

GAO

Report to the Chairman, Environment,
Energy, and Natural Resources
Subcommittee, Committee on
Government Operations, House of
Representatives

December 1991

WATER POLLUTION

More Emphasis Needed on Prevention in EPA's Efforts to Protect Groundwater



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**Resources, Community, and
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December 30, 1991

The Honorable Mike Synar
Chairman, Environment, Energy, and Natural
Resources Subcommittee
Committee on Government Operations
House of Representatives

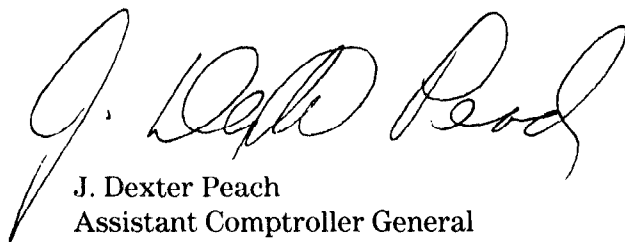
Dear Mr. Chairman:

As requested in your June 25, 1990, letter and subsequent discussions with your office, we have reviewed the Environmental Protection Agency's efforts to prevent groundwater contamination, including (1) what major initiatives EPA has taken to prevent groundwater contamination and (2) what major barriers inhibit the implementation of a more preventive approach toward dealing with groundwater contamination.

As arranged with your office, unless you publicly announce its contents earlier, we will make no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to other appropriate congressional committees; the Administrator, EPA; and the Director, Office of Management and Budget. We will also make copies available to other interested parties upon request.

This work was performed under the direction of Richard L. Hembra, Director, Environmental Protection Issues, (202) 275-6111. Other major contributors to this report are listed in appendix V.

Sincerely yours,



J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

Groundwater supplies about 40 percent of the U.S. population with drinking water, is used extensively by agriculture and industry, and supports sensitive surface water ecosystems. Once groundwater is contaminated, it is extremely expensive and difficult, if not impossible, to clean up. Many environmental officials say that additional efforts are needed to better protect groundwater resources and that preventing groundwater contamination is often a more cost-effective option than conducting cleanups after sites are contaminated.

Concerned that the Environmental Protection Agency (EPA) has placed too much emphasis on cleaning up hazardous waste sites and not enough emphasis on preventing contamination, the Chairman, Environment, Energy, and Natural Resources Subcommittee, House Committee on Government Operations, asked GAO to assess a number of issues related to EPA's efforts to prevent groundwater contamination. Among the issues GAO examined are (1) EPA's efforts to emphasize the prevention of groundwater contamination and (2) the major barriers inhibiting the implementation of a more preventive approach.

Background

Though the full extent of groundwater contamination nationwide is uncertain, evidence of contamination is increasing. EPA has documented cases of pesticide residues in public water supplies, and nitrates from fertilizers and other sources in private drinking water wells. These and other contaminants have been linked to serious health problems, including cancer and damage to the kidneys and central nervous system.

Since groundwater has been traditionally associated with local land use planning and water allocation issues, the federal government's role has been limited primarily to providing funding, guidance, and research to support state efforts to develop and implement groundwater protection strategies. Nevertheless, EPA exercises a number of groundwater-related responsibilities through a variety of programs, including Superfund, hazardous waste management, and pesticides regulation. To coordinate these responsibilities, EPA established the Office of Groundwater Protection in 1984, which developed a strategy to guide the agency's groundwater protection activities.

In August 1988, the EPA Administrator requested the Deputy Regional Administrators to prepare a "white paper" assessing progress that the agency has made under its 1984 groundwater strategy and to identify how the agency could improve its groundwater program. The assessment concluded that (1) EPA groundwater-related policies and programs

are not effectively coordinated across the agency, (2) EPA management and accountability systems do not effectively measure and track progress in protecting groundwater, and (3) EPA groundwater policies and programs overemphasize the cleanup of groundwater contamination at the expense of efforts to prevent contamination in the first place. To address these shortcomings, the paper recommended that EPA establish a groundwater task force to review and clarify the agency's groundwater policy. In September 1990, that task force presented a number of policy principles, including a call for a better balance in EPA groundwater activities between prevention and remediation activities.

Results in Brief

EPA's new groundwater strategy includes initiatives to help states establish comprehensive groundwater protection programs. These initiatives focus on providing states with financial and technical assistance to help establish these programs. The strategy emphasizes the prevention of groundwater contamination and stresses the need to achieve a greater balance between prevention and remediation activities.

Nevertheless, the potential for success in implementing the new approach is limited by some of the same barriers that restricted EPA's previous efforts under the 1984 strategy to prevent groundwater contamination. According to the large majority of EPA and state groundwater officials contacted by GAO, a primary problem deals with the current balance of limited resources between remediation efforts and prevention-oriented activities. Most state and regional officials expressed concern that while EPA's new approach appears to stress an increased emphasis on prevention, it is not accompanied by a meaningful shift in funding priorities. Without such a shift, it will be difficult for the agency to provide additional assistance to help the states establish comprehensive groundwater protection programs, and to improve its own management and accountability systems to effectively measure and track progress in protecting groundwater.

Principal Findings

New Approach Attempts to Emphasize Prevention and Address Former Weaknesses

EPA's new groundwater approach attempts to emphasize the prevention of contamination, stressing the need for an improved balance between remediation and prevention activities. For example, EPA is reviewing whether the states have developed and implemented preventive elements of their groundwater programs, including whether the states have

identified their most valuable and vulnerable groundwater aquifers and evaluated or ranked their highest-priority sources of groundwater contamination. In addition, the new approach attempts to address weaknesses of the agency's efforts to protect groundwater under the 1984 strategy. For example, to more effectively coordinate groundwater-related policies and programs across EPA, the new approach establishes the Groundwater Policy Committee and two work groups to provide overall groundwater policy direction for the agency. The work groups include (1) a state programs implementation work group to incorporate state input into the development of comprehensive state groundwater programs and to ensure that EPA's groundwater-related programs are all conforming to the agency's policy of developing effective and comprehensive state groundwater programs and (2) an interoffice regulatory work group to serve as a forum for officials from EPA's groundwater-related programs to evaluate regulatory actions that affect more than one program.

