REPORT TO THE CONGRESS

Improved Federal And State Programs Needed To Insure The Purity And Safety Of Drinking Water In The United States B-166506

Environmental Protection Agency

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

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

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

This is our report on improved Federal and State programs needed to insure the purity and safety of drinking water in the United States.

We made our review 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).

We are sending copies of this report today to the Director, Office of Management and Budget; the Chairman of the Council on Environmental Quality; the Secretary of Agriculture; the Secretary of the Interior; the Secretary of Transportation; the Secretary of Defense; the Secretary of the Army; the Secretary of Health, Education, and Welfare; and the Administrator, Environmental Protection Agency.

Elmer B. Staats

Comptroller General
of the United States

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

IMPROVED FEDERAL AND STATE PROGRAMS NEEDED TO INSURE THE PURITY AND SAFETY OF DRINKING WATER IN THE UNITED STATES

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D I G E S T

WHY THE REVIEW WAS MADE

Because of public and congressional concern over the purity and safety of drinking water, GAO reviewed State and Federal programs designed to make sure that the public is being provided with drinking water of acceptable quality.

The information on which this report is based was obtained in Maryland, Massachusetts, Oregon, Vermont, Washington, and West Virginia; at the headquarters of the Environmental Protection Agency (EPA) in Washington, D.C.; and at recreation sites owned by the Corps of Engineers, Forest Service, and National Park Service in the Northwest.

FINDINGS AND CONCLUSIONS

Local governments and utilities are responsible for constructing, operating, and maintaining about 40,000 public water supply systems in the Nation and for taking samples of the water for analysis.

The States are responsible for monitoring water quality of public water supply systems. (See p. 7.)

Federal authority to regulate drinking water is restricted to the drinking water used on interstate carriers and to foreign- and domestic-bottled drinking water sold interstate.

The Federal Government has established drinking water standards for bacteria, chemicals, and sampling frequency and the States, including the six in GAO's review, have adopted these standards--with minor modifications--as regulations or guidelines.

According to EPA, the majority of the people in the United States can be assured that the water they drink is safe. However, recent EPA studies and GAO's review showed that potentially dangerous water was being delivered to some consumers, particularly by small systems serving populations of 5,000 or less.

GAO's review of bacteriological records for 446 systems in 6 States showed that:

--81 systems were delivering water whose bacteria content exceeded the limits of the Federal drinking water standards for 2 or more months during the year ended March 31, 1972. Under EPA's program for evaluating

and classifying interstate carrier water supply systems, these 81 systems could be classified as prohibited for use by interstate carriers.

--44 additional systems were delivering water whose bacteria content exceeded the limits of the Federal standards for 1 month during the year and could be classified as provisionally approved for use by interstate carriers.

States and localities tested many of the 446 systems less frequently than the Federal standards recommended. The quality of the water was not fully known.

EPA could have classified 207 of the 446 systems as prohibited for use by interstate carriers and 112 as provisionally approved because insufficient samples were taken.

Only 60 of the 446 systems complied with both Federal bacteriological and sampling requirements and could have been classified as approved. (See pp. 10 to 18.)

The six States' chemical monitoring programs were inadequate. Although the States had adopted Federal chemical quality standards and required that water supplies be analyzed for chemical content, they did not have any records of chemical analysis for 79 of the 446 systems.

The chemical quality of the water for most of the remaining 367 systems was not fully know because the States generally did not make analyses for many toxic and hazardous elements, such as arsenic, cadmium, or cyanide.

The Federal drinking water standards recommend that, in addition to bacteriological and chemical sampling, frequent sanitary surveys of water supplies be conducted to locate and identify health hazards which might contaminate the supplies. However, the extent to which the States conducted sanitary surveys varied substantially. Only Maryland was making frequent periodic surveys. (See pp. 18 to 21.)

In the six States, GAO found that:

--Water treatment plants needed to be expanded, replaced, and repaired and, in some cases, the plants did not provide disinfection to eliminate bacteria. (See pp. 22 to 26.)

--Operators of many water treatment plants received little or no training in operating the plants. (See pp. 27 and 28.)

--Programs for detecting, eliminating, and preventing cross-connections[1]--a leading cause of contamination of water in the distribution system--did not exist or were not used effectively. (See pp. 31 to 34.)

Federal programs which impact on drinking water

Although several Federal programs impact on drinking water, no Federal laws provide specifically for regulating the quality of public water supplies. Federal authority to regulate drinking water is restricted to the drinking water used on interstate carriers--planes, buses, trains, and vessels--and to domestic and imported

[1]Physical connections between drinking water distribution systems and systems containing substances which could contaminate the drinking water.

Contents

ABBREVIATIONS

ABWA	American Bottled Water Association
CWSS	Community Water Supply Study
DWS	drinking water standards
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
GAO	General Accounting Office
HEW	Department of Health, Education, and Welfare
NPS	National Park Service
PHS	Public Health Service

bottled drinking water sold interstate.

Supplies serving interstate carriers are classified annually as approved, provisionally approved, or prohibited.

A provisionally approved classification is a warning that significant deficiencies exist but there is no imminent or substantial danger to health.

A prohibited classification means that serious deficiencies exist, and interstate carriers are prohibited from using the supply. (See pp. 35 to 37.)

The interstate carrier water supply program is designed to halt the spread of communicable diseases from one State to another. In some cases, EPA's administration of the program was inadequate and needed to be improved.

EPA guidelines recommend that water supply systems (1) use laboratories which had been certified within the last 3 years for bacteriological analyses of water samples and (2) be inspected annually by the States to evaluate reliability.

GAO's review of the records for 64 interstate carrier water supply systems in the 6 States showed that

--18 had used laboratories which had not been certified as recommended by EPA and

--38 had not been inspected by the States during 1972.

EPA did not always reclassify water supplies promptly from approved to provisionally approved when deficiencies were noted during inspections. (See pp. 39 and 40.)

Federal authority to regulate the quality of water supplies is limited. If EPA determines that water supplies used by interstate carriers are not bacteriologically safe, Federal enforcement action is limited to prohibiting interstate carriers from using the systems as a source of potable water.

Present legislation does not authorize the Federal Government (1) to take action to correct the bacteriological problems or (2) to restrict the use of the water by the communities served by the systems. Also the Federal Government did not monitor the quality of water provided to interstate travelers at interstate highway rest areas. (See pp. 40 to 45.)

GAO evaluated the adequacy of Federal water quality monitoring programs at 71 water supply systems serving 35 Corps of Engineers, National Park Service, and Forest Service recreation sites in Oregon and Washington.

The three agencies were collecting and analyzing bacteriological samples, but the sampling differed widely among the agencies. Chemical test analyses and sanitary surveys of water treatment facilities to identify potential health hazards were being made infrequently and, in some cases, not at all.

As a result, the agencies did not have adequate assurance that the quality of water supplied to the public was of acceptable quality.

GAO recommended that the three agencies improve their monitoring programs. All three agreed generally with GAO and have taken, or propose to take, corrective action. (See pp. 40 to 50.)

Bottled drinking water

The Federal Government did not have a formal program for monitoring the quality of bottled water and had not established standards for bottled water quality. On January 8, 1973, the Food and Drug Administration (FDA) published in the Federal Register proposed bottled water quality standards but exempted mineral water from the proposed standards because it is generally not consumed in the same quantity as other drinking water. As of August 1973, the standards had not been finalized. (See pp. 53 to 59.)

RECOMMENDATIONS

The Administrator, EPA, should improve EPA's administration of the interstate carrier water supply program by making sure that

--laboratories used to conduct bacteriological test analyses are certified every 3 years,

--more frequent sanitary surveys of the supply systems are made by EPA or the States, and

--classifications of systems are revised promptly when deficiencies are found. (See p. 68.)

The Secretary of Health, Education, and Welfare (HEW) should require the Commissioner, FDA, to finalize the standards for bottled drinking water, define mineral water, and establish standards for mineral water (See p. 69.)

AGENCY ACTIONS AND UNRESOLVED ISSUES

EPA generally agreed with GAO and said that it would continue to improve its current program within existing authority.

HEW said it would issue standards and manufacturing practices guidelines for bottled drinking water and that efforts were underway to define and establish mineral water standards.

The Corps of Engineers, National Park Service, Departments of Transportation and Agriculture, and various agencies of the six States agreed also, in general, with GAO. (See p. 69.)

MATTERS FOR CONSIDERATION BY THE CONGRESS

Legislation being considered by the Congress--Senate bills 433 and 1735 and House bills 1059, 5368, and 9726--would provide reasonable solutions to the problems identified by GAO.

The legislation would require EPA to establish national primary drinking water standards designed to reasonably protect the public health and national secondary standards designed to reasonably insure esthetically adequate drinking water.

The legislation provides also that the States have the primary responsibility for enforcing the standards, but it authorizes EPA to enforce the primary standards if the States fail to take corrective action after receiving notice from EPA that a public drinking water system does not comply with a primary standard.

The legislation also provides for more effective regulation of (1) water available to interstate travelers, (2) water at Federal recreation sites, and (3) bottled water.

This report contains information which will be useful to the Congress in its consideration of pending legislation.

CHAPTER 1

INTRODUCTION

In recent years, a great amount of financial resources has been directed to solving the problem of water pollution--a byproduct of our increasing population and industrial development. Increasing amounts and more types of wastes are being discharged into the Nation's waters. Many of the new types of wastes are difficult to treat, control, or even detect. In an increasing number of places these discharges seriously pollute ground and surface waters that serve as sources of public drinking water. Much public and congressional concern has been expressed about the capability of water purification plants to adequately protect the public against the biological and chemical pollutants in the water.

Although the classical communicable waterborne diseases, such as typhoid, cholera, and dysentery, were generally brought under control by the 1930s, outbreaks of communicable disease from contaminated drinking water continue to occur. From 1961 to 1970, 35 known waterborne disease outbreaks caused by contaminated water from public drinking water systems and 93 reported outbreaks caused by water from private systems resulted in more than 46,000 cases of illness and 20 deaths in this Nation. An even far more pressing problem is whether our present drinking water supply systems will be able to deliver water of adequate quality in the years ahead.

Local governments and utilities are responsible for constructing, operating, and maintaining water supply systems and for taking samples of the water for analysis. The States have established water quality standards and sampling requirements and are responsible for monitoring water quality of public supply systems.

State and local governments have the primary responsibility for insuring that drinking water delivered to the public by about 40,000 public water supply systems in the Nation is pure, safe, and wholesome.

At the Federal level, the Environmental Protection Agency (EPA) is responsible for (1) conducting research to develop or upgrade Federal drinking water standards, (2) insuring that drinking water served on interstate carriers

meets Federal standards, and (3) providing technical assistance to State and local institutions concerned with drinking water. For fiscal year 1973, the Congress appropriated about $4.3 million for EPA's water supply program.

The Food and Drug Administration (FDA) Department of Health, Education, and Welfare (HEW), is responsible for (1) enforcing EPA's decisions to prohibit interstate carriers from using contaminated water supplies and (2) regulating the quality of bottled drinking water sold interstate.

Also, several Federal agencies provide drinking water to the public at Federal recreation areas and are responsible for insuring that such water is pure, safe, and wholesome.

DRINKING WATER STANDARDS

Under authority of the Public Health Service Act (42 U.S.C. 264), the Public Health Service (PHS) HEW, established the interstate carrier water supply program[1] for insuring that drinking water used by interstate carriers--planes, trains, buses, and vessels--does not contain contaminants which might introduce, transmit, or spread communicable diseases between the States. PHS also established drinking water standards (DWS) as part of the interstate quarantine regulations for use in evaluating the adequacy of interstate carrier water supplies. The DWS, last revised in 1962, includes criteria for (1) water quality, (2) water quality sampling, and (3) reliability of facilities.

The DWS includes mandatory standards for the protection of health and recommended standards primarily for esthetics. All 50 States have adopted the DWS--in some cases with minor modifications--as regulations or as guidelines.

SCOPE OF REVIEW

We evaluated the adequacy of Federal, State, and local programs for insuring that the public was being provided drinking water of acceptable quality.

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[1]Reorganization Plan No. 3 of 1970 transferred responsibility for the interstate carrier water supply program from PHS to EPA on December 2, 1970.

The review was conducted from April through December 1972 at EPA headquarters in Washington, D.C.; at EPA regional offices in Boston, Philadelphia, and Seattle; at the EPA National Environmental Research Center in Cincinnati; at selected Corps of Engineers, National Forest Service, and National Park Service recreation sites in the Northwest; and at State public health and food and drug agencies, and public water systems in Maryland, Massachusetts, Oregon, Vermont, Washington, and West Virginia. We reviewed pertinent documents, reports, and files and held discussions with cognizant agency officials. In addition, we reviewed the action taken by California to improve water supply programs in the San Bernardino-Riverside-Ontario metropolitan area as a result of an EPA study of those programs.

CHAPTER 2

STATE DRINKING WATER PROGRAMS

State and local governments have the primary responsibility for insuring that drinking water delivered to the public by about 40,000 public water supply systems in the Nation is pure, safe, and wholesome.

According to EPA, the majority of the people in the United States can be assured that the water they drink is safe. However, recent EPA studies and our review of the water supply programs in six States--Maryland, Massachusetts, Oregon, Vermont, Washington, and West Virginia--showed that potentially dangerous water was being delivered to some consumers, particularly by small water supply systems serving populations of 5,000 or less. Our review of the bacteriological records for 446 systems in the 6 States showed that:

--81 systems were delivering water whose bacteria content exceeded the limits of the DWS for 2 or more months during the year ended March 31, 1972. Under EPA's program for evaluating and classifying interstate carrier water supply systems, these 81 systems could be classified as prohibited for use by interstate carriers.

