handwritten signature in black ink, appearing to read "Jay Solomon".

JAY SOLOMON
Administrator

Enclosure

GSA FACT SHEET
Public Buildings Service
October 27, 1977

GSA Comments on GAO's Draft Report Entitled
"Municipal And Industrial Water Conservation--
The Federal Government Could Do More"

GAO Recommendations to the Administration, GSA

"We recommend that the Administrator, GSA:

--give high priority to the development of information on the water and energy saving capability, cost and effectiveness of currently available water saving devices:

--undertake a regular, continuing program of identifying and evaluating new water saving devices and techniques;

--modify GSA specifications to require the installation of devices found to be effective in new construction and, where feasible, in existing facilities; and

--establish a liaison with EPA, HUD, and other Federal agencies to assure timely dissemination of new information developed on the effectiveness of water saving devices which GSA identifies and tests for use by other agencies in programs they administer."

GSA Actions

The General Services Administration (GSA) has given high priority to the development of information on the water and energy saving capability, cost and effectiveness of currently available water-saving devices and has in effect a continuing program of identifying and evaluating new water-saving devices and techniques.

Through GSA's Federal Specification Program all existing specifications, including energy and environmental related devices, are reviewed periodically for cost and effectiveness and to maintain the current state-of-the-art. In addition, all new energy and environmental related devices are identified and evaluated and, if justified, are incorporated in Federal specifications. Copies of specifications are made available to customer agencies through our procurement programs.

As a result of recent revisions, Federal Specification WW-P-514 for plumbing fixtures and fittings is being revised to make available to construction agencies water conservation items such as water closets, urinals, flushing devices, and lavatories with self-closing faucets and shower heads. In addition, Federal Specification WW-S-1913A, which covers domestic-type shower heads, has been revised. Under this

specification only water conservation-type shower heads will be available through the Federal Supply Service National Supply System. Also, a project is underway to revise Federal Specification WW-R-1910 for faucets. Under this revision the specification will only include lavatory and kitchen sink faucets that will conserve water.

Recommendations made by the GSA Water Conservation Task Group are being compiled for the modification of specifications to require the installation of devices found to be effective in new construction and, where feasible, in existing facilities.

GSA has established a liaison with the National Academy of Sciences' International Council for Building Research, the Environmental Protection Agency and other Federal agencies, and private industry organizations to assure timely dissemination of new information developed on the effectiveness of water-saving devices.

General Comments

GAO note: The GSA discussion under "General Comments" related to material included in our draft report which has been either revised or deleted in this final version.



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

JAN 24 1978

OFFICE OF
PLANNING AND MANAGEMENT

Mr. Henry Eschwege
Director
Community and Economic
Development Division
United States General Accounting Office
Washington, DC 20548

Dear Mr. Eschwege:

EPA has reviewed your draft report entitled: "Municipal and Industrial Water Conservation--The Federal Government Could Do More" and has the following comments:

This GAO report compliments EPA for past efforts to define opportunities for water conservation, makes general recommendations to a score of Departments and Agencies, and specifically recommends that EPA assume the leadership:

"in establishing an interagency task force* of Federal and non-Federal agencies involved in water supply activities to jointly develop Federal objectives, policies, and action plans for establishing a clearinghouse for water conservation practices involving municipal and industrial water supplies..."

The Water Resources Council is heading an interagency review of water conservation as a part of the President's water resources study. This group has expressed a desire to take over the water conservation activities suggested by GAO. EPA has no objection to giving the Water Resources Council the task force and clearinghouse functions recommended by GAO as EPA does not have pervue over other Federal Agencies involved in water conservation activities. We understand that GAO has reconsidered their recommendation and supports housing the water conservation activities in the Water Resources Council.

*Emphasis added

EPA is staunchly in favor of water conservation and recycling as evidenced by the efforts to encourage flow reduction and land treatment through administration of the construction grants program. Moreover, EPA's conservation philosophy is now well represented by inter- and intra-agency task force participation in support of President Carter's resource policy review.

One expected outcome of the policy review is a better policy definition of inter-agency responsibilities for implementing water conservation on a national basis. Also, the Clean Water Act of 1977, signed by the President on December 28, 1977, contains several legislative requirements heavily impacting water conservation.