The approach also includes plans to improve EPA's management and accountability systems, including efforts to (1) better incorporate its regions and states in the annual planning and evaluation of groundwater activities across EPA programs, (2) modify the agency's accountability systems to provide greater incentives to EPA program managers to incorporate groundwater concerns into program priorities, and (3) encourage the states to provide data that could be used to better track and measure the nation's progress in protecting groundwater.

Shift in Priorities Could Help EPA Implement the New Strategy

Although EPA's new approach attempts to emphasize prevention and addresses certain weaknesses identified in its 1984 strategy, EPA regional and state officials told GAO that these efforts will continue to be hindered unless the current balance of limited groundwater resources is shifted toward preventive activities. As an example, one of EPA's primary programs for preventing groundwater contamination—the Well-head Protection Program, which is designed to protect drinking water—has received approximately \$10 million in federal funding since its inception in 1986 through fiscal year 1991. In comparison, the average cost for cleaning up only 1 of the 1,200 hazardous waste sites located across the country is about \$25 million. According to EPA and state officials, a continued overemphasis on remediation would hamper the agency's plans to provide additional groundwater-related financial and technical assistance to states, and would inhibit its ability to follow through on its plans to improve its management and accountability systems for measuring and tracking progress in protecting groundwater.

Accordingly, GAO believes that some shift in emphasis between preventive and remedial programs is warranted to help states implement preventive groundwater protection programs more effectively. Importantly, such a shift need not involve a major restructuring of funding for state groundwater-related activities.

To some extent, EPA and the states may be able to further emphasize prevention through existing state groundwater-related grant programs. These include, for example, grant programs for nonpoint source pollution (diffuse sources of pollution) and drinking water protection. While it is unlikely that a large share of these funds could be redirected from their present uses, federal and state groundwater officials suggested to GAO that there may be some opportunities for shifting a portion of these groundwater-related grants to place a greater emphasis on preventing groundwater contamination. Accordingly, EPA should work with the states and the cognizant congressional authorizing and appropriations committees to identify ways in which some of the existing groundwater-related grant programs can be used for these purposes.

Recommendation

To improve the balance between prevention and remediation in state groundwater-related programs, GAO recommends that the Administrator, EPA, work with the states to develop ways to reorient some of their existing groundwater-related grant programs to provide greater emphasis on preventive activities. Where congressional approval is needed, EPA should work with the cognizant authorizing and appropriations committees in the 1993 budget process to reorient funding priorities to provide greater emphasis on preventive activities.

Matter for Congressional Consideration

The Congress may wish to consider providing greater emphasis on preventive groundwater-related activities as it considers funding for EPA's groundwater programs during the 1993 budget process.

Agency Comments

GAO discussed the contents of this report with EPA officials, who generally agreed with the factual information presented. Their comments have been incorporated where appropriate. However, as agreed, GAO did not obtain written comments on a draft of this report.

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Abbreviations

DRA	Deputy Regional Administrator
EPA	Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GAO	General Accounting Office
GIS	geographic information systems
OGWDW	Office of Ground Water and Drinking Water
OGWP	Office of Ground Water Protection
ORD	Office of Research and Development
ppb	parts per billion
RCRA	Resource Conservation and Recovery Act
SDWA	Safe Drinking Water Act
STARS	Strategic Targeted Activities for Results System
TSCA	Toxic Substances Control Act
UIC	Underground Injection Control

Introduction

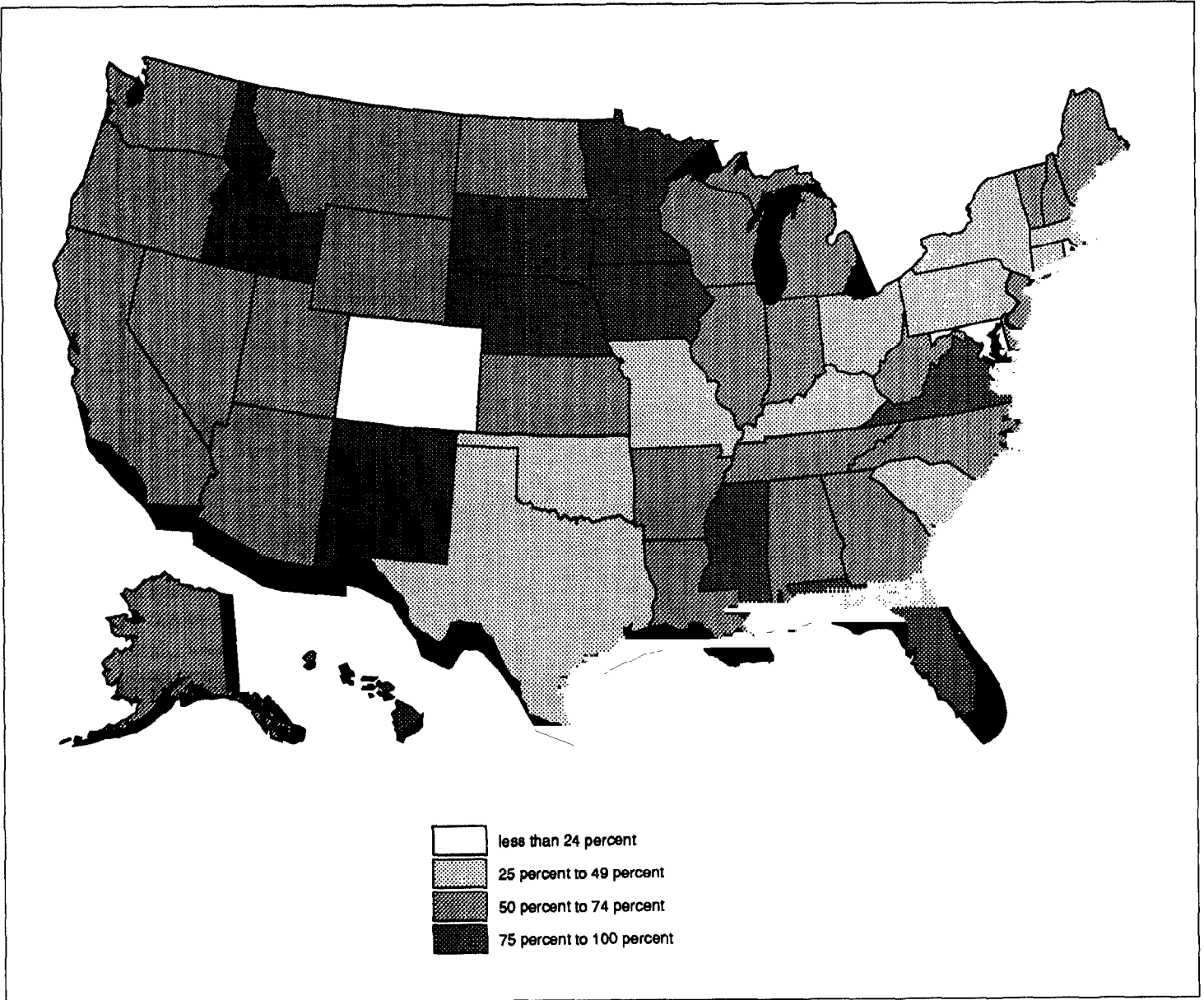
Groundwater is a valuable natural resource that is the source of drinking water for approximately 40 percent of the U.S. population—about 100 million people. The percentage is much higher in rural areas, where more than 90 percent of the population depends on this source for drinking water. (See fig. 1.1.) Groundwater supplies 94,600 community drinking water system wells in addition to 10.5 million rural private wells. Groundwater is also used for agricultural activities, supplying approximately 40 percent of the water used for irrigation and about 55 percent of the water consumed by livestock. In addition, groundwater is used for industrial activities, supplying as much as 30 percent of the water used by industry in many of the eastern states. More importantly, the consumption of groundwater is increasing at twice the rate of surface water consumption.