--44 additional systems were delivering water whose bacteria content exceeded the limits of the DWS for 1 month during the year and could be classified as provisionally approved for use by interstate carriers.[1]

States and localities tested many of the 446 systems less frequently than recommended in the DWS, and the quality of the water was not fully known. EPA could have classified 207 of the 446 systems as prohibited for use by interstate carriers and 112 as provisionally approved because insufficient samples were taken.

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[1]See p. 35 for a discussion of the interstate carrier program and EPA's criteria for classifying water supplies as approved, provisionally approved, or prohibited.

Our review showed that the States had not eliminated the principal causes of waterborne disease outbreaks. The following table shows the principal causes of waterborne disease outbreaks, nationwide.

Cause	Percent of waterborne disease outbreaks during 1938-45	1946-60	1961-70
Contamination of distribution system	23	34	47
Inadequate treatment	19	23	20
Untreated ground water	25	10	15
Untreated surface water	15	9	6
Miscellaneous	18	24	12
Total	100	100	100

In the six States:

--Water treatment plants needed to be expanded, replaced, and repaired and, in some cases, needed disinfection to eliminate bacteria.

--Operators of many water treatment plants received little or no training in plant operations.

--Programs for detecting, eliminating, and preventing cross-connections,[1] a leading cause of contamination of water in the distribution systems, did not exist or were not being used effectively.

The following sections of this chapter discuss the results of EPA studies and our findings at the six States.

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[1]Any physical connection or arrangement between two otherwise separate piping systems, one of which contains potable water and the other contains water of unknown or questionable safety or steam, gases, or chemicals. See p. 31 for further discussion of cross-connection.

EPA STUDIES OF MUNICIPAL WATER SUPPLY SYSTEMS

In July 1970 EPA issued a report on its community water supply study (CWSS). The study had been designed to determine the quality of water delivered to a cross section of consumers served by public water supply systems. EPA had evaluated 969 water supply systems serving 18.2 million people in 8 metropolitan areas and Vermont for

--bacteriological and chemical quality of the water at the consumer's tap,

--extent of bacteriological surveillance, and

--condition of the water supply facilities.

The CWSS concluded that, although the overwhelming majority of the public could be assured that its drinking water was safe and wholesome, several million people consumed water that occasionally contained potentially hazardous amounts of bacteria and some consumed potentially dangerous chemicals. The following table summarizes the major deficiencies disclosed by the CWSS.

Deficiency	Percent of systems	Percent of study population served by systems having deficiencies
Water quality:		
Bacteria content exceeded DWS recommended limits	25	12
Bacteria content exceeded DWS mandatory limits	16	2
Chemical content exceeded DWS mandatory limits	5	(less than 1)
Bacteriological surveillance:		
Failed to analyze the number of samples required by DWS	85	Not available
Failed to analyze half the number of samples required by DWS	69	Not available
Facilities:		
Inadequate protection of ground-water resources, or inadequate disinfection, or inadequate water pressure	56	69

The CWSS also stated that most plant operators were inadequately trained, that most systems did not have cross-connection control programs, and that the States had not inspected most systems for 3 years.

The CWSS concluded that, of the 969 systems studied, about 397 were delivering water of inferior quality to 2.5 million people and that, of the 2.5 million people, 360,000 were receiving water which was potentially dangerous.

As of July 1973, EPA had completed studies in Georgia, Kansas, Maryland, and New Mexico, which are to be published in the near future. In addition, studies are underway or in the planning stage in Connecticut, Florida, Idaho, and New Jersey.

Since the CWSS was published, EPA has published water supply studies for Kentucky, Tennessee, and Wyoming. As shown below, EPA's findings in these States were similar to its findings in CWSS.

Deficiencies	Percent of systems having deficiency		
	Tennessee	Kentucky	Wyoming
Water quality:			
DWS bacteriological quality standards not met	31	17	33
DWS chemical standards not met:			
Mandatory	5	3	9
Recommended	33	22	35
Facilities:			
Inadequate treatment facilities	67	58	70
Inadequate operation of facilities	62	73	83
Inadequate cross-connection control programs	72	92	(a)
Plant operator not certified (note b)	33	56	[c]96
Surveillance:			
DWS bacteriological surveillance standards not met	54	64	35
Chemical evaluation not made for 3 years	80	6	96
Surveys to determine condition of facilities not made for 12 months	41	67	91

[a]EPA's report did not mention this deficiency.

[b]To obtain certification, certain training and experience requirements must be met and a written examination must be passed.

[c]Inadequately trained operators operated 96 percent of the facilities.

Actions taken as a result of the CWSS

To determine what actions States took when their drinking water problems were publicized, we examined the actions taken by West Virginia, Vermont, and California. The CWSS had included the water supply systems of the Charleston, West Virginia, metropolitan area; Vermont; and the San Bernardino-Riverside-Ontario, California, metropolitan area.

Since completion of the CWSS, West Virginia has

--provided increased funding and manpower for its water supply program,

--expanded its certification program to insure that operators of small water treatment plants meet certain minimum training and experience requirements, and

--required public water supply systems to chlorinate the water to eliminate bacteria.

In addition, a new treatment facility was being constructed in the Charleston area. Despite these actions the deficiencies cited in the CWSS for the small water systems in West Virginia remained largely uncorrected because of a lack of State and local funds. These deficiencies included inadequate bacteriological sampling and the lack of an adequate cross-connection control program.

Since completion of the CWSS survey work, Vermont has (1) officially adopted the DWS, (2) established standards for construction, (3) increased its State water supply program staff from one man working part time to two engineers and two sanitarians, and (4) increased its surveillance of water supplies and identified 86 supplies of which the State had not been aware. Also the State installed an automatic data processing system for reporting monthly the bacteriological status of each water supply in the State. The State established an operator certification program and hired a full-time instructor to provide instruction and on-the-job training to operators of water treatment plants.

The counties in the San Bernardino-Riverside-Ontario metropolitan area, which were responsible for regulating water systems with less than 200 connections, received

moderate increases in funding and personnel. The State increased its water supply program by three positions, established an operator certification program, and initiated a program requiring water quality monitoring by water purveyors. We found that bacteriological monitoring of the 30 water supply systems sampled in the San Bernardino-Riverside-Ontario metropolitan area had improved considerably since the CWSS but was still inadequate at 16 of the systems.

NEED FOR IMPROVED MONITORING OF PUBLIC WATER SUPPLY SYSTEMS

The water being made available to the public should be analyzed periodically to insure that it is of acceptable quality. The DWS recommends a monitoring program for water supply systems that includes frequent analyses of the water for bacteriological content, periodic analyses of the water for chemical content, and frequent sanitary surveys of the water treatment facilities to identify potential health hazards.

Without such a program, the States do not have reasonable assurance that the water available to the public is of acceptable quality and does not pose potential health hazards.

The six States reviewed generally need to improve their water quality monitoring programs.

Bacteriological sampling

Bacteriological sampling and analysis is performed to determine whether coliform bacteria--a potential health hazard--is present in the water.

The DWS recommends that a minimum of two bacteriological samples be collected and analyzed monthly and that additional samples, based on the population served by the water supply system, be collected and analyzed. The DWS states that samples should be collected from several points throughout the distribution system to insure that the samples are representative of the quality of the water being delivered.

With the exception of Oregon and Massachusetts, the States' and Federal DWS bacteriological sampling requirements and standards for water quality were identical. Oregon had adopted the DWS water quality standards but required that fewer samples be analyzed for bacteriological content. If a system had a good bacteriological record, Oregon required only one-fourth the number of samples recommended in the DWS. Although Massachusetts had not formally adopted the DWS, the State used the DWS as a guide in determining water quality but required fewer samples than the DWS recommended.

Oregon officials said the State required fewer samples primarily because (1) it did not have the laboratory capacity to analyze the number of samples the DWS recommended and (2) the number it required was sufficient to permit a representative water quality analysis. Massachusetts officials said that, in their opinion, the number of samples required by the State was sufficient to provide a representative analysis of the quality of the water.

We reviewed the State bacteriological surveillance records for 446 water supply systems in the six States for the year ended March 31, 1972. We classified each system as approved, provisionally approved, or prohibited according to criteria contained in EPA's publication "A Guide to the Interstate Carrier Water Supply Certification Program."[1]

Our review of these records showed that:

--81 systems were delivering water whose bacteria content exceeded the limits of DWS bacteriological standards for 2 or more months and could be classified as prohibited for use by interstate carriers. Of the 81 systems, 66 served populations of 5,000 or less.

--44 additional systems were delivering water whose bacteria content exceeded the limits of DWS bacteriological standards for 1 month and could be classified as provisionally approved for use by interstate carriers. Of the 44 systems, 40 served populations of 5,000 or less.

Many of the 446 systems were tested less frequently than recommended in the DWS. We found that:

--207 systems could be classified as prohibited for use by interstate carriers because at least 50 percent of the recommended samples had not been taken for 3 months or more. Of these 207 systems, 149 served populations of 5,000 or less.

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[1]See page 35 for a discussion of the interstate carrier program and EPA's criteria for classifying water supplies as approved, provisionally approved, or prohibited.

--112 systems could be classified as provisionally approved for use by interstate carriers because the recommended samples had not been taken for 2 or more months. Of these 112 systems, 77 served populations of 5,000 or less.

Of the 446 systems, only 60 complied with both the DWS recommended bacteriological standards and sampling requirements and could have been classified as approved for use by interstate carriers. Appendixes I through VII show classifications of the 446 systems by population categories and by State.

The six States generally informed water suppliers, by letter, of their failure to meet bacteriological standards or sampling requirements. In addition, State personnel sometimes visited the suppliers to stimulate corrective action.

We found generally that the letters and visits were not effective in obtaining corrective action from the water suppliers. For example, Oregon had notified four suppliers of their failure to submit the required number of samples for the year ended December 31, 1971, and State personnel had visited two of these suppliers. The letters and visits apparently had little effect because from January to August 1972 none of the suppliers had submitted the required number of samples--one supplier had not submitted any samples from June to August 1972.

West Virginia, Washington, Oregon, and Massachusetts officials said that in some cases the States did not encourage suppliers to submit the required number of samples because the States lacked sufficient laboratory capacity and adequate numbers of technicians to conduct the bacteriological analyses.

Vermont and Maryland officials said that they had sufficient personnel and laboratory capacity to analyze the samples. A review of records showed, however, that the required number of samples were not being received from many systems.

Chemical sampling

The DWS includes standards and sampling criteria for evaluating the chemical content of water supplies. The DWS

states that, under normal circumstances, chemical sampling and analysis of water supplies need to be made only semiannually and that:

> "Where experience, examination, and available evidence indicate that particular substances are consistently absent from a water supply or below levels of concern, semiannual examinations for those substances may be omitted."

The six States had adopted the DWS chemical standards and required that water supplies be analyzed for chemical content. The States, however, did not have any records of chemical analyses for 79 of the 446 systems whose records we reviewed. Of the remaining 367 systems, only 2 had chemical concentrations that exceeded the DWS mandatory limits, but 135 systems had chemical concentrations that exceeded one or more of the DWS recommended standards. We found that the chemical quality of the water for most of the 367 supplies was not fully known because the States generally did not make analyses for many toxic and hazardous elements, such as arsenic, cadmium, or cyanide. For example, Massachusetts did not make analyses for any of the nine chemicals included in the DWS mandatory standards, except for those supplies serving interstate carriers. Vermont did not make analyses for 7 of the 20 chemicals included in the mandatory and recommended standards.

With the exception of Oregon, the States required that chemical analyses of public water supplies be made annually. Oregon required chemical testing when a water supply was first used but did not require periodic sampling thereafter. As of March 1972, the most recent chemical analyses for the water supplies whose records we reviewed in Oregon were an average of 7 years old. In August 1972 Oregon required large community water supply systems to have their water analyzed for chemical content at least once every 3 years. An Oregon official stated that the smaller systems were required to have their water analyzed for chemical content at least once every 5 years. Massachusetts required public water supply systems to have their water analyzed for some chemicals three times a year.

Our review of the chemical analyses made for water supplies in the other four States showed that many of the most

recent chemical analyses were more than 1 year old, as shown in the following table.

State	Percent of systems for which the most recent chemical analysis was more than 1 year old
Maryland	27
West Virginia	45
Vermont	49
Washington	65

According to State officials, annual chemical analyses were not made for all chemicals because of the high cost involved, insufficient manpower, and/or the low probability of the presence of certain chemicals in the water.

Sanitary surveys

The DWS states that frequent sanitary surveys of water supplies are to be conducted to locate and identify health hazards which might lead to contamination of the supplies.

Five of the States reviewed conducted sanitary surveys. The sixth State, Washington, did not make sanitary surveys but required its larger supply systems to submit annual reports which contained much of the information obtained during sanitary surveys.

Our review of State inspection records showed that the extent to which the States conducted sanitary surveys varied substantially. For example, in fiscal year 1972, West Virginia made surveys of 122 of its 615 supply systems. Since 1966 Massachusetts has conducted State surveys only when new supply systems were first used or when problems arose. Oregon, as of July 1972, had conducted sanitary surveys during the past 5 years of only 197 of its 510 large supply systems. In August 1972, Oregon established a requirement for State surveys of supply systems every 5 years.