- o Section 5(b) requires EPA to "... submit a report to Congress ... before July 1, 1978 which analyzes the relationship between programs under [the] Act and the programs by which State and Federal agencies allocate quantities of water." The report must also include recommendations "... to improve coordination of efforts to reduce and eliminate pollution ... with programs for managing water resources."
- o Section 23 requires EPA to promulgate regulations allowing grantees to reduce fees paid by industrial users of waste treatment services if those users "... adopt ... means of reducing the demand for waste treatment services through reduction in the total flow of sewage or unnecessary water consumption."
- o Section 37 requires EPA to "... develop and operate within one year ... a continuing program of public information and education on recycling and reuse of wastewater (including sludge), the use of land treatment, and methods for the reduction of wastewater volume."
- o Section 72 requires EPA, in cooperation with the States, to send Congress a report in two years recommending legislation for a program requiring "... coordination between water supply and wastewater control plans as a condition [for awarding] grants for construction of treatment works ..."

Thus the Clean Water Act of 1977 as well as the President's policy review will both encourage and support EPA's announced strong water conservation position. There is now a task force in EPA, chaired by a staff member of the Office of Water and Hazardous Materials (OWHM), to determine the strategies necessary to implement the Clean Water Act of 1977.

We appreciate this opportunity to comment on this draft report.

Sincerely,

A handwritten signature in cursive script that reads "Bill Drayton".

William Drayton, Jr.
Assistant Administrator
for Planning and Management



MANPOWER,
RESERVE AFFAIRS
AND LOGISTICS

ASSISTANT SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

4 JAN 1978

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

Dear Mr. Eschwege:

This is in reply to your letter to the Secretary of Defense dated 29 September 1977, regarding your draft report on "Municipal and Industrial Water Conservation -- the Federal Government Could Do More," (OSD Case #4726, GAO Code 08527).

We concur that there are numerous opportunities for the Federal Government to encourage water conservation. With regard to the Civil Works functions of the Army, the extent of the role the Federal Government should play in encouraging or requiring water conservation measures by State and local agencies is unclear in view of the legislative history of many of the programs where these opportunities are available. On page 48 of your draft report, you indicated that the Corps of Engineers expressed a reluctance to incorporate a water conservation requirement in water supply contracts executed with local interests. This reluctance stems from the uncertainty of its authority in this area. [See GAO note 3, p. 67.]

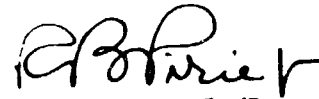
With regard to the recommendations to the Secretary of Defense as stated on page 59 of the draft, the utilities engineer of this office and utilities engineers in the three Military Departments are continually searching for improved methods and products to be used in all areas of energy conservation including water. Several water conservation products have been tried in recent years and other products which appear to be similar to these have been evaluated. We are using a number of these devices and expect to make further installations wherever an engineering analysis clearly indicates that the device is cost effective and there is a reasonable probability that its use is practical for the specific application. It must be recognized that there are products on the market which have not been properly engineered and there are other products which are costed

disproportionately to the value received. As an example of the latter point, consider one alternative to water limiting shower heads. There is a plastic insert on the market which can be placed in existing shower heads. This unit is patented by the Virginia Polytechnic Institute and State University (VPISU) and is an engineered orifice selling for about fifty cents. It does make a whistling sound in some cases but from the water conservation view appears to be as effective as some \$9 shower heads. The DoD has tried both limited-flow heads and the VPISU insert but has not obtained conclusive results that either is a water saver. With any reduced flow method, it appears that the user may take a longer shower and thus defeat the objective.

Notwithstanding these problem areas, we will continue to seek improved water conservation methods. As an example, enclosed is a brief report on a Navy test of the use of "gray" water to flush toilets. In the revised construction criteria manual we intend to set maximum flow levels for new and replacement toilets. On the basis that a limited-flow shower head will cost no more than a conventional head and that as users become more accustomed to these units a water reduction could be achieved, a maximum flow level will also be set for new and replacement shower heads.

Also enclosed are recommended changes to statements in the draft GAO report. The opportunity to review this report is appreciated.

Sincerely,



ROBERT B. PIRIE, JR.
Principal Deputy Assistant Secretary
of Defense (MRA&L)

Encls [See GAO note 1, below.]

- GAO notes:
1. Enclosures have been deleted for brevity.
 2. Page references in these appendixes refer to the draft report and do not necessarily agree with the page numbers in the final report.
 3. In subsequent discussions with Corps representatives, they indicated that they could require, as an item of local cooperation, that future purchasers of municipal and industrial storage space prepare and provide plans, acceptable to the Corps, demonstrating that the water to be supplied will be used efficiently.

(08527)