Since groundwater and surface water are often interconnected, groundwater is also important for sustaining surface water ecosystems. For example, during dry periods, groundwater can maintain aquatic ecosystems by providing a base flow of water to streams and wetlands.

Although groundwater has traditionally been considered a relatively pristine medium, it is vulnerable to contamination from a variety of sources, including discharges from underground storage tanks, hazardous waste landfills, septic tanks, and agricultural activities. (See fig. 1.2.) Such contamination can be dangerous to human health and the environment.

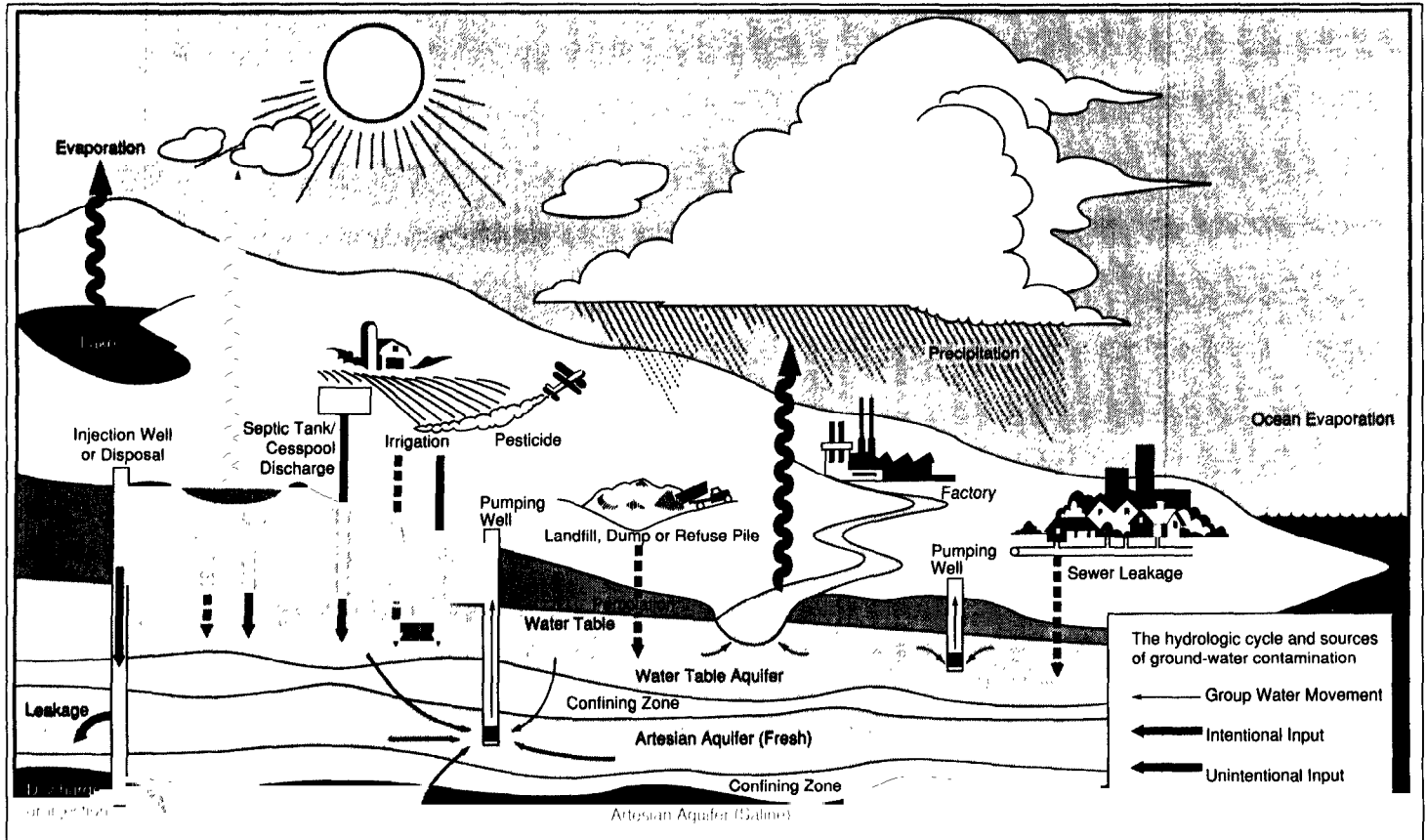
Once contaminated, groundwater can be very expensive and time-consuming to clean up. In some cases, cleanup may be impossible. Furthermore, well-documented cases such as the Love Canal, New York case, where concerns about groundwater contamination forced many residents to evacuate their homes, show that there are social as well as economic costs of contamination.

Figure 1.1: Percentage of State Populations Using Groundwater as a Source of Drinking Water



Source: EPA.

Figure 1.2: Sources of Groundwater Contamination



Source: EPA.

Evidence of Groundwater Contamination

The full nature and extent of groundwater contamination nationwide is uncertain. However, it is known that the current and potential sources of groundwater contamination are vast. Examples of actual or potential sources of such contamination include pesticides and fertilizers that are spread on the ground, hazardous waste land disposal facilities, underground storage tanks, and septic systems.