Our review of survey records for 41 supply systems in Maryland showed that 37 had been surveyed by the State at least once in fiscal year 1972. State officials said that 8 inspectors made about 700 surveys in 1972 and that their goal was to make quarterly surveys at all systems. This is

a significant improvement over fiscal year 1969 when the State had 2 or 3 qualified inspectors who made 175 surveys.

With the exception of Maryland, State officials said that State sanitary surveys were not being made as often as necessary or in sufficient depth to detect unsanitary conditions, primarily because of a lack of manpower.

As summarized in the following table, our review of State records showed that in 1972 the workload per inspector ranged from 29 systems in Massachusetts to 170 systems in Oregon.

State	Number of systems subject to surveys	Number of inspection personnel	Systems per inspector
Massachusetts	350	12	29
Maryland	301	8	38
Vermont	286	4	71
West Virginia	615	5	127
Oregon	[a]510	3	170

[a]As a result of a State law effective January 1, 1972, 2,500 to 3,000 additional systems could be brought under State control.

Although Washington does not have a regular inspection program, eight personnel are available to conduct sanitary surveys as needed.

In July 1973 the Oregon Health Division said that the State legislature had provided additional staff for making field inspections.

NEED TO IMPROVE WATER SUPPLY FACILITIES

Many of the water supply systems whose records we reviewed were constructed many years ago and had deficiencies which could inhibit the systems' ability to deliver water of acceptable quality. Although we did not identify any recent waterborne disease outbreaks attributable to inadequate facilities in the States reviewed, we noted the following incident during our review of EPA records.

During November and December 1971, an outbreak of gastroenteritis occurred among residents of a trailer court in Alaska after they had consumed drinking water. Of the 114 residents, 78 percent became ill and suffered from symptoms of nausea, vomiting, abdominal pain, fever, and diarrhea. Fourteen persons not residing in the trailer court also experienced gastroenteritis after coming in contact with residents of the trailer court.

Investigators found that sewage had backed up through the floor drain in the wellhouse, filled the wellhouse to a 1-foot depth, and drained into the two wells supplying drinking water to the residents. According to EPA officials, this incident could have been avoided by proper construction and by installation of the well pumps to prevent contaminants from entering the wells.

The 1970 CWSS report stated that:

--Most public water systems were constructed more than 20 years ago and, since they were built, populations increased rapidly and thereby placed a greater strain on plant and distribution capacity.

--When the systems were constructed, they were designed to remove bacteriological contaminants but not toxic chemicals or virus contaminants.

--Many systems were plagued by such deficiencies as inadequate source protection, inadequate transmission or pumping capacity, insufficient treatment for removing suspended solids, or low-pressure areas in the distribution system.

Our review showed that many systems--both large and small--had facility deficiencies.

West Virginia officials stated that many of the State's water supply facilities were from 30 to 50 years old. Of the 615 systems in the State, 540 had submitted data to the State which showed that 415 systems needed to be renovated or replaced--46 needed to provide chlorination. Of the 415 systems, 356 served populations of less than 1,000.

Oregon did not have data on the condition of all water supply facilities in the State. A preliminary State Public Health Engineering Office report on 54 systems in one county showed that 32 systems had one or more of the following deficiencies.

Deficiency	Number of systems having the deficiency
Inadequate water treatment	26
Inadequate water storage	19
Inadequate distribution system	12
Inadequate water source during summer months	9

Our review of State records of 39 randomly selected systems showed that 17 had one or more facility deficiencies, as shown below.

Deficiency	Number of systems having the deficiency
Inadequate reservoir or storage	11
Inadequate distribution system	8
Inadequate source (well)	4
Inadequate water treatment	4
Improperly constructed well	2

Maryland inspection records and other documents showed that facility deficiencies existed in all sizes of systems in Maryland but predominantly in the smaller systems. The deficiencies ranged from the lack of chlorination and poor water quality at a supply serving a population of 80 to an open and old reservoir and old distribution lines at a supply serving a population of 1.5 million.

A Vermont report, dated January 1972, showed that about 265,000, or 93 percent, of the 283,000 people served by municipal systems in the State either were consuming water that did not meet the State's quality standards or were served by systems that needed major improvements.

According to Massachusetts officials, many distribution facilities are old and in need of repair.

Washington officials said that 82 of the State's 426 larger systems needed one or more of the following improvements.

Required improvement	Number of systems needing improvement
New or improved water filtration systems	41
New or improved disinfection procedures for bacteriological control	35
Covers for open reservoirs to prevent contamination of potable water	44

In addition, 19 systems were required to study and report on their watershed control to guarantee quality control without water filtration.

Factors hindering correction of facility deficiencies

The cost to correct all deficiencies in water supply systems can be quite high. State officials said that the small communities did not have the funds to correct the deficiencies.

In 1967 the Department of Commerce estimated that construction funds of $28.8 billion would be required, nationwide, between 1967 and 1980 to remedy water treatment facility deficiencies and to meet increased requirements of a growing population.

State estimates of the cost to correct system deficiencies obtained during our review are shown below.

	State estimates of funds needed to correct system deficiencies
	(millions)
Maryland	$20 to $200
Massachusetts	(a)
Oregon	$25 to $200
Vermont	$58.8
Washington	[b]$100
West Virginia	$243.8

[a]Not available.

[b]Includes only the State's larger supply systems.

Although it would be costly to correct all system deficiencies, correction of those deficiencies causing potential health hazards could be much less costly. For example, tests of one water supply serving 26,000 persons in a town in Massachusetts showed that the water had positive coliform bacteria samples--a potential health hazard--and had chemical concentrations exceeding the color, iron, and manganese recommended limits. The bacteriological problem was corrected at a cost of less than $5,000 by rehabilitating the pumping station and replacing the chlorination unit. A State official said that correcting the color, iron, and manganese problem would require additional treatment at a cost of about $3 million.

Our review of 58 supply systems in Vermont, which were cited in the 1970 CWSS report as delivering water whose bacteria content exceeded the DWS limits, showed that 42 systems needed disinfection or chlorination to kill the bacteria. The systems also had other deficiencies which adversely affected the esthetic quality of the water.

Vermont officials estimated that the total equipment cost to correct the bacteria problem was $30,000 and that additional costs might be incurred to house the equipment. State officials said that proper installation and operation of the equipment would substantially eliminate the potential health hazard at the 42 systems. Although we were unable to obtain an estimate of the cost to correct system deficiencies affecting the esthetics of the water at all 42 systems, State

estimates to correct all deficiencies at 19 of the 42 systems totaled $3.7 million.

Aside from the costs involved, some municipalities were reluctant to provide chlorination to kill bacteria in their drinking water because they objected to the taste and odor of chlorine.

For example, as early as September 1966, the Vermont health department recommended that a chlorinator be installed at a supply system serving a town with a population of 500. In July 1969 an official of the State's health department advised the municipality that:

> "I do not foresee any practical method of rendering this water safe for drinking except by the incorporation of automatic chlorination equipment * * *."

The system's operator said that many people in the municipality did not want chlorine added to the water because of its objectionable taste and odor. Furthermore, he said that he was unaware of any reported illnesses that had been caused by drinking the water. In July 1973 a municipal official said the municipality was studying the feasibility of developing alternative sources of drinking water.

Actions taken by the States to finance correction of facility deficiencies

Vermont and Washington have established programs to aid in constructing water supply facilities.

Washington had a loan and grant program for local public facility projects, such as water systems, treatment plants, sewers, arterials, and access roads. Furthermore, a referendum was approved in November 1972 providing for the sale of $50 million of State bonds for funding the planning, construction, acquisition, and improvement of local water supply systems.

Vermont had a grant program to assist localities in constructing water supply facilities. The State also had a revolving fund to provide loans to finance engineering planning. The loans are to be repaid when construction is begun.

NEED TO INSURE THAT OPERATORS ARE QUALIFIED AND ADEQUATELY TRAINED

Water supply facilities must be properly operated and maintained by qualified operators to insure that they deliver good quality water. According to EPA, between 1961 and 1970, 12 waterborne disease outbreaks were caused by inadequate control of the water treatment process by the system operators. Although there were not any recent waterborne disease outbreaks attributable to improper operation and maintenance of water supply systems in the six States reviewed, our review of State records identified several incidents of potential health hazards due to inadequate operation and maintenance.

1. A town in Vermont, with a population of 1,300, which had an outbreak of 300 cases of gastroenteritis in 1963, installed a chlorinator in 1970 to disinfect its water supply. Since 1970, however, the State health department found the chlorinator inoperative during numerous visits to the water supply. In August 1973 a town official said that, after a new operator had taken charge of the system, the town had had satisfactory bacteriological tests.

2. The operator of a supply system serving a town in Oregon, with a population of 200, failed to (1) drain and clean the reservoir and (2) install screens on the reservoir vents and drainage overflow pipes. As a result, sediment, floating scum, and insect larvae had accumulated in the supply's storage area. In addition, the operator did not chlorinate the water properly. The bacteria and chemical content of the water was unknown at the time of our review, because the operator had not submitted water samples for analysis.

In July 1973 the State said that the city had hired an engineer to recommend needed system improvements and to provide the guidance necessary to make the needed improvements.

The 1970 CWSS report stated that

--61 percent of the operators included in the study had not received any formal water treatment training,

--71 percent of the operators did not have formal training for microbiological work, and

--46 percent of the operators who needed training in chemistry did not have any.

The six States had operator certification and training programs for water treatment plant operators. The implementation of these programs varied substantially as discussed below.

Operator certification

The States generally required the operators to meet certain training and experience requirements and to pass a written examination to become certified. In general, the operators were certified to operate plants under one of a number of classifications established primarily on the basis of the size of the population being served by the plants. Operator certification requirements became more stringent as the size of the plant increased.

The American Water Works Association reported in January 1973 that, of the 50 States and the District of Columbia, 33 had mandatory certification programs, 14 had voluntary certification programs, and 4 did not have certification programs.

Of the States reviewed, four had mandatory certification programs and two had voluntary certification programs. As the following table shows, two of the mandatory programs had been established within the last 3 years, and a large number of the operators had not been certified, even in the States where certification was mandatory.

Operator Certification

State	Effective date of certification program	Percent of operators in the State certified	Certified as of
Mandatory certification:			
Maryland	1969	[a]42	Apr. 1972
Massachusetts	July 1972	(b)	-
Vermont	Aug. 1971	10	July 1973
West Virginia	1933	78	May 1972
Voluntary certification:			
Oregon (note c)	1954	28	July 1972
Washington	1963	[a] 4	May 1972

[a]Percent of systems operated by certified operators.

[b]State legislation, effective July 1, 1972, required certification, but State officials said that the program would not be implemented until July 1973 because of insufficient funding.

[c]In July 1973 an Oregon health official said that action was being taken to establish a mandatory operator certification program.

The State records showed that the certified operators were generally operating and maintaining the larger water treatment systems.

For example, in Maryland about 42 percent of the systems had certified operators but the systems served over 90 percent of the State's population served by public supplies. Although only 4 percent of the systems in Washington had certified operators, the systems provided drinking water to 77 percent of the State's population served by public water supply systems.

Generally, the smaller systems did not have certified operators. State officials said that, in many cases, the operators of small systems were employed part time because the systems did not require, or have sufficient funds for,

full-time operators. They said that, to supplement their income, some operators accept employment for other municipal services, such as police protection, trash collection, and building maintenance, or seek other part-time employment. They said also that these operators frequently were not interested in obtaining the training required for operator certification and that the operators who had obtained the needed training and certification generally sought better paying full-time positions with the larger systems.

Training programs

The six States had training programs in cooperation with universities, community colleges, and the American Water Works Association. These training programs were designed to qualify operators for certification and to keep water supply personnel abreast of the latest developments on operating and maintaining water supply systems.

Our review indicated that many operators were not participating in the training programs. For example, Washington officials said that, of the estimated 8,000 plant operators and other plant personnel in Washington, only about 20 percent had received some form of training in the last 5 years. An Oregon public health official said that about 50 percent of the 750 operators of the large water supplies in the State were in dire need of training and instruction. He stated also that most of the operators of the smaller systems needed training.

State officials said that many operators had not participated in the training programs because of the

--lack of travel funds necessary for an operator to attend training courses,

--lack of another person capable of operating the system in the operator's absence,

--inability of a part-time operator to attend because he had another job, and

--lack of interest by the city administration or the operator himself.

NEED TO ELIMINATE CROSS-CONNECTIONS

One of the most frequent sources of contamination of drinking water has been a physical connection, called a cross-connection, between a distribution system and a system containing substances which could contaminate the drinking water. When such a physical connection exists, the substances can enter the water distribution system through either

--backsiphonage, which occurs when pollutants enter the water system because the pressure is reduced within the water system, as shown in illustration I on the next page, or

--backflow, which occurs when pollutants are forced into the water distribution system because of higher pressure in the second system, as shown in illustration II on the next page.

Between 1961 and 1970, pollutants entering public water distribution systems through cross-connections caused 12 disease outbreaks. In the six States reviewed, we identified the following disease outbreaks which resulted from inadequate control of cross-connections.

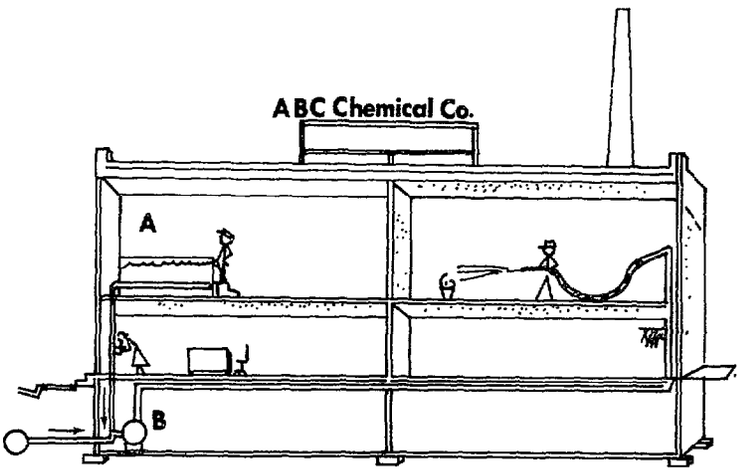
1. In 1969 an outbreak of 4 cases of hepatitis and 125 cases of gastroenteritis occurred in an industrial plant in Massachusetts after employees drank water which had become contaminated through a cross-connection with a polluted water supply system used primarily for the plant's sprinklers and toilets. Following the outbreak, the plant took action to correct the problem.

2. In a town in Oregon, 24 cases of diarrhea among grade school students in 1969 resulted from their drinking water which had been contaminated through a cross-connection with the school's lawn sprinkler system which used water from a nearby irrigation ditch. An Oregon health official said the problem had been corrected soon after the incident.

3. The most publicized outbreak happened at a college in Massachusetts in 1969 when 90 individuals contracted

ILLUSTRATION I

BACKSIPHONAGE



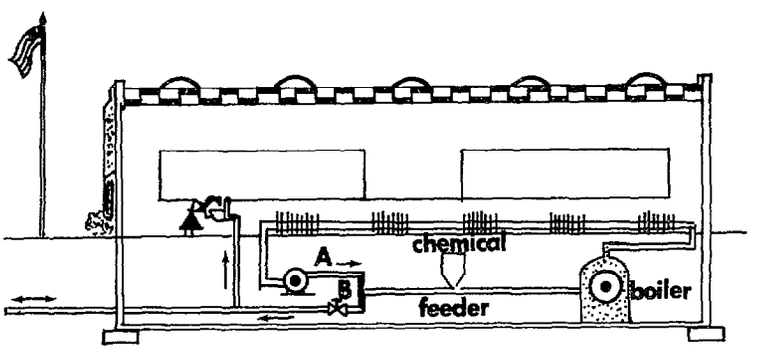
A. CONTACT POINT: A chemical tank has a submerged inlet.

B. CAUSE OF REVERSED FLOW: The plant fire pump draws suction directly from the city water supply line which is insufficient to serve normal plant requirements and a major fire at the same time. During a fire emergency, reversed flow may occur within the plant.

SUGGESTED CORRECTION: The water service to the chemical tank should be provided through an airgap.

ILLUSTRATION II

BACKFLOW



A. CONTACT POINT: A direct connection from the city supply to the boiler exists as a safety measure and for filling the system. The boiler water system is chemically treated for scale prevention and corrosion control.

B. CAUSE OF REVERSED FLOW: The boiler water recirculation pump discharge pressure or backpressure from the boiler exceeds the city water pressure and the chemically treated water is pumped into the domestic system through an open or leaky valve.

SUGGESTED CORRECTION: As minimum protection two check valves in series should be provided in the makeup waterline to the boiler system. An air gap separation or reduced pressure principle backflow preventer is better.

Source: Water Supply and Plumbing Cross-Connections: Hazards in Household and Community Systems Department of HEW, Public Health Service.

infectious hepatitis after drinking water from a faucet in an athletic equipment building. The waterline to the faucet ran through a series of sunken sprinkler boxes used for irrigation. After the incident, investigators learned that the water in the sprinkler boxes became contaminated when children, who were infected with hepatitis, used the boxes as bathing pools. The investigators found that the use of water to fight a nearby fire caused a reduction in pressure in the water main and backsiphonage of the contaminated water from the sprinkler boxes to the drinking faucet. After the outbreak the college took action to correct the problem.

Other cross-connections have resulted in the infiltration of toxic chromate chemicals, gasoline, hot water, and steam into drinking water systems. The CWSS reported that

--54 percent of the public water supply systems reviewed did not have cross-connection control ordinances,

--only 43 percent of the systems were attempting to control cross-connections in new construction, and

--only 11 percent of the systems had adequate programs to control cross-connections.

Responsibility for controlling cross-connections was at the State level in three of the States in our review and at the water supply level in two of the States. As of September 1972, the sixth State, Vermont, did not have a cross-connection control program because of staffing limitations. Vermont officials said that they were not aware of any local cross-connection control programs and that they were not able to estimate the number of cross-connections in the State.

Massachusetts required that each cross-connection be approved and licensed annually to insure that corrective control devices are properly installed and operating. As of December 1972, there were about 1,300 licensed cross-connections in the State. Until January 1972 most licensed cross-connections were inspected annually, but, because of inadequate staffing, only about 50 percent of the known cross-connections were inspected during 1972. A State official said that numerous cross-connections had not been licensed and estimated that there were probably as many as 100,000 cross-connections in the State.

A West Virginia official said that the State's cross-connection control program was practically nonexistent due to staffing limitations. He said that at least two full-time engineers would be required to initiate and conduct an adequate control program.

Maryland's recently approved plumbing code authorizes the State's Department of Licenses and Inspections to enforce regulations and to eliminate health hazards related to cross-connections. The State had previously relied on the State's licensed plumbers and its building permit program for controlling cross-connections on new construction, but the State had not had a program for identifying and eliminating existing cross-connections.

In Washington and Oregon the individual water supply systems had the primary responsibility for control of cross-connections. In Oregon only 8 of the 510 water supply systems had active cross-connection control programs. Oregon has a school providing control training to water supply personnel.

In Washington the revised State board of health regulations, which were issued in January 1971, required the water supply systems to establish programs for control of cross-connections. The State sent letters to over 400 of the larger water supply systems instructing the suppliers to establish cross-connection control programs. A State official said that, as of October 1972, only two or three of the systems had established effective cross-connection control programs. In August 1973 the State said that many of the remaining systems were establishing control programs.

CHAPTER 3

FEDERAL PROGRAMS IMPACTING ON DRINKING WATER

Although several Federal programs impact on drinking water, no Federal laws specifically provide for regulating the quality of public water supplies. Some Federal agencies provide financial assistance to communities for constructing water supply systems. Also the Federal Highway Administration assists in financing construction of drinking water facilities at interstate highway rest stops, and several Federal agencies provide drinking water to the public at Federal recreation areas.

The Federal Government has authority to regulate drinking water used on interstate carriers. The interstate carrier water supply program was established under broad legislative authority (42 U.S.C. 264) which authorized Federal regulations for preventing the spread of communicable diseases between the States.

We found that the Federal agencies did not have reasonable assurance that the public was receiving good quality drinking water. The Federal-State administration of the interstate carrier water supply program, in some cases, was inadequate and needed to be improved. The Federal Government did not monitor the quality of water provided to travelers at interstate highway rest areas but, rather, relied on the States for such monitoring. The States' drinking water monitoring programs, however, were not adequate. In addition, Federal agencies did not have adequate assurance that the water supplied to the public at Federal recreation sites was of acceptable quality.

The following sections of this chapter discuss the interstate carrier water supply program and water quality monitoring at interstate highway rest stops in Washington and Oregon and at Federal recreation sites.

THE INTERSTATE CARRIER WATER SUPPLY PROGRAM

The Public Health Service Act, as amended, authorized the Surgeon General, PHS:

"* * * to make and enforce such regulations as in his judgment are necessary to prevent the introduction, transmission, or spread of communicable diseases from foreign countries into the States or possessions, or from one State or possession into any other State or possession."

Under authority of the act, PHS established the interstate carrier water supply program for insuring that drinking water used by interstate carriers does not contain contaminants which might introduce, transmit, or spread communicable diseases between the States. PHS also established the DWS as part of the interstate quarantine regulations for use in evaluating the adequacy of interstate carrier water supplies.

Since 1970, EPA has been responsible for revising the DWS and for evaluating the adequacy of the water supplies used by interstate carriers and FDA has been responsible for enforcing EPA's decisions to prohibit carriers from using contaminated water supplies.

EPA annually classifies water supplies serving interstate carriers as approved, provisionally approved, or prohibited on the basis of information and recommendations provided by the States and supplemented by Federal or joint Federal-State surveys of the supplies.

Supplies are classified as approved when (1) the water quality meets the DWS, (2) the supply systems are reliable, and (3) the bacteriological sampling requirements of the DWS are met for at least 11 of 12 months.

Supplies are classified as provisionally approved when the supply systems are capable of supplying safe quality water but one or more of the following conditions exist.

--The bacteriological quality of the water does not comply with the DWS for 1 month of a year.

--The quality of the water does not comply with certain recommended chemical and physical limits but does comply with mandatory (health related) standards.

--The bacteriological sampling requirements of the DWS have not been met for 2 or more months of the year.

--The reliability of the supplies to provide safe quality water may be questionable because of deficiencies in the facilities or in the operation of the facilities.

--The State has not submitted bacteriological records for the supplies to EPA for at least 18 months and the quality of the water is not fully known.

The provisionally approved classification notifies the systems that one or more of the above exist but that no imminent danger to health exists.

Supplies are classified as prohibited for use by interstate carriers when the bacteriological quality of the water fails to comply with the DWS for 2 or more months of a year or when at least 50 percent of the samples required by the DWS are not obtained for 3 months of the year.

EPA had classified 531 of the 661 water supply systems serving interstate carriers as of July 1, 1971, as approved and 130 as provisionally approved. Because of incomplete reporting by the States and delays incurred by EPA's regional offices in processing reports, as of July 1, 1972, EPA had classified only 538 systems--416 as approved and 122 as provisionally approved.

EPA's records for the 122 provisionally approved systems showed that 26 percent had been supplying water of less-than-satisfactory quality, 48 percent had failed to meet the DWS bacteriological sampling requirements, 35 percent had facilities deficiencies, and 9 percent had significant operational deficiencies. Nine percent of the systems had been provisionally approved because the States had not submitted bacteriological data to EPA for more than 18 months. These percentages exceed 100 because some systems had been provisionally approved for more than one reason.

From August 1970 to March 1972, 15 water supply systems serving about 425,000 people had been classified as prohibited for use by interstate carriers. Of the 15 systems, 11 had been classified as prohibited because they failed to meet the DWS bacteriological quality requirements and 4 had been classified as prohibited because of inadequate bacteriological monitoring.

The six States in our review had a total of 64 water supplies that were used by interstate carriers as of December 31, 1972. Our review showed that the Federal-State administration of the interstate carrier water supply program needed to be improved. We also noted certain limitations on the Federal authority to regulate the quality of interstate carrier water supplies.

Need for improved administration of the interstate carrier water supply program

In many cases the laboratories conducting bacteriological tests for the interstate carrier water supply systems were not certified by EPA or a designated State agency, contrary to EPA regulations. In addition, many systems were not being inspected annually by the States and were not being operated by certified operators. Less than half the systems had cross-connection control programs.

EPA regulations recommended that each bacteriological laboratory serving an interstate carrier water supply be certified every 3 years by EPA's Division of Water supply or a designated State agency. According to an EPA official, the certification is required to insure the reliability of a laboratory's test analysis. He said that laboratories were certified if they had qualified microbiologists and used EPA-approved techniques in analyzing samples for bacteriological content. We found that 18 of the 64 systems had used laboratories for bacteriological tests that had not been certified within the last 3 years. In May 1973 EPA officials told us that they were examining the reasons for the use of the uncertified laboratories.

EPA guidelines recommend that State water supply regulatory agencies visit each interstate carrier water supply annually to evaluate the system's reliability. The guidelines state that a water supply system is to be considered reliable if, among other things, the operator is trained and certified and the distribution system is free from hazards, such as cross-connections.

Our review of EPA records for the 64 systems as of December 31, 1972, showed that:

--25 did not have certified operators,
--27 did not have cross-connection programs,
--38 had not been inspected by the States during 1972.

In addition, we noted that in some cases EPA did not always reclassify systems promptly when deficiencies were noted during joint Federal-State inspections. For example, during a 1964 survey of an approved interstate carrier system in a city in Oregon, EPA's predecessor agency recognized the need for the system

to provide protective fencing for its open reservoirs. In a report dated November 1969, resulting from another joint Federal-State inspection of the same system made during 1968-69, EPA recommended that, among other things, the city provide (1) additional water treatment because of periodic high turbidity and (2) covers for the reservoirs. In addition, EPA suggested that postchlorination be provided at five open reservoirs.

Between 1969 and 1971, Federal, State, and city officials held meetings and corresponded frequently concerning the recommendations. As of August 1971, postchlorination facilities had been installed at two of the five reservoirs and a number of studies had been made, but the city had not adopted a plan for implementing the recommendations. In March 1972 the State recommended that EPA reclassify the water system as provisionally approved because (1) the facility deficiencies compromised the system's reliability to consistently deliver water of good quality and (2) existing uncovered reservoirs and the lack of postchlorination constituted hazards to the water quality. In October 1972 the city notified the State that it planned to cover the open reservoirs within 15 years and to provide increased security for the reservoirs in the interim. In December 1972, 3 years after the need for additional water treatment and reservoir covers was first noted, EPA reclassified the system from approved to provisionally approved because of failure to correct the facility deficiencies.

In July 1973 officials of the city's Bureau of Water Works said that the bureau was making engineering studies and, when completed, they would aggressively implement an improvement program.

Limitations on Federal authority to regulate quality of water supplies

Under the interstate carrier water supply program, EPA monitored the quality of drinking water delivered by 538 of the estimated 40,000 public water supplies in the country in 1972. The 538 systems serve as the water supply for more than 80 million people.