As environmental programs and techniques for monitoring groundwater advance, evidence of contamination is increasing. For example, an Environmental Protection Agency (EPA) survey released in November 1990 found that, nationwide, as many as 60,900 rural domestic wells and 7,600 community water system wells may contain pesticide residues at levels above current health standards. Also, the survey estimated that

as many as 254,000 rural domestic wells and 1,130 community wells may have levels of nitrates above current health standards.

Additional evidence of groundwater contamination is being reported by various states. For example, Connecticut has recorded 1,400 well contaminations that affect the drinking water of 250,000 people. In Hawaii, pesticide contamination was found in 13 public drinking water wells that serve more than 130,000 people. In Long Island, New York, over half of 8,000 wells tested were contaminated with the pesticide, aldicarb, and more than 2,000 homes had wells with concentrations exceeding New York State health standards.

Hazardous waste land disposal facilities present one of the most direct contamination threats to groundwater. Depending upon the underlying terrain, the rate of groundwater flow, and the type and amount of constituents released from facilities, contaminated groundwater can easily migrate from these facilities and adversely affect groundwater users. In December 1987, we reported that over 70 percent of the existing 1,451 hazardous waste land disposal facilities in the nation were leaking and that over 50 percent may require corrective actions to mitigate groundwater contamination.¹

Importance of Preventing Groundwater Contamination

Protecting groundwater is particularly important because it is most often used untreated—just as it comes from the ground. This is especially true with regard to the 10.5 million rural private wells located throughout the U.S. that are not subject to the federal monitoring and treatment requirements that apply only to public water supply systems.

Protecting groundwater is also important because groundwater contamination presents dangers to human health and the environment. Contaminated groundwater can cause cancer and has been linked to other serious health problems. For example, four of the five pesticides that EPA detected in groundwater at levels above current health standards are classified as possible or probable human or animal carcinogens that can cause damage to the liver, kidneys, spleen, and eyes.² In addition, exposure to nitrates, which EPA also found in groundwater at levels

¹See *Hazardous Waste: Corrective Action Cleanups Will Take Years to Complete* (GAO/RCED-88-48, Dec. 9, 1987).

²EPA's 1990 National Survey of Pesticides in Drinking Water Wells found five pesticides—alachlor, atrazine, dibromochloropropane (DBCP), ethylene dibromide (EDB), and gamma-HCH (Lindane)—in rural domestic wells at levels above current drinking water standards. With the exception of atrazine, all of these pesticides are classified as probable human or animal carcinogens.

above current health standards, can result in a blood condition in infants, referred to as "blue baby," that causes a severe oxygen deficiency and can lead to death. For example, in June 1986, a South Dakota baby died from this condition and subsequent investigation showed that the family's well contained nitrate levels that were 15 times greater than the federal safe drinking water standard.

Once groundwater is contaminated, it is extremely expensive and difficult to clean up. The following is an illustration. The pesticide aldicarb was found in Long Island groundwater in 1979. Over the next 7 years, approximately \$3 million was spent measuring aldicarb concentrations in wells, and another \$2.5 million was spent installing and maintaining carbon filtration units in over 2,500 affected households.

In some cases, cleaning up contaminated groundwater may be impossible. A September 1989 Department of Commerce study prepared for EPA evaluated groundwater extraction technology, which is the most commonly used technology for cleaning up contaminated groundwater, and found that complete and final restoration of groundwater was achieved at only 1 of 19 sites examined.³ One of the sites studied involved the cleanup of contaminated aquifers used as a public water supply in New Jersey. A 6-year extraction process, which cost approximately \$10 million, reduced the average concentration of contaminants to acceptable levels; however, continued monitoring indicated that high concentrations of contaminants have reappeared and that, in some cases, these concentrations are higher than those that existed before the extraction process began. For example, at one of several monitoring wells at this site, the extraction process appeared to have reduced the average concentration of one contaminant from 1,758 parts per billion (ppb) to 349 ppb. However, the average concentration of this contaminant rose to 7,946 ppb 5 years after extraction operations were shut down. Officials in charge of the cleanup operation suspect that the rise in pollutant levels stems from the fact that the pollutants are in the form of a dense liquid that cannot be removed by currently available technology. As a result, the objective of this cleanup operation has changed from restoring the quality of the groundwater to containing the existing pollutants.

³This method of remediation, also referred to as the "pump and treat method," usually includes three steps: (1) extraction of contaminated groundwater from the aquifer, (2) treatment of the extracted water, and (3) disposal of the contaminants and discharge of the treated water.

As more instances of groundwater contamination are identified, concern about groundwater protection is growing. Although EPA has made some progress in its efforts to clean up such contamination, the technical difficulty and expense involved in these operations have focused attention on the advantages of preventing contamination from occurring in the first place, which may be less expensive.

In addition, there is a growing awareness of the relative importance of "nonpoint" sources of groundwater contamination,⁴ such as contamination from pesticides that leach into groundwater. Nonpoint sources of contamination are so diffuse that cleanup is often impossible. Preventive measures, such as promoting the proper use of fertilizers and pesticides on crops, may be the only effective alternative for protecting groundwater supplies from such sources of contamination.

State and Federal Roles to Protect Groundwater

Both EPA and the states agree that the primary responsibility for protecting groundwater belongs to the states. At the state level, a variety of agencies are responsible for cleaning up and preventing groundwater contamination. At the federal level, EPA has principal authority among federal agencies for the regulation and protection of groundwater resources. EPA's groundwater responsibilities include providing financial and technical support to states for developing groundwater protection programs, integrating groundwater protection policies into various EPA programs, and assessing and evaluating EPA groundwater program effectiveness. EPA also conducts a wide variety of research projects to support the agency's efforts to protect groundwater, including research on groundwater monitoring and research on the control of sources of groundwater contamination. Many other federal agencies also have groundwater-related responsibilities, which include collecting and analyzing groundwater data and conducting research on potential groundwater contaminants.