If EPA determines that the water delivered by these systems is not bacteriologically safe, Federal enforcement action is

limited to preventing interstate carriers from using the systems as a source of potable water. Present legislation does not authorize the Federal Government (1) to take action to correct the bacteriological problems or (2) to restrict the use of the water by the communities served by the systems.

In addition, EPA is uncertain as to whether it can enforce the DWS chemical standards for water used by interstate carriers because chemicals do not cause communicable diseases. Section 361 of the Public Health Service Act refers to the "introduction, transmission, or spread of communicable diseases." HEW, when the interstate carrier water supply program was under its jurisdiction, interpreted the act as not authorizing enforcement of chemical standards because chemicals do not cause communicable diseases. EPA's guidelines for evaluating interstate carrier water supply systems, however, state that violations of DWS chemical standards can serve as the basis for classifying a system as provisionally approved or prohibited.

Until April 1973 no interstate carrier water supply had been classified as provisionally approved or prohibited solely because it did not comply with the DWS chemical standards. In May 1973 EPA officials said that five systems had been classified as provisionally approved because the chemical content of the water exceeded the DWS limits.

We did not determine whether the chemical content of the water delivered by the 64 interstate carrier water supplies included in our review exceeded the DWS limits. We noted, however, that many of the supplies had not been analyzed for all the chemical constituents listed in the DWS and therefore it was not known whether the supplies complied with the chemical standards.

DRINKING WATER AVAILABLE TO TRAVELERS ON INTERSTATE HIGHWAYS

Federal authority under the interstate carrier program applies only to water used on interstate carriers. Although the Public Health Service Act authorized the Federal Government to prevent the spread of communicable diseases from one State to another, an EPA official said that EPA had not obtained a legal decision as to whether the agency can regulate the quality of drinking water available at rest stops on the interstate highway system. The Federal Government has relied primarily on the State highway or health agencies to insure that drinking water supplied to travelers at interstate highway rest areas is of good quality. However, the States' drinking water monitoring programs did not provide such assurance.

The Federal Highway Administration has estimated that about 1,000 rest areas are on the interstate highway system. These rest areas, for which the Federal Government has provided funds to cover about 90 percent of the cost, have drinking water facilities, rest rooms, and picnic areas for highway travelers. A Federal Highway Administration survey of selected rest areas, completed in May 1971, showed that more than 7 percent of the vehicles using interstate highways stopped at the rest areas and that 47 percent of the people who stopped at those rest areas drank water from rest area facilities.

In 1972 EPA conducted a pilot study in 3 States of 119 drinking water supply systems at (1) interstate highway rest stops and (2) other locations, including commercial facilities, within a short distance of the highways. As of August 1973, EPA's final report on the study had not been released. EPA found that:

--The water supply systems at interstate highway rest stops were providing water which was significantly better than those serving commercial facilities.

--The water at 63 percent of the systems did not meet the recommended or mandatory limits of the DWS. (The water from 15 percent of the 119 systems did not meet DWS bacteriological standards.)

--Bacteriological monitoring was inadequate at 92 percent of the systems.

We reviewed the adequacy of State water quality monitoring programs for 25 interstate highway rest areas in Oregon and 21 rest areas in Washington. Washington and Oregon were reviewed because they had substantially more rest areas on interstate highways than the other States in our review.

Our review of State records showed that, in general, Oregon had an adequate bacteriological sampling program. Washington did not have an adequate program and therefore did not have reasonable assurance that the water at rest areas was of adequate bacteriological quality. Neither State took periodic chemical samples nor made sanitary surveys at rest area water systems.

Bacteriological sampling

Of the 21 rest areas in Washington, 5 were served by 3 community water systems. The State highway agency relied on the system operators to sample and test the water's quality, but the operators of these systems had not provided the State highway agency with any test results. The operator of one of the systems serving two rest areas took water samples only twice a year; the operator of the second system serving two other rest areas took water samples regularly. The fifth rest area was served by a large city water supply system which was sampled regularly but on occasion exceeded DWS bacteriological standards.

The water for the other 16 rest areas in Washington came from 13 wells which were controlled by the State highway agency. We found that, as of September 1972, the State highway agency had not made bacteriological analyses of the water from six wells after the rest areas they served were first opened to the public in 1970 and 1971. Bacteriological analyses were made only annually, and sometimes less frequently, on water samples from the other seven wells.

In August 1973 the State's Department of Highways said that a program of periodic bacteriological sampling had been established for all water supply systems providing drinking water to the public at highway rest areas and maintenance sites.

Oregon's highway agency appeared to have an adequate bacteriological sampling program. In general, samples were being taken twice a month at each of the 25 rest areas reviewed. The State highway agency had procedures for follow-up action to correct deficiencies identified when the water samples were analyzed. The State had provided special training to field personnel responsible for water supplies and, according to State officials, the State planned to provide annual training to employees responsible for sampling.

Chemical sampling

Both the Oregon and Washington highway agencies obtained chemical analyses of water from new supplies when they were opened, but these analyses did not include tests for all the toxic chemicals listed in the State standards or the DWS.

Neither State was taking periodic samples for chemical analyses because the States' health agencies did not require them and in Oregon because of the high cost involved in conducting the analyses.

In August 1973, the Washington Department of Highways said that it would obtain one chemical sample a year from all water supply systems providing drinking water to the public at highway rest areas.

Sanitary surveys

Sanitary surveys were not being made of water supplies at rest areas in Oregon or Washington; however, maintenance personnel in both States visited the rest areas frequently and were aware of sanitary conditions. In July 1973, the Oregon Highway Division said it had initiated a biennial sanitary survey program at all rest areas. According to a Washington highway official, no inspection program is planned until additional staff becomes available, possibly next year.

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In July 1972 the Federal Highway Administration distributed "Guidelines for the Review of Plans for Water Supply and Sanitary Waste Treatment Facilities for Safety Rest Areas" to its regional offices to assist them in reviewing the design of sanitary facilities for rest areas. For rest

areas with their own sources of water supply, such as wells, the guidelines provide that:

--The water supplies should be chlorinated to protect the users.

--The water should be tested before the water source is used to determine whether its physical, chemical, biological, and radiological characteristics meet applicable State standards.

The guidelines, however, do not provide for periodically testing water at rest areas with their own sources of supply.

For rest areas using community water supply systems, the guidelines provide that:

--As a minimum, the water supply must meet the requirements of the responsible State water supply regulatory agency.

--The State highway department should determine the water district's ability to maintain the water supply, including its sanitary quality, and should examine the district's practices for routinely monitoring water quality.

--All water supplies should be chlorinated to protect the users.

A Washington highway official said the State planned to install chlorinators at all of its unchlorinated systems to comply with the Federal Highway Administration guidelines. Oregon was chlorinating the water supplies at the 25 rest areas reviewed.

In August 1973 the Department of Transportation said that it had had difficulty in prescribing more stringent monitoring requirements than those set by other Federal and State agencies, because once the facility was completed it became the responsibility of the State to operate and maintain. The Department also said that a policy statement, which would include recommendations for a minimum water quality monitoring program, was being considered. However, the Department must first determine whether the Federal Highway Administration has legal authority to establish such a policy.

NEED FOR IMPROVED MONITORING OF WATER SUPPLY SYSTEMS SERVING FEDERAL RECREATION SITES

Each year more people visit Federal recreation sites. To insure that the drinking water at these sites is safe for consumption, Federal agencies should periodically take samples of the water for analysis of bacteriological and chemical content and should make sanitary surveys of the water supply facilities to identify health hazards that might lead to contamination of the water.

We evaluated the adequacy of Federal water quality monitoring programs at 71 water supply systems serving 35 Corps of Engineers, National Park Service (NPS), and Forest Service recreation sites in Oregon and Washington. We randomly selected these systems for evaluation on the basis of population served, type of climate, soil, and location. We found that the programs differed widely among these agencies. Test analyses and sanitary surveys were being made infrequently and, in some cases, not at all. As a result, the agencies did not have adequate assurance that the water supplied to the public was of acceptable quality.

Bacteriological sampling

The DWS recommends that a minimum of two bacteriological samples be collected and analyzed monthly and that additional samples be collected and analyzed on the basis of the population served by the water supply system.

The Corps did not have written guidelines prescribing the frequency for bacteriological sampling. NPS and the Forest Service required that samples be taken before seasonally operated sites were opened to the public and periodically from all water supply systems when in use.

The records at the recreation sites included in our review showed that generally the agencies were collecting and analyzing samples but that the sampling was inconsistent within and among the three agencies. We found that:

--Of the 17 Corps supply systems reviewed, 1 had been sampled monthly, 3 had been sampled from twice a month to quarterly, 5 had been sampled irregularly,

6 had been sampled about once a year, and 2 had not been sampled from January 1971 to August 1972. (See app. VIII.)

--Of the 28 Forest Service supply systems reviewed, 9 had not been sampled between January and August 1972; 2 had been sampled on an irregular basis; and 17 had been sampled periodically, that is, monthly or twice monthly depending upon the size of the site. Of the 20 seasonally operated facilities, 14 had not been sampled before they were opened to the public in 1972. (See app. IX.)

--Of the 26 NPS supply systems reviewed, 15 had been sampled twice monthly, 1 had been sampled monthly, 1 had been sampled once or twice monthly, 8 had been sampled irregularly, and 1 had not been sampled from January 1971 to August 1972. (See app. X.)

In 1970 EPA conducted a study of 61 Corps' Ohio River Division water supply systems in Indiana and Ohio. EPA found that bacteriological sampling was inadequate for 88 percent of the 61 water systems reviewed. In addition, 19 percent of the 56 systems sampled delivered water whose bacteria content exceeded the DWS limits for coliform bacteria content. As a result of EPA's study, the Corps' Ohio River Division issued a directive in March 1972, requiring monthly bacteriological sampling for all ground-water sources and semimonthly sampling for surface-water sources.

Chemical sampling

The PHS's guidelines for recreation sites recommend that a chemical analysis of a water supply be made annually but provide that the frequency of such analysis may be reduced to once every 3 years when experience and laboratory records indicate that the chemical characteristics of a supply are consistently within the prescribed limits.

The Corps did not have written guidelines prescribing the frequency of chemical sampling or the elements that should be included in the analyses. NPS and the Forest Service required that chemical analyses be made for a new supply source. The Forest Service also required a chemical analysis when there was reason to believe that a change had

occurred in the water's chemical characteristics. The chemical sampling of the systems reviewed is discussed below.

Corps of Engineers

Chemical analyses were not being made periodically for any of the 17 water supply systems we reviewed. In some instances, chemical tests had been made when the systems were constructed, but tests were not made for many toxic elements including arsenic, barium, cyanide, and lead.

As a result of EPA's 1970 study of drinking water systems at Corps facilities in Indiana and Ohio, the Corps' Ohio River Division issued a directive requiring monthly chemical testing for all systems using ground water and semimonthly testing for systems using surface water. The directive stated that these frequencies could be reduced after sufficient histories had been developed from the analyses.

Forest Service

Forest Service officials said that chemical analyses had been made for a number of the water systems at the time they were constructed. Records of chemical analyses were not available for 20 of the 28 systems we reviewed due, in part, to the fact that they had been constructed many years ago. Records available for eight of the systems showed that the chemical analyses that had been made generally did not include tests for all toxic elements. Periodic chemical analyses were not being made for any of the 28 systems reviewed.

National Park Service

None of the 26 systems reviewed were sampled periodically for chemical analysis. Chemical analyses were made for a number of water systems when they were constructed and/or as a result of a 1971 PHS request. These analyses, however, generally did not include tests for hazardous elements, such as arsenic, barium, cadmium, chromium, cyanide, lead, selenium, or silver.

Lack of surveys to determine sanitary conditions at Corps and Forest Service sites

The DWS states that frequent sanitary surveys are to be made to locate and identify health hazards, such as unclean equipment, buildings, and surroundings, which might lead to contamination of a water system. EPA recommends that the surveys be made annually by persons trained and competent in environmental sanitation and epidemiology of waterborne diseases. According to EPA, information obtained from a sanitary survey is essential to the proper interpretation of bacteriological and chemical analysis data. Routine sanitary surveys were being conducted at NPS recreation sites but not at the sites administered by the Corps and the Forest Service.

Actions taken by the Corps, Forest Service, and NPS, to improve drinking water quality monitoring programs

In letters sent between October and December 1972 to the Corps, Forest Service, and NPS, we presented the findings of our review of Federal water quality monitoring programs at Federal recreation sites and recommended that the three agencies insure that periodic bacteriological and chemical samples are taken of their water supply systems at recreation sites. We recommended also that the Corps and Forest Service insure that periodic sanitary surveys are made of their water supply systems.

All three agencies generally agreed with our findings. The Corps, in its reply dated December 8, 1972, stated that an Engineering Circular Letter would be sent to all Corps divisions and districts providing guidance for operating and testing potable water systems at Corps projects to insure that bacteriological, chemical, and physical standards are met. As of August 1973, the Corps had not sent the letter.

The Forest Service, in its reply dated February 6, 1973, stated that, in conjunction with EPA, it was revising and clarifying instructions on

--requirements for physical, chemical, and bacteriological sampling;

--proper operation and maintenance of drinking water systems; and

--performance of sanitary surveys.

NPS, in its reply dated January 5, 1973, stated that instructions had been sent to all regional directors outlining water quality guidelines designed to bring their monitoring programs in line with the Federal DWS.

PROPOSED REVISIONS TO THE DWS

In October 1971 EPA established an Advisory Committee on the Revision and Application of Drinking Water Standards. The committee consisted of individuals from professional, industrial, and academic fields.

Since December 1971 the advisory committee has been (1) examining the adequacy of the DWS and (2) developing proposed revisions to the DWS. Some of the proposed revisions include:

--Replacing the terms "mandatory limits" and "recommended limits" with the terms "approval limits (health)" and "approval limits (esthetics)."

--Increasing the approval limit (health) for arsenic from 0.05 to 0.1 milligrams per liter on the basis of new information that low-level chronic exposure to arsenic does not have a carcinogenic effect.

--Changing the approval limit (esthetics) for turbidity from 5 units to approval limit (health) of 1 unit.

--Adding health approval limits of 0.002 milligrams per liter for mercury and standard bacterial plate counts where it is indicated that the coliform test is not fully reliable in determining distribution system quality.

--Substituting instantaneous chlorine residual tests for some of the more time-consuming coliform bacteria tests.

--Recommending that water supplies and/or State health agencies notify physicians periodically of the sodium content in the water so that they may advise their patients on low-sodium diets.

--Requiring water utilities to maintain, and make available to the public, certain records related to the quality of the water supply.

According to an EPA official, EPA plans to publish the proposed revisions to the DWS in accordance with requirements of the legislation being considered by the Congress when the legislation is enacted.

CHAPTER 4

PUBLIC DOES NOT HAVE REASONABLE ASSURANCE THAT BOTTLED DRINKING WATER IS OF ACCEPTABLE QUALITY

The Food and Drug Administration (FDA) has authority to regulate imported and domestic bottled water sold interstate. However, neither the Federal nor the State agencies included in our review had effective programs for insuring that bottled water was pure, safe, and free of potential health hazards.

The Federal Government did not have a formal program for monitoring the quality of bottled water and had not established standards for bottled water quality. During 1971 and 1972 EPA and FDA had made some studies of the quality of bottled water and of the sanitation of bottling facilities. Although the States reviewed had programs for the regulation of bottlers and bottled water, they frequently had not adequately implemented their programs.

The following sections of this chapter discuss the growth of the bottled-water industry, Federal and State efforts to monitor and regulate bottled water, and the results of Federal and State tests of bottled water made at our request.

BOTTLED WATER AND GROWTH OF THE BOTTLED-WATER INDUSTRY

There are basically four types of bottled water:

--Drinking water, which may come from a well or spring or which may be scientifically prepared with minerals added to improve taste.

--Fluoridated water, which has controlled amounts of fluorine added to help retard tooth decay.

--Distilled water, which has been vaporized and condensed to make it free from solids, minerals, or trace elements.

--Purified water, from which the minerals have been removed by deionization, reverse osmosis, or electrodialysis.

The origin of the bottled-water industry in America can be traced back about 100 years when mineral water was first bottled and sold to the public as a therapeutic agent. Bottled water was sold primarily to commercial establishments until the early 1950s when attention was again focused on providing bottled water to the public.

Increased interest in the environment and fears of municipal water supply pollution in recent years has resulted in a significant increase in bottled-water sales to the public. In January 1972 the American Bottled Water Association (ABWA), the industry's national nonprofit trade association representing a large proportion of the bottlers, estimated that bottled-water sales had been increasing by 10 to 15 percent annually. Although the exact size of the bottled-water industry was unknown, ABWA estimated that the 700 domestic bottling plants had 1971 sales exceeding $80 million. In addition, ABWA estimated that 1971 imported European bottled-water sales in the United States were $250,000.

ABWA has established minimum standards, identical to the DWS, for bottled water and certifies member companies who comply with the standards. ABWA can withdraw certification of a member company when the standards are not met. Loss of certification, however, will not halt plant operations because the association is merely a voluntary organization of bottled-water companies.

FEDERAL MONITORING OF BOTTLED WATER

Before 1971 Federal agencies generally had not comprehensively studied the quality of bottled water. During 1971 EPA and FDA conducted the first Federal studies of bottled-water quality and sanitation of bottling facilities. According to FDA, the Federal Food, Drug, and Cosmetic Act, as amended (21 U.S.C. 321(f) et seq.), authorizes it to regulate imported and domestic-bottled water sold interstate. The act states that FDA shall have jurisdiction over "articles used for food or drink for man or other animals." FDA did not, however, establish standards for bottled water.

FDA's study, which included 25 plants in 23 States and Puerto Rico, was initiated because the Arkansas Health Department had found samples of unsanitary bottled water.

In its report on the study, issued September 8, 1971, FDA stated that the (1) chemical analyses showed little problem caused by pesticides, heavy metals (mercury, lead, cadmium), or acidity, (2) facility inspections disclosed that sanitary conditions were generally satisfactory but there were a few objectionable conditions, (3) bacteriological analyses of the water showed that 7 samples contained coliform bacteria which, according to the DWS, is undesirable in potable water, and (4) tests for micro-organisms revealed that 47 samples contained micro-organisms ranging from 1,400 to about 28 million micro-organisms per milliliter. Although there are no official standards for the number of ordinary micro-organisms present in drinking water, the report stated that acceptable potable water usually contained less than 1,000 micro-organisms per milliliter. According to the FDA report, the high micro-organism counts probably resulted from two factors

--the water was bottled under insanitary conditions in unclean containers and/or

--the micro-organisms grew and reproduced in the water.

The report also stated that:

"If the source of the large numbers of organisms found is the result of growth, it might be advisable to add a preservative such as chlorine to those bottled waters. We recognize that a suggestion for adding (chlorine) would cause havoc in the industry, which we suspect owes a substantial part of its existence to the claims that they are selling pure water containing no added chemicals."

During December 1971 and January 1972, EPA conducted a survey of 25 bottling plants in California, Connecticut, Ohio, and Texas. In its report EPA stated that the condition of plant facilities ranged from unwashed floors and deteriorated equipment to sparkling cleanliness and modern automated equipment. EPA noted that glass bottles were usually sanitized and filled under sanitary conditions but that plastic bottles were assumed to be sanitary and often were filled without rinsing--a practice which could lead to contamination. Furthermore, EPA stated that laboratory control data at the bottled-water plants revealed that

there was virtually a complete lack of source water testing or chemical analysis of the finished water.[1] Generally, only the larger bottling plants made bacteriological analyses of the finished water regularly and checked the disinfectant level in the water.

EPA's bacteriological analyses of 70 samples taken from the 25 bottlers showed coliform bacteria in 4 finished water samples and 2 raw water samples. Micro-organisms in excess of 1,000 per milliliter were found in 4 bottled-water samples, 2 treated tapwater samples, and 2 raw water samples.

From a chemical analysis of 48 samples, EPA found 1 sample had lead concentrations above the mandatory DWS limits.

In its report EPA stated that it could not judge the quality of bottled water sold to the public from single samples taken from a limited number of bottlers but that some features of bottling practices appeared to be sufficiently common to warrant the following conclusions.

1. Product quality control was generally deficient.

2. The sanitation of plastic bottles was generally ignored.

3. The presence of bacteria indicated that bottled water and/or containers may have been contaminated.

4. The fact that bacteria content exhibited both growth and die-off indicated that the quality of bottled water may be suspect even if plant tests indicated the relative absence of bacteria.

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[1]Water that has been processed by the bottler and is ready for bottling.

STATE REGULATION OF BOTTLED WATER

Maryland, Massachusetts, Oregon, Washington, and West Virginia had programs for the regulation of bottlers and bottled water but had not adequately implemented their programs to insure that the public was provided with pure, safe, and wholesome bottled water. (Vermont's bottled-water program was not reviewed because, according to State officials, the State's bottlers were not operating at the time of our review.) Only three States attempted to regulate out-of-State or imported bottled water marketed within their borders.

The States' bottled-water programs included licensing bottlers, inspecting bottling facilities, and sampling water quality.

Licensing

The States reviewed had licensing or permit programs for regulating bottled water. The requirements for licenses varied significantly among the States. For example, Maryland required intrastate bottlers to submit formal applications and a water sample for laboratory analysis. Maryland also required State approval of the source of water supply and the bottling facilities. Maryland's licenses are renewable each year and may be denied if an applicant's facilities are unsanitary or if its water supply becomes polluted.

In contrast, Washington's licensing program was voluntary. As of May 1972, only one of five bottlers in the State was licensed. A State official said that the State had informally approved three other bottlers and that a forth bottler was probably approved by the county health department. He said that the approval process was informal and that these approvals were not documented.

We noted that in at least one State bottled water was being marketed without the required permit. West Virginia required intrastate bottlers to obtain permits before initiating bottling operations in the State and required bottlers or distributors in other States to obtain permits before selling water in West Virginia. During our review we noted that three brands of bottled water were being marketed in the

State without the required permits. One of the brands was bottled in the State and two were imported. In July 1972 we brought this matter to the attention of State officials who, in turn, notified the firms to discontinue sales in the State.

Maryland and West Virginia have established reciprocity agreements with other States for licensing out-of-State bottlers. Before selling bottled water in those States, out-of-State bottlers usually were required to present a permit or license issued by the State where the water was bottled.

To insure that imported bottled water was potable, Maryland, Massachusetts, and West Virginia required each out-of-State bottler to submit a water sample for chemical analysis and to furnish bacteriological test reports from an approved laboratory in its home State.

Washington and Oregon did not attempt to regulate imported bottled water but relied on FDA and the exporting State or country for assurance that such water was safe, pure, and wholesome.

Although the five States in general could suspend or revoke the licenses of bottlers who failed to comply with State standards, they rarely revoked licenses for noncompliance.

Inspections

Some States had specific bottled-water inspection guidelines and made periodic inspections of bottling plants, and others did not have such guidelines and made inspections irregularly. West Virginia, Oregon, and Massachusetts periodically inspected bottling plants to determine whether the facilities and the equipment used in the bottling process were sanitary.

In contrast, Maryland and Washington had no specific bottled-water inspection program. Although the Washington State health department was inspecting some bottled-water plants, it had not established specific guidelines, had not maintained a record of inspections, and had placed a low priority on inspecting bottled-water plants. In July 1973 Maryland and Washington officials said that inspection programs had been initiated.

The effectiveness of the States' inspection activities was limited. Generally, when the States noted recurring unsanitary conditions during inspections of bottling facilities, they did not take enforcement action to obtain compliance with regulations.

For example, West Virginia's regulations required that, when a violation was noted during an inspection, the State was to give the bottler sufficient time to correct the violation before making a followup inspection. The regulations stated that, if the same violation was found during the followup inspection, the bottler's permit to operate the plant and/or distribute bottled water was to be revoked.

During 1970-71 the State inspected the six plants in the State and identified such violations as inadequate records, poor testing standards and equipment, unsanitary conditions, and noncompliance with the State's mandatory chlorination requirement. At the two bottlers where followup inspections had been completed as of June 1972, the State found recurring violations but did not revoke the bottlers' permits. According to a State health official, the State's policy was to assist the bottlers in meeting the State standards rather than to revoke their permits.

Sampling

Most of the States in our review required bottlers to submit samples of their water to the State to be tested for bacteriological quality, chemical content, and physical properties. The submission frequency and the testing coverage differed significantly among the States.

Washington was the only State that had not established a formal sampling program; however, it did collect some samples and tested them for coliform bacteria and chemical content. These samples were collected infrequently and the chemical analyses were rather limited in that they did not include tests for arsenic, barium, cadmium, chromium, cyanide, lead, silenium, or silver. In July 1973 the Washington State Department of Agriculture said that it had established an inspection program which would include routine sampling and analysis of bottled water.

Although the other four States had more comprehensive sampling programs, they generally did not test for the full range of chemical and physical constituents and/or did not sample as frequently as their regulations required.

For example, Maryland regulations required all interstate bottlers to comply with the bacteriological, chemical, and physical limits prescribed in the DWS. The regulations required a minimum of two samples a month. However, county personnel were taking monthly samples from two of the four bottlers in the State and State personnel were taking samples infrequently from the remaining two bottlers. The samples were not routinely tested for the full range of chemical constituents specified in the DWS.

Only Maryland and West Virginia required out-of-State bottlers to submit samples for tests. Maryland required out-of-State bottlers to submit one sample a year to the State for bacteriological and chemical analysis. As a prerequisite for license renewal, West Virginia required out-of-State bottlers to submit two bacteriological reports a month in addition to one sample a year for chemical analysis.

TEST RESULTS OF BOTTLED WATER PURCHASED BY GAO

To determine the quality of bottled water available to the public, we purchased off-the-shelf bottled water and had it tested by EPA or laboratories in the States in which our review was made. In the absence of Federal standards for bottled water, we compared the results to the DWS.

The tests showed that some brands of imported bottled mineral water exceeded the DWS mandatory chemical limits for arsenic and flouride and the DWS recommended chemical standards for total dissolved solids, manganese, sulfates, and chloride.

Although none of the samples exceeded the DWS bacteriological limits, some had bacteria counts up to 1.9 million total micro-organisms per milliliter. The DWS does not set a limit on total micro-organisms. According to EPA, however, acceptable tapwater usually contains less than 1,000 total micro-organisms per milliliter. EPA has proposed that a standard of 500 total micro-organisms per milliliter be incorporated into the DWS.

The results of the analyses of our samples are discussed below.

Massachusetts

EPA's analyses of the five domestic samples we purchased showed that the samples did not exceed the DWS chemical or bacteria limits.

Chemical analysis of two foreign samples of bottled mineral water, however, showed that both samples exceeded the DWS recommended limits for total dissolved solids and one exceeded the DWS mandatory limits for arsenic and fluoride.