States Have Primary Responsibility for Groundwater Protection

The primary responsibility for protecting groundwater belongs to the states, in part, because (1) groundwater programs must consider the environmental and hydrogeological conditions unique to given localities and (2) groundwater protection involves local land use and water allocation issues, which have historically been the prerogative of state and

⁴Nonpoint sources of pollution are diffuse sources of pollution rather than pollutants discharged from a single, specific point source.

local governments. Usually, several agencies in each state have groundwater responsibilities, in part, because implementation of federal programs with groundwater impacts is distributed among several state agencies. For example, programs related to drinking water are usually located in state public health agencies, while programs related to pesticide and fertilizer contamination are located in state agricultural departments. State programs include initiatives intended to prevent groundwater contamination, such as preventing certain activities around aquifers that are designated as a community's only source of drinking water, and initiatives to clean up existing groundwater contamination, primarily through state-administered Superfund programs that deal with cleaning up hazardous waste.

All states have developed groundwater protection strategies. In general, these strategies attempt to develop comprehensive, long-range plans for protecting groundwater and seek to institutionalize groundwater protection at the state and local levels. In fiscal year 1991, EPA provided the states with approximately \$7.7 million to develop groundwater protection strategies.

EPA Has Major Groundwater Responsibilities

At the federal level, EPA has principal authority for regulating and protecting groundwater resources. While a federal statutory program currently regulates surface waters, no equivalent national program exists for regulating groundwater. Instead, EPA's authority is organized around six federal environmental statutes that help prevent and clean up groundwater contamination: the Resource Conservation and Recovery Act (RCRA); the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund); the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); the Toxic Substances Control Act (TSCA); the Safe Drinking Water Act (SDWA); and the Clean Water Act.⁵ Responsibilities for protecting groundwater under these statutes are delegated to a number of EPA offices.⁶

To coordinate the numerous EPA offices with groundwater responsibilities, in 1984 EPA established the Office of Ground Water Protection

⁵Appendix I summarizes the six statutes that address groundwater protection.

⁶These offices include the Office of Solid Waste and Emergency Response, Office of Pesticides and Toxic Substances, Office of Water, Office of Policy Planning and Evaluation, and Office of Research and Development. Appendix II gives a brief description of the EPA offices with responsibilities for groundwater.

(OGWP),⁷ now reorganized as a part of EPA's Office of Ground Water and Drinking Water (OGWDW).⁸ OGWDW is responsible for establishing and implementing an agencywide framework for making decisions about groundwater protection and integrating groundwater protection policies into various EPA programs.

In addition to EPA, other federal agencies have a variety of groundwater responsibilities. For example, the Department of the Interior's U.S. Geological Survey has the principal role in providing baseline data on groundwater usage. Other agencies within the Department of the Interior and the U.S. Department of Agriculture are responsible for protecting natural resources—including groundwater—that are under their domain. The Department of Defense also controls and mitigates potential sources of groundwater pollution at defense installations. In addition, the Department of Energy conducts hydrogeologic investigations of facilities that store and process nuclear materials.⁹

EPA's 1984 Groundwater Protection Strategy

In August 1984, EPA adopted a groundwater protection strategy to guide EPA and state groundwater activities. The 1984 strategy contained components that focused on protecting groundwater by preventing groundwater contamination from occurring as well as cleaning up groundwater that is contaminated. This strategy specified that EPA provide financial and technical assistance to help states develop and implement groundwater protection programs and that EPA attain agencywide consistency with regard to decisions affecting groundwater.

While the 1984 strategy made some progress in encouraging states to develop groundwater protection programs, the goal of agencywide consistency with regard to groundwater decisionmaking was not achieved. Dissatisfaction with EPA's groundwater strategy, both within and outside of EPA, led the EPA Administrator in August 1988 to ask the agency's Deputy Regional Administrators (DRAS) to develop a "white paper" on how EPA could improve the implementation of its groundwater protection strategy. The resulting white paper stated that EPA's inability to attain agencywide consistency with regard to groundwater policies and programs was due partly to the fact that EPA's groundwater

⁷The term "groundwater" is spelled three ways in government documents: groundwater, ground water, and ground-water.

⁸EPA's Office of Water has recently reorganized its offices, combining OGWP with EPA's Office of Drinking Water to form the new Office of Ground Water and Drinking Water.

⁹Appendix III describes the roles of federal agencies with groundwater responsibilities.

policies were not “widely accepted or clearly understood” among the agency’s programs and offices. As a result, the DRAS called for EPA to develop a clear national groundwater policy and made recommendations for accomplishing this goal. One recommendation called for the establishment of a task force charged with reviewing and clarifying EPA’s groundwater policy to address issues presented in the DRA white paper.

EPA’s 1991 Groundwater Protection Strategy

In response to the recommendations of the DRA white paper, EPA established a groundwater task force in July 1989 to address a number of issues, including how to better coordinate groundwater activities within the agency and whether EPA should take a new approach to protecting groundwater that includes a stronger emphasis on preventing groundwater contamination. The task force presented a draft final version of its findings in September 1990 that included policy and implementation principles for an “aggressive approach” to protect groundwater and recommended that these principles be reflected in EPA policies, programs, and resource allocations. The report, which was finalized in July 1991, emphasizes the need for preventing groundwater contamination and identifies the need for a better balance between prevention and remediation activities. As part of the agency’s efforts to emphasize prevention, EPA will be encouraging the states to include certain preventive elements in their state comprehensive groundwater programs, including the identification of the most valuable and vulnerable groundwater aquifers and the evaluation or ranking of the highest priority sources of groundwater contamination.

Objectives, Scope, and Methodology

In a June 25, 1990 letter, the Chairman, Environment, Energy, and Natural Resources Subcommittee, House Committee on Government Operations, expressed concern over the high cost of cleaning up groundwater after contamination and the fact that potentially less expensive efforts to prevent groundwater contamination from occurring in the first place were not getting the attention they deserve. Accordingly, he asked us to examine a number of issues related to EPA’s efforts to prevent groundwater contamination. On the basis of this request and subsequent discussions with the Chairman’s office, we agreed to examine

- what the agency’s efforts have been to emphasize the prevention of groundwater contamination and
- whether any major barriers inhibit the implementation of a more preventive approach toward addressing groundwater contamination.

Our examination of EPA's 1984 Groundwater Protection Strategy is discussed in chapter 2. A discussion of EPA's more recent efforts to prevent groundwater contamination and to address the weaknesses of the 1984 strategy appears in chapter 3.

Our work in addressing these issues included examining numerous documents, including the 1984 Groundwater Protection Strategy and supporting guidance, the DRA white paper, the draft and final versions of the groundwater task force report, state and association comments on the groundwater task force report, EPA's Pesticides and Groundwater Strategy, agency operating guidance, and budgetary information.