West Virginia

We purchased four intrastate, six interstate, and two foreign brands of bottled water in West Virginia. Three of these brands (two foreign and one intrastate) did not have the necessary permits to sell in the State.

EPA's chemical analyses of the water showed that the two foreign brands of mineral water did not meet several DWS chemical standards, as shown in the following schedule.

Substance	DWS		Test results	
	Recommended	Mandatory	Brand A	Brand B
	(in milligrams per liter)			
Total dissolved solids	500	-	3,756	543
Chloride	250	-	300	-
Manganese	0.05	-	0.12	-
Arsenic	0.01	0.05	0.2	-
Fluoride	[a]0.7 to 1.2	[a]1.4 to 2.4	6.3	3.2

[a]The standard is dependent on temperature.

EPA's bacteriological analyses of three brands, one of which was being sold without a permit, showed total bacterial counts of 1,900,000, 61,000, and 8,600 micro-organisms per milliliter.

We notified the State of the test results. Following confirmation of the excessive amount of arsenic in the foreign brand of mineral water, the State Director of Health notified the distributor to stop selling the product in the State. The State also notified the other firms which did not have a permit to discontinue sales in the State.

Maryland

The Maryland Central Laboratory's analyses of the 18 brands of bottled water we purchased showed that one foreign sample exceeded DWS mandatory chemical limits for arsenic and fluoride and one domestic and four foreign samples exceeded one or more of the the DWS recommended chemical limits for sulfates, manganese, and total dissolved solids. Bacteriological test results showed that four brands had total bacterial counts ranging between 580 and 7,800 micro-organisms per milliliter. Maryland officials said that the State had requested guidance from FDA on applying the DWS to bottled water.

Washington

EPA's chemical analyses of five domestic and three foreign bottled-water samples we purchased in Washington showed that one domestic brand exceeded the recommended standards for iron and manganese and one foreign brand exceeded the mandatory limit for fluoride. Bacteriological test results for the domestic samples were invalid because an EPA laboratory technician inadvertently introduced some contaminated material into the samples.

Oregon

EPA's chemical analyses of four domestic bottled water samples we purchased in Oregon showed that one sample exceeded the recommended standard for copper and another exceeded the recommended standard for manganese. Bacteriological test results were invalid because of the EPA laboratory technician's mistake mentioned above.

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On July 27, 1972, we gave FDA the test data we had obtained on the foreign brand of mineral bottled water purchased in West Virginia that had excessive amounts of arsenic. The tests in West Virginia had been the first to be completed during our review. Subsequently, on August 7, 1972, we sent a letter to FDA requesting information on any actions it might take in regulating bottled water. On September 19, 1972, FDA replied:

> "We are presently considering publishing a Federal Register notice alerting interested parties that bottled water should meet the criteria of the Public Health Service Drinking Water Standards. Mineral water will not be included; however, we anticipate proposing at some subsequent date an identity standard for bottled mineral water * * *."

FDA stated also that its analysis of bottled water and bottled mineral water had not disclosed harmful amounts of minerals. FDA's analyses of several samples of one brand of a foreign-imported mineral water, however, showed that the arsenic and fluoride contents were substantially higher than those of the DWS limits.

On January 8, 1973, FDA published in the Federal Register proposed bottled-water quality standards which are consistent with the DWS. With the exception of mineral water, the standards would apply to water that is sealed in bottles or other containers and intended for human consumption.

The proposed regulations require that, if the bottled water does not meet the prescribed standards, the label so state. However, water which is bottled and sold as mineral water is exempted from this labeling requirement even though it may contain concentrations of bacteria or chemicals which exceed the limits of the Federal quality standards.

In August 1973, HEW advised us that:

> "It is not reasonable to expect that bottled water with a high mineral content would be consumed as the only source of water on a daily basis or in the same quantity that municipal water is consumed, because water with a high mineral content generally produces a laxative effect which tends to limit consumption. Consequently, the chemical limits for mineral water can be less restrictive than those for municipal drinking water."

Mineral water was the only bottled water tested that exceeded DWS mandatory limits for arsenic and fluoride. As of August 1973, 13 months after we first notified FDA of our findings, it had not (1) defined what should be considered mineral water and exempt from the proposed standards or (2) set standards for mineral water.

CHAPTER 5

LEGISLATIVE CHANGES BEING CONSIDERED BY THE CONGRESS

Several safe drinking-water bills have been introduced in the first session of the 93d Congress. Senate bill 433 and House bill 1059 were introduced in January 1973. On June 22, 1973, the Senate passed Senate bill 433. Senate bill 1735 and House bill 5368, the administration bills, were introduced in May and March 1973, respectively, and House bill 9726 was introduced in July 1973. The five bills would authorize the establishment of Federal drinking water standards applicable to public water supplies and would define the Federal and State roles with respect to drinking water. The main provisions and the differences between the bills are discussed below.

SENATE BILL 433

Senate bill 433, entitled "Safe Drinking Water Act of 1973" would:

--Authorize the EPA Administrator to establish and enforce national primary drinking-water standards for the protection of public health which (1) shall include the maximum limits for contaminants which may exist in any public water system and which may cause or transmit disease or cause chemical poisoning or other impairments, (2) may apply to any feature of the water system including the treatment, storage, and distribution facilities, and (3) shall include requirements for the adequate operation and maintenance of facilities and surveillance and monitoring of water quality to insure a dependable supply of drinking water.

--Authorize the EPA Administrator to establish national secondary drinking-water standards for attaining and maintaining esthetically adequate drinking water.

--Authorize Federal grants to the States to assist them in establishing and maintaining adequate programs to insure the safety of public drinking water if the Administrator has approved the State's plan. The Administrator will approve the plan if it provides for,

among other things, (1) formally adopting drinking-water standards which are no less stringent than the national primary drinking-water standards and (2) adopting State regulations and procedures for implementing and enforcing such standards.

--Define public water systems as any system which provides drinking water to (1) 10 or more premises or 40 or more individuals, (2) carriers serving travelers in interstate commerce, and (3) facilities or establishments serving travelers in interstate commerce.

--Authorize Federal grants for programs to train water supply system operators.

The bill, although defining the Federal role in drinking water, would leave the primary enforcement responsibility with the States if the States had a plan, approved by the Administrator, for establishing and maintaining a program to insure the safety of public drinking water.

For bottled water, the bill would:

--Require that bottled water comply with national primary drinking water standards.

--Define bottled drinking water as water for human consumption sold in a closed container and would, therefore, include mineral water.

The bill would require Federal agencies having jurisdiction over any building, installation, or other property which is or will be served by a federally owned or maintained public water system to comply with national primary drinking water standards, including requirements for monitoring water quality.

HOUSE BILL 1059

House bill 1059, entitled "Safe Drinking Water Act," would amend the Public Health Service Act and the Food, Drug, and Cosmetic Act. The provisions of House bill 1059 are similar to those of Senate bill 433.

House bill 1059 would:

--Authorize the establishment of primary and secondary drinking water standards.

--Provide for Federal and State authority to enforce the primary standards.

--Authorize grants to support State drinking-water programs and to train personnel.

--Require Federal agencies to comply with the primary drinking water standards, including requirements for water quality monitoring.

--Authorize the Administrator to establish standards for bottled drinking water.

SENATE BILL 1735 AND HOUSE BILL 5368

Senate bill 1735 and House bill 5368, bills proposed by the administration, would also provide for primary and secondary drinking water standards. The bills contain many of the same provisions as Senate bill 433 and House bill 1059, but do not

--authorize grants to support State drinking-water programs,

--provide for Federal regulation of bottled water, or

--authorize Federal training grants.

HOUSE BILL 9726

House bill 9726, which would amend the Public Health Service Act, would provide for national primary and secondary drinking water regulations. The bill contains many of the same provisions as House bill 1059 and would also:

--Provide for State and EPA authority to grant a variance from a primary drinking-water regulation for up to 3 years for any public water system unable to meet contaminant-level requirements due to compelling factors.

--Authorize the EPA Administrator to publish regulations for the protection of underground sources of drinking water.

CHAPTER 6

CONCLUSIONS, RECOMMENDATIONS, AND FEDERAL AND STATE COMMENTS

CONCLUSIONS

Although the drinking water used by most of the people in the United States is considered safe, recent EPA studies and our review of the water supply programs in 6 States showed that potentially dangerous water was being delivered to some consumers, particularly by small water supply systems serving populations of 5,000 or less.

We believe that, to help correct this situation:

--The local governments and utilities need to expand, replace, or improve water treatment facilities.

--The States need to improve their water quality monitoring programs.

--The States need to insure that water treatment plant operators are qualified and adequately trained.

--The States, local governments, and utilities need to establish more effective programs for eliminating cross-connections.

The Federal-State administration of the interstate carrier water supply program, in some cases, was inadequate and needed to be improved.

The Federal Government did not monitor the quality of the water provided to travelers at interstate highway rest areas. Therefore there was no assurance that communicable diseases were not being spread from one State to another by travelers using the interstate highway system. In addition, Federal agencies did not have adequate assurance that the water supplied to the public at Federal recreation sites was of acceptable quality.

Neither the Federal nor the State agencies included in our review had effective programs for insuring that

bottled water was pure, safe, and free of potential health hazards. Legislation being considered by the Congress--Senate bills 433 and 1735 and House bills 1059, 5368, and 9726--would provide reasonable solutions to the problems we identified. The legislation would require EPA to establish national primary drinking water standards designed to reasonably protect the public's health and national secondary standards designed to reasonably insure esthetically adequate drinking water. The legislation provides also that the States have the primary responsibility for enforcing the standards, but it authorizes EPA to enforce the primary standards if the States fail to take corrective action after receiving notice from EPA that a public drinking water system does not comply with a primary standard. The legislation also provides for more effective regulation of (1) water available to all interstate travelers, (2) water at Federal recreation sites, and (3) bottled water.

RECOMMENDATIONS TO ADMINISTRATOR, ENVIRONMENTAL PROTECTION AGENCY

We recommend that, to improve the administration of the interstate carrier water supply program, the EPA Administrator insure that

- --laboratories used to conduct bacteriological test analyses of water supplies are certified every 3 years as recommended by EPA,
- --more frequent sanitary surveys of the supply systems are made by EPA or the States to identify potential hazards, and
- --the classifications of systems are revised promptly when deficiencies are found.

RECOMMENDATIONS TO THE SECRETARY OF HEALTH, EDUCATION, AND WELFARE

We recommend that the Secretary of Health, Education, and Welfare require the Commissioner, FDA, to finalize the standards for bottled drinking water, define mineral water, and establish standards for such mineral water.

FEDERAL AND STATE COMMENTS

In July 1973 we sent this report to EPA, Department of Transportation, Department of Agriculture, HEW, Corps, NPS, and the cognizant agencies of the six States reviewed.

By letter dated July 25, 1973 (see app. XI), EPA stated:

> "The report will be a valuable contribution to the growing body of knowledge on the performance and effectiveness of the nation's water supply systems and programs."

EPA stated also:

> "In response to your recommendation, we will continue our efforts to improve our current program within existing authority."

By letter dated August 8, 1973, HEW concurred with our recommendation to HEW and stated:

> "FDA is preparing the final standard for bottled drinking water and a good manufacturing practices guideline for the bottled water industry. FDA expects to issue both in the next few months. Efforts to define and establish standards for mineral water are also underway."

The other receipients of the report generally agreed with our findings. We considered their comments in this report.

CLASSIFICATION OF SYSTEMS GAO REVIEWED

FOR YEAR ENDED MARCH 31, 1972, BY POPULATION CATEGORIES

Population served	Total number of systems sampled	Classification (note a)				
			Provisional due to		Prohibited due to	
		Approved	Inadequate water quality	Inadequate bacteriological monitoring	Inadequate water quality	Inadequate bacteriological monitoring
Under 500	183	11	22	48	46	93
501 to 5,000	124	16	18	29	20	56
5,001 to 10,000	33	2	2	10	2	17
10,001 to 25,000	37	5	-	8	5	20
25,001 to 50,000	27	10	2	9	3	6
50,001 to 100,000	28	6	-	5	5	14
Over 100,000	14	10	-	3	-	1
Total	446	60	44	112	81	207

[a]Based on EPA's program for evaluating and classifying interstate carrier water supply systems.

CLASSIFICATION OF SYSTEMS GAO REVIEWED IN MARYLAND

FOR YEAR ENDED MARCH 31, 1972, BY POPULATION CATEGORIES

Population served	Total number of systems sampled	Classification (note a)				
			Provisional due to		Prohibited due to	
		Approved	Inadequate water quality	Inadequate bacteriological monitoring	Inadequate water quality	Inadequate bacteriological monitoring
Under 500	14	1	1	5	-	7
501 to 5,000	12	4	1	2	-	5
5,001 to 10,000	4	-	1	3	-	-
10,001 to 25,000	3	-	-	3	-	-
25,001 to 50,000	3	1	-	1	-	1
50,001 to 100,000	2	-	-	1	-	1
Over 100,000	3	1	-	2	-	-
Total	41	7	3	17	-	14

[a]Based on EPA's program for evaluating and classifying interstate carrier water supply systems.

CLASSIFICATION OF SYSTEMS GAO REVIEWED IN MASSACHUSETTS

FOR YEAR ENDED MARCH 31, 1972, BY POPULATION CATEGORIES

Population served	Total number of systems sampled	Classification (note a)				
			Provisional due to		Prohibited due to	
		Approved	Inadequate water quality	Inadequate bacteriological monitoring	Inadequate water quality	Inadequate bacteriological monitoring
Under 500	2	-	-	-	2	2
501 to 5,000	23	1	-	-	3	22
5,001 to 10,000	12	-	-	-	-	12
10,001 to 25,000	15	-	-	-	-	15
25,001 to 50,000	7	-	1	4	2	2
50,001 to 100,000	18	2	-	2	4	13
Over 100,000	5	4	-	-	-	1
Total	82	7	1	6	11	67

[a]Based on EPA's program for evaluating and classifying interstate carrier water supply systems.

CLASSIFICATION OF SYSTEMS GAO REVIEWED IN OREGON

FOR YEAR ENDED MARCH 31, 1972, BY POPULATION CATEGORIES

Population served	Total number of systems sampled	Classification (note a)				
			Provisional due to		Prohibited due to	
		Approved	Inadequate water quality	Inadequate bacteriological monitoring	Inadequate water quality	Inadequate bacteriological monitoring
Under 500	24	7	4	7	6	3
501 to 5,000	21	5	5	7	3	1
5,001 to 10,000	5	2	-	1	1	-
10,001 to 25,000	5	3	-	2	-	-
25,001 to 50,000	6	5	-	1	-	-
50,001 to 100,000	2	2	-	-	-	-
Over 100,000	1	1	-	-	-	-
Total	64	25	9	18	10	4

[a]Based on EPA's program for evaluating and classifying interstate carrier water supply systems.

CLASSIFICATION OF SYSTEMS GAO REVIEWED IN VERMONT

FOR YEAR ENDED MARCH 31, 1972, BY POPULATION CATEGORIES

Population served	Total number of systems sampled	Classification (note a)				
			Provisional due to		Prohibited due to	
		Approved	Inadequate water quality	Inadequate bacteriological monitoring	Inadequate water quality	Inadequate bacteriological monitoring
Under 500	39	-	3	1	18	26
501 to 5,000	15	-	2	1	9	6
5,001 to 10,000	2	-	-	-	1	1
10,001 to 25,000	4	-	-	-	3	1
25,001 to 50,000	1	-	1	-	-	-
50,001 to 100,000	-	-	-	-	-	-
Over 100,000	-	-	-	-	-	-
Total	61	-	6	2	31	34

[a]Based on EPA's program for evaluating and classifying interstate carrier water supply systems.

CLASSIFICATION OF SYSTEMS GAO REVIEWED IN WASHINGTON

FOR YEAR ENDED MARCH 31, 1972, BY POPULATION CATEGORIES

Population served	Total number of systems sampled	Classification (note a)				
			Provisional due to		Prohibited due to	
		Approved	Inadequate water quality	Inadequate bacteriological monitoring	Inadequate water quality	Inadequate bacteriological monitoring
Under 500	78	1	10	26	15	42
501 to 5,000	28	2	4	9	5	14
5,001 to 10,000	5	-	-	2	-	3
10,001 to 25,000	5	-	-	2	2	2
25,001 to 50,000	6	2	-	2	1	2
50,001 to 100,000	2	-	-	1	1	-
Over 100,000	3	2	-	1	-	-
Total	127	7	14	43	24	63

[a]Based on EPA's program for evaluating and classifying interstate carrier water supply systems.

CLASSIFICATION OF SYSTEMS GAO REVIEWED IN WEST VIRGINIA

FOR YEAR ENDED MARCH 31, 1972, BY POPULATION CATEGORIES

Population served	Total number of systems sampled	Classification (note a)				
			Provisional due to		Prohibited due to	
		Approved	Inadequate water quality	Inadequate bacteriological monitoring	Inadequate water quality	Inadequate bacteriological monitoring
Under 500	26	2	4	9	5	13
501 to 5,000	25	4	6	10	-	8
5,001 to 10,000	5	-	1	4	-	1
10,001 to 25,000	5	2	-	1	-	2
25,001 to 50,000	4	2	-	1	-	1
50,001 to 100,000	4	2	-	1	-	-
Over 100,000	2	2	-	-	-	-
Total	71	14	11	26	5	25

[a]Based on EPA's program for evaluating and classifying interstate carrier water supply systems.

APPENDIX VIII

CORPS SITES GAO VISITED

Corps projects visited	Sites visited	Water system operated by	Frequency of water samples taken January 1971 to August 1972
Bonneville	Dam and Locks, Bradford Island, and Tanner Creek (note a)	Corps	Semimonthly until July 1971; monthly thereafter
Fern Ridge	Kruger Park (note b)	Corps	None during last 2 years
McNary	Dam and Locks	Corps	Varied from two a month to quarterly
	McNary Beach	Corps	Varied from two a month to quarterly
	Hat Rock State Park	State of Oregon	Varied from weekly to quarterly
Ice Harbor	Dam and Locks	Corps	Irregularly, but at least four times in last 2 years
	Levey Park	Corps	Irregularly, but at least six times in last 2 years
	Fishhook Park	Corps	Irregularly, but at least seven times in last 2 years
	Sacajawea State Park	State of Washington	Irregularly, but at least five times in last 2 years
	Hood Park	Walla Walla County, Wash.	Irregularly, but about six times a year
	Columbia Park (note c)	Benton-Franklin County, Wash.	About once a year

[a]One water supply system.

[b]Two water supply systems.

[c]Six water supply systems.

FOREST SERVICE WATER SUPPLY SYSTEMS

INCLUDED IN GAO'S REVIEW

National forest	Ranger district	Area served by water supply system	Frequency of bacteriological sampling January 1971 to August 1972
Mt. Baker	Monte Cristo	Gold Basin Campground and Hemple Creek Campground (note b)	Monthly (note a)
		Verlot Campground and Turlo Campground (note b)	Monthly (note a)
	Glacier	Douglas Fir Campground	Monthly (note a)
		Nooksack Campground	Monthly (note a)
		Silver Fir Campground	Monthly (note a)
		Henther Meadows Ski Area	Every 2 months during 1971, irregularly during 1972
Ochoco	Big Summit	Walton Lake Campground	No samples since Aug. 1971
		Scotts Camp Campground	No samples since Aug. 1971
		Ochoco Campground	Irregularly, four samples since May 1971
		Ochoco Divide Campground	No samples since Aug. 1971
		Wildwood Campground	No samples since Aug. 1971
		Carrol Campground	No samples since Aug. 1971
	Prineville	Wildcate Campground	Monthly (note a)
		Drake Creek Campground	Monthly (note a)
Siuslaw	Oregon Dunes National Recreation Area	Siltcoos Campground	Monthly (note a)
		South Eel Creek Campground	Monthly (note a)
		Tahkenitch Campground	Monthly (note a)
	Waldport	Canal Creek Campground (note c)	No samples since Aug. 1971
		Cape Perpetua Visitor Center	No samples since Aug. 1971
		Rock Creek Campground	No samples since May 1971
Wenatchee	Cle Elum	Crystal Springs Campground	Twice monthly
		Kachess Campground	Twice monthly
		Salmon La Sac Campground	Twice monthly
		Wish Poosh Campground	Twice monthly
	Leavenworth	Johnny Creek Campground	Monthly
		Mission Ridge Ski Area	Monthly
		Tumwater Campground	Twice monthly

[a]Samples generally taken monthly although there were occasional omissions.

[b]One water supply system.

[c]Two water supply systems.

APPENDIX X

NATIONAL PARK SERVICE WATER SUPPLY SYSTEMS

INCLUDED IN GAO'S REVIEW

National park	Area served by water system	Frequency of water samples taken January 1971 to August 1972
Oregon Caves National Monument	Caves area	Every 2 weeks
	NPS residential area	Every 2 weeks
Crater Lake National Park	Rim Village area	Monthly
	Park headquarters area	Varied between monthly and twice monthly
	Lightning Springs	Irregularly, one sample since 1-1-71
	Lost Creek Campground	No samples since 1-1-71
	Mazema Campground	Twice monthly in 1972
	Kerr Notch	Irregularly, one sample since 1-1-71
Whitman-Mission National Historic Site	Whitman-Mission area	Every 2 weeks
Olympic National Park	Kalaloch	Irregularly, eight samples since 1-1-71
	Deer Park	Irregularly, three samples since 1-1-71
	Mora	Irregularly, three samples since 1-1-71
	Fairholm	Twice monthly
	Dosewallips	Irregularly, three samples since 1-1-71
	Heart O' the Hills	Twice monthly
	Graves Creek	Irregularly, five samples since 1-1-71
	Hoh	Twice monthly in 1972
	July Creek	Irregularly, six samples since 1-1-71
Mt. Rainier National Park	Longmire	Twice monthly
	Paradise	Twice monthly
	Ohanapecosh	Twice monthly
	Sunrise	Twice monthly
	White River Campground	Twice monthly
	Tipsoo Lake	Twice monthly
	Ipsut Creek	Twice monthly
	Cougar Rock Campground	Twice monthly

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

JUL 25 1973

Mr. Edward Densmore
Assistant Director
Resources and Economic Development Division
General Accounting Office
Crystal Mall #2 - Room 506
Washington, D. C. 20460

Dear Mr. Densmore:

We have reviewed your proposed report to the Congress entitled, "Assessment of Federal and State Programs for Assuring the Purity and Safety of Drinking Water." The report will be a valuable contribution to the growing body of knowledge on the performance and effectiveness of the nation's water supply systems and programs. As we noted during your recent testimony before the Senate, your findings very closely support the results of EPA studies and we are in agreement on the major areas of concern. Our detailed comments on your report are enclosed. [See GAO note 1.]

In response to your recommendation, we will continue our efforts to improve our current program within existing authority.

[See GAO note 2.]

We appreciate having had the opportunity to review your proposed report.

Sincerely yours,

Thomas E. Carroll
Assistant Administrator
for Planning and Management

Enclosures

GAO notes: 1. The detailed comments are not included herein but were considered in this report.

2. Material related to matters which are no longer discussed in the report has been deleted.

APPENDIX XII

PRINCIPAL FEDERAL OFFICIALS RESPONSIBLE FOR ADMINISTRATION OF ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF AGRICULTURE		
SECRETARY OF AGRICULTURE:		
Earl L. Butz	Dec. 1971	Present
Clifford M. Hardin	Jan. 1969	Nov. 1971
CHIEF, FOREST SERVICE:		
John R. McGuire	Apr. 1972	Present
Edward P. Cliff	Mar. 1962	Apr. 1972
DEPARTMENT OF DEFENSE		
SECRETARY OF DEFENSE:		
James R. Schlesinger	May 1973	Present
Elliot L. Richardson	Jan. 1973	May 1973
Melvin R. Laird	Jan. 1969	Jan. 1973
DEPARTMENT OF THE ARMY		
SECRETARY OF THE ARMY:		
Howard H. Callaway	May 1973	Present
Robert F. Froehlke	July 1971	May 1973
Stanley R. Resor	July 1965	June 1971
CHIEF OF ENGINEERS:		
Lt. Gen. Frederick J. Clarke	Aug. 1969	Present
Lt. Gen. William F. Cassidy	July 1965	July 1969
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE		
SECRETARY OF HEALTH, EDUCATION, AND WELFARE:		
Caspar W. Weinberger	Feb. 1973	Present
Frank C. Carlucci (acting)	Jan. 1973	Feb. 1973

	Tenure of office	
	From	To
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE (continued)		
SECRETARY OF HEALTH, EDUCATION, AND WELFARE (continued):		
Elliot L. Richardson	June 1970	Jan. 1973
Robert H. Finch	Jan. 1969	June 1970
ASSISTANT SECRETARY (HEALTH) (note a):		
Charles C. Edwards	Mar. 1973	Present
Richard L. Feggel (acting)	Dec. 1972	Mar. 1973
Merlin K. DuVal, Jr.	July 1971	Dec. 1972
Roger D. Egeberg	July 1969	July 1971
Philip R. Lee	Nov. 1965	Feb. 1969
COMMISSIONER OF FOOD AND DRUGS:		
Sherwin Gardner (acting)	Mar. 1973	Present
Charles C. Edwards	Feb. 1970	Mar. 1973
Herbert L. Ley, Jr.	July 1968	Dec. 1969
DEPARTMENT OF THE INTERIOR		
SECRETARY OF THE INTERIOR:		
Rogers C. B. Morton	Jan. 1971	Present
Fred J. Russell (acting)	Nov. 1970	Jan. 1971
Walter J. Hickel	Jan. 1969	Nov. 1970
DIRECTOR, NATIONAL PARK SERVICE:		
Ronald H. Walker	Jan. 1973	Presentt
George B. Hartzog	Jan. 1964	Jan. 1973
ENVIRONMENTAL PROTECTION AGENCY (note b)		
ADMINISTRATOR, ENVIRONMENTAL PROTECTION AGENCY:		
Russell E. Train	Sept. 1973	Present
John Quarles (acting)	Aug. 1973	Sept. 1973

	Tenure of office	
	From	To
ENVIRONMENTAL PROTECTION AGENCY (continued)		
ADMINISTRATOR, ENVIRONMENTAL PROTECTION AGENCY (continued):		
Robert W. Fri (acting)	Apr. 1973	Aug. 1973
William D. Ruckelshaus	Dec. 1970	Apr. 1973
ASSISTANT ADMINISTRATOR FOR AIR AND WATER PROGRAMS:		
Robert L. Sansom	Apr. 1972	Present
Donald Mosiman	Dec. 1970	Apr. 1972

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[a]Before November 1972 this position was designated as Assistant Secretary for Health and Scientific Affairs.

[b]Before the establishment of EPA in December 1970, the Bureau of Water Hygiene, HEW, was responsible for water supply.

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