During our review, we also interviewed groundwater officials at EPA headquarters and in all 10 EPA regions. In our interviews with EPA headquarters staff, we focused on plans for implementing the groundwater task force report and the balance between EPA actions to prevent groundwater contamination and actions to clean up existing contamination. Our telephone interviews with EPA regional groundwater officials focused on the impacts that EPA's 1984 Groundwater Protection Strategy had on regional groundwater programs and the expected impacts of the groundwater task force report on these programs. Regional officials were also asked for their opinions on how well groundwater protection efforts are coordinated within EPA and were asked to identify problems or barriers they encountered in their efforts to prevent groundwater contamination.

To obtain state perspectives on EPA's efforts to prevent groundwater contamination and to examine the impacts of these efforts on state groundwater programs, we interviewed groundwater officials from eight states: California, Connecticut, Florida, Iowa, Minnesota, New Jersey, Texas, and Wisconsin. We selected these states to obtain a diversity in a number of factors, including geography, groundwater program development, and the type of groundwater contamination problems being experienced. These interviews focused on how EPA's 1984 groundwater protection strategy affected state programs and how the more recent EPA groundwater protection initiatives may affect them in the future. Additionally, we asked the state officials for their views about how well EPA groundwater responsibilities are coordinated between the numerous EPA offices, barriers encountered in their efforts to prevent groundwater contamination, and the types of assistance they need from EPA to prevent groundwater contamination.

In addition, we contacted representatives of other organizations including the Council of State Governments, Association of State and Interstate Water Pollution Control Administrators, The Urban Institute, and the National Wildlife Federation.

Our review work was conducted from August 1990 to September 1991 and was performed in accordance with generally accepted government auditing standards. We discussed the contents of this report with EPA officials, who generally agreed with the factual information presented. Their comments have been incorporated where appropriate. However, as agreed, we did not obtain written comments on a draft of this report.

EPA's Efforts to Promote Prevention of Groundwater Contamination Have Thus Far Had Limited Success

While some components of EPA's 1984 groundwater strategy were designed to prevent groundwater contamination, this strategy has made limited progress in promoting prevention. Through the strategy, EPA has supported state efforts to prevent and clean up groundwater contamination by providing grant assistance and technical guidance to help states develop groundwater protection programs. However, the large majority of state officials we contacted maintained that this support has been inadequate. In addition, these officials said that state and federal budget priorities often dictate that the limited resources available be used to clean up groundwater contamination rather than to prevent contamination from occurring.

The 1984 strategy also prompted EPA to initiate efforts to place controls on sources of groundwater contamination that had not been previously addressed, such as contamination from underground storage tanks and pesticide use. In addition, the strategy called for EPA to study the need for placing additional controls on surface impoundments and landfills to prevent groundwater contamination. However, some of these controls have not been effectively implemented. For example, in April 1990, we reported that EPA had made little progress in assessing and revising its general standards for regulating industrial waste facilities to better prevent groundwater contamination.¹ Moreover, the strategy has not resulted in the effective control of nonpoint sources of pollution, which are among the most significant unaddressed sources of groundwater contamination.

Among the reasons why EPA has had limited success in preventing groundwater contamination are the following:

- EPA groundwater-related policies and programs have not been effectively coordinated within the agency.
- EPA management and accountability systems have not effectively measured and tracked progress in protecting groundwater.
- EPA priorities and resource allocations have favored groundwater remediation rather than the prevention of groundwater contamination.

¹See Nonhazardous Waste: Environmental Safeguards for Industrial Facilities Need to Be Developed (GAO/RCED-90-92, Apr. 12, 1990).

EPA's First Major Effort to Prevent Groundwater Contamination—The 1984 Strategy

In the late 1970s and early 1980s, efforts to protect groundwater were uncoordinated, information on the potential health effects of groundwater contaminants was limited, and groundwater science was in its infancy. These and other factors led the EPA Administrator to recognize the need for a federal role in protecting the quality of the nation's groundwater. Thus, in 1983, EPA's Deputy Administrator formed the Groundwater Task Force to

- identify areas of serious inconsistencies between groundwater programs and institutions at the local, state, and federal levels;
- assess the need for greater program coordination of groundwater-related activities within EPA; and
- help strengthen states' capabilities to protect groundwater resources.

The Task Force produced the Groundwater Protection Strategy in August 1984, which represented the agency's first attempt to outline an approach to protect groundwater. This strategy contained four major components.

- First, the strategy recommended that EPA provide funding and technical support for state efforts to develop groundwater protection programs. In this regard, the strategy supported the states' belief that the primary responsibility for managing groundwater resources should be at the state level because of the variability in the quality of groundwater resources throughout the states. The strategy called for the state programs to contain preventive initiatives, such as discouraging the placing of hazardous waste sites near aquifers that serve as irreplaceable drinking water supplies, as well as initiatives to clean up existing contamination.
- Second, the strategy called for assessing problems associated with previously unaddressed sources of groundwater contamination, such as contamination from leaking underground storage tanks.
- Third, the strategy called for issuing guidelines for EPA decisions affecting groundwater. These groundwater protection guidelines were to be based on a policy of differential protection that would focus agency efforts toward protecting aquifers that were most vulnerable to contamination and of the greatest use and value.
- The last major component of the strategy recognized that a number of EPA program offices have groundwater responsibilities and that greater consistency must be achieved between these programs if they are to

effectively protect groundwater. In this regard, the task force recommended that EPA establish an oversight committee to coordinate the groundwater-related activities of all of the agency's program offices.

EPA Has Made Limited Progress in Promoting the Prevention of Groundwater Contamination

Thus far, EPA has made limited progress in promoting the prevention of groundwater contamination under its 1984 strategy. While the agency has supported state groundwater programs through funding and technical assistance, most of the state officials we contacted consider the financial and technical support provided by EPA to be inadequate. The agency has also helped states implement a number of programs designed to prevent groundwater contamination from point sources, such as the Underground Injection Control (UIC) program.² However, these efforts have met with only partial success. In addition, many nonpoint sources of groundwater contamination, which may only be controlled effectively through prevention, remain largely unaddressed.

Some Progress Made in Setting Up State Programs

State officials acknowledge that, to some extent, EPA has helped build political support within states for groundwater protection by identifying the importance of groundwater. In addition, EPA has provided funding and technical assistance to help states develop groundwater protection programs which include certain activities that are vital to preventing groundwater contamination. According to EPA, all 50 states have developed groundwater protection strategies, and most of the states have systems for classifying their groundwater resources. However, EPA is currently uncertain as to how many of the states are implementing activities extensive enough to constitute groundwater protection programs. Technical and financial assistance from EPA has also helped states establish Wellhead Protection Programs.³ As of early October 1991, EPA had approved 16 state Wellhead Protection Programs, and the agency expected to approve 8 more programs by the end of 1991.

²EPA's UIC program, created in 1980, is designed to prevent groundwater contamination by regulating industrial waste products that are injected into the ground.

³The Wellhead Protection Program was established under the 1986 Safe Drinking Water Act Amendments to protect public water wells which serve as sources of drinking water. States are given the responsibility of establishing a program to manage the potential sources of groundwater contamination that lie within a designated area around a public well.

Limited Progress Made in Preventing Groundwater Contamination

EPA has provided states with technical and financial support for groundwater activities, but most of the state groundwater officials we interviewed said that EPA's support has not been adequate and should be increased. For example, EPA has provided technical guidance to states on how groundwater resources should be classified in order to focus on those groundwater resources that need the greatest protection. However, EPA has provided the states with only limited information on which pollutants constitute the greatest threat to groundwater so the states can target the worst potential pollutants. In addition, the 1988 Deputy Regional Administrators' study of EPA's groundwater program found that the states need more help in establishing computer systems for managing the groundwater data collected.

Regarding the states' financial situation, all of the states contacted said that they needed more funding to implement groundwater programs. For example, one state groundwater official explained that his state's current groundwater funding (\$100,000) was barely enough to support one staff member and certainly not enough to help establish a groundwater program. Another official explained that preventive activities, such as delineating groundwater areas to determine the amount of protection they require, need additional federal funding. This official estimated that it would cost approximately \$5 million to delineate groundwater areas across his state.

EPA has also helped promote prevention through its work to assess and implement source-specific statutes to control sources of groundwater contamination that were not fully addressed before the 1984 strategy—in particular, leaking storage tanks, surface impoundments,⁴ and landfills. As an example, under RCRA, EPA has instituted requirements for protecting groundwater, including requirements for monitoring groundwater, lining storage tanks with noncorrodible material to prevent contaminants from leaking into groundwater, installing systems to collect substances leaching from surface impoundments, and handling hazardous wastes at landfills. These efforts include measures that are intended to prevent future groundwater contamination.

EPA has made efforts to identify and control major point sources of groundwater contamination, but indications are that some of these efforts have been ineffective. For example, in July 1988, we reported

⁴A surface impoundment is any significant man-made or natural depression—such as a pit, pond, or lagoon—used to treat, store, or dispose of agricultural, mining, oil and gas, municipal, and industrial wastes.

that EPA had made limited progress in identifying and regulating hazardous waste nearly 12 years after RCRA was passed.⁵ Earlier in 1988, we reported that 39 of the 50 hazardous waste land disposal facilities examined had not developed the groundwater-monitoring data needed to demonstrate they had achieved EPA's groundwater-monitoring goals, including a lack of data needed to determine whether or not the facilities were leaking contaminants into groundwater.⁶ In April 1990, we reported that EPA had made little progress in assessing and revising its general standards for regulating industrial waste facilities to better prevent groundwater contamination. This assessment was ordered by the Congress in 1984, and revised standards were to be developed by March 1988.⁷

To help protect groundwater used for drinking water supplies, the Safe Drinking Water Act (SDWA) of 1974 requires EPA to establish the UIC program.⁸ EPA guidance and some state regulations for implementing this legislation include requirements that operators of injection wells that began operating after the UIC program went into effect are subject to an "area of review" requirement, which states that any improperly plugged—or sealed off—wells in the immediate vicinity of their injection wells must be plugged. In July 1989, however, a GAO review found cases where contamination from injection wells that were developed by the oil and gas industry and were operating before the UIC program went into effect was migrating into nearby, abandoned oil and gas wells that were not plugged or that were improperly plugged.⁹ In order to better safeguard drinking water from contamination from such wells, we recommended that EPA require that UIC program regulations or guidance be established for state- and EPA-administered programs to make existing wells subject to the area-of-review requirements. In response, EPA formed a federal advisory committee to consider such action and plans to issue a proposed rule by October 1992.

⁵See Hazardous Waste: New Approach Needed to Manage the Resource Conservation and Recovery Act (GAO/RCED-88-115, July 19, 1988).

⁶See Hazardous Waste: Groundwater Conditions at Many Land Disposal Facilities Remain Uncertain (GAO/RCED-88-29, Feb. 18, 1988).

⁷See Nonhazardous Waste: Environmental Safeguards for Industrial Facilities Need to Be Developed (GAO/RCED-90-92, Apr. 12, 1990).

⁸Through the UIC program, EPA, directly or indirectly through delegation to states, regulates the design, construction, and operation of underground injection wells which inject wastes and other fluids below underground drinking water sources.

⁹See Drinking Water: Safeguards Are Not Preventing Contamination From Injected Oil and Gas Wastes (GAO/RCED-89-97, Jul. 5, 1989).

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EPA is also encouraging states to establish comprehensive Wellhead Protection Programs to protect public water supply wells from all sources of contamination. These programs are an integral part of EPA's efforts to prevent groundwater contamination because they are designed to include fundamental components needed to effectively manage groundwater resources, including identifying the major sources of groundwater contamination and the proper procedures for the siting of new groundwater wells.

However, without additional federal funding, states and localities will be hard-pressed in their efforts to establish and implement effective Wellhead Protection Programs. For example, states received no federal funding for Wellhead Protection Programs from fiscal year 1986 through fiscal year 1989. In fiscal year 1990, the \$2.5 million in grant funding available to the states to implement Wellhead Protection Programs represents an average of \$50,000 for each state. As an indication of the adequacy of this amount of funding, one state groundwater official commented that to conduct a detailed mapping of his state's aquifers (which represents only one of seven elements needed to establish a Wellhead Protection Program), it would cost \$200,000 to \$300,000 per water utility.

EPA is also attempting to prevent groundwater contamination through its efforts to control nonpoint sources of groundwater contamination. In 1989, EPA presented an ambitious 5-year plan to help improve state and local efforts to control nonpoint source pollution. However, we reported in October 1990 that resource constraints had significantly inhibited EPA's progress in implementing this plan and concluded that the agency's nonpoint agenda will remain largely unfulfilled if the agency stays on its present course.¹⁰

As part of EPA's efforts to address nonpoint sources of groundwater contamination, the agency is attempting to identify pesticides that present the greatest potential for leaching into groundwater and to establish regulatory controls for their use.¹¹ However, our recent report on the agency's efforts concluded that EPA has been slow in assessing the

¹⁰See *Water Pollution: Greater EPA Leadership Needed to Reduce Nonpoint Source Pollution* (GAO/RCED-91-10, Oct. 15, 1990).

¹¹Under FIFRA, EPA has the authority to take regulatory action on pesticides that present serious risks to health or the environment, including placing restrictions on the use of the pesticide or canceling the registration of the pesticide, which would remove it from the marketplace.

leaching potential of 16 pesticides that have been identified as groundwater contaminants and that the agency could do more to regulate these pesticides.¹² Among the reasons cited for EPA's slow pace in assessing these pesticides was a lack of sufficient resources to perform the assessments.

Reasons Why EPA Made Limited Progress in Preventing Groundwater Contamination

Factors limiting progress in EPA's efforts to prevent groundwater contamination include (1) difficulties in coordinating the agency's groundwater-related policies and programs and (2) problems in its management and accountability systems' ability to track and measure progress in preventing groundwater contamination. In addition, as noted in the section above, resource constraints are an underlying problem affecting efforts to prevent groundwater contamination—as they are in many other environmental programs. In addition, the large majority of state officials we contacted said that state and federal budget priorities often dictate that the limited resources available be used to clean up groundwater contamination rather than to prevent contamination from occurring.

EPA Groundwater-Related Policies and Programs Have Not Been Fully Coordinated

The 1988 DRA white paper identified a major shortcoming of EPA's groundwater program to be a lack of coordination of groundwater-related policies and programs within the agency. The DRAs found the problem to be due to the fact that EPA's groundwater policies are neither "widely accepted nor clearly understood" among the agency's program offices. For example, the DRAs found confusion within EPA regarding the 1984 strategy's differential groundwater protection guidelines and the desired level of integration of the agency's programs.¹³ According to the DRA white paper, the 1984 strategy failed to address inconsistencies in cleanup standards across EPA programs. This led to, among other things, varying degrees of protection of groundwater resources at the state and local level. Furthermore, the lack of coordination has prevented states from focusing resources in the most comprehensive manner to promote groundwater protection.

¹²See *Pesticides: EPA Could Do More to Minimize Groundwater Contamination* (GAO/RCED-91-75, Apr. 29, 1991).

¹³EPA's differential groundwater protection guidelines established a system for classifying groundwater aquifers so that the agency's efforts could be targeted toward protecting the aquifers most vulnerable to contamination and of the greatest use and value. For example, class I aquifers (irreplaceable drinking water sources) receive the greatest protection.

Of the groundwater officials from the eight states we contacted, officials in five states agreed with the DRA's findings, explaining that EPA's groundwater-related initiatives were often inconsistent in their approaches to groundwater protection and that EPA needed to adopt a more comprehensive policy for addressing groundwater contamination. For example, different EPA programs utilize different approaches to establish cleanup and protection standards for groundwater resources. The state officials noted that these differences in cleanup standards have led to varying levels of protection of groundwater resources and public health at the state and local levels. As a result of such inconsistencies, state environmental, health, and agricultural policies and programs that are groundwater-related are not integrated. Additionally, the DRAs noted that until EPA policies and programs develop a consensus on issues such as the cleanup standards, state programs will continue to reflect the inconsistencies present in the federal programs.

A 1989 report by the Congressional Research Service also recognized the lack of integration of groundwater policies among EPA program offices, stating that "several years into this effort, the goal of Agency-wide consistency has not been achieved."¹⁴ The report noted that a major obstacle to achieving agencywide adoption of the 1984 strategy's differential groundwater protection guidelines is the inconsistency in the degree of groundwater protection required by various federal statutes and, consequently, federal programs.

Although EPA's 1984 strategy established the Assistant Administrator/Regional Administrator Oversight Committee to coordinate the groundwater-related activities of all of the agency's program offices, groundwater officials from the states and regions said that coordination problems still exist. One state official explained that these problems occur because EPA headquarters and regional groundwater offices are attempting to coordinate with other agency program offices that have not been traditionally oriented toward groundwater. In addition, one regional official noted that other EPA program offices have legislatively mandated priorities that take precedence over other considerations, and that without a specific groundwater mandate, coordinating groundwater policies with other offices receives little priority.

In the past, EPA has not emphasized a comprehensive approach to groundwater protection that includes an assessment of all sources of

¹⁴See *Groundwater Quality: Current Federal Programs and Recent Congressional Activities*, 89-195 ENR, Mar. 1, 1989.

groundwater contamination in a given area.¹⁵ Rather, as the 1988 DRA white paper stated, EPA's program priorities are based on addressing site-specific sources of contamination. As a result, the DRA review of EPA's groundwater program found that agency initiatives with broad approaches to preventing and cleaning up groundwater contamination—such as the Wellhead Protection Program and the 1984 groundwater strategy—are not being effectively supported and integrated across program lines. Groundwater officials from five of the eight states that we contacted agreed with these findings, including one state official who said that EPA needed to protect groundwater as a whole, instead of using an approach that applies “band-aids” to particular sources of contamination. Another state official explained that a more comprehensive approach would allow states to focus limited resources on groundwater initiatives that address the greatest risks to human health and the environment.

EPA Management and Accountability Systems Have Not Effectively Tracked and Measured Progress in Preventing Groundwater Contamination

The 1988 DRA review of EPA's groundwater program also identified the lack of effective management and accountability systems as a barrier to implementing an effective groundwater protection agenda. The report noted that one problem resulting from the lack of such systems is that EPA program areas are not consistently setting joint groundwater protection priorities. The report stated that this, in turn, could lead to inefficient use of the agency's groundwater resources. The report also noted that without such systems, managers of various EPA programs have little incentive to give groundwater protection initiatives priority.

In addition to reinforcing a sense of accountability for achieving groundwater goals among program officials, the DRA report also noted that good management and accountability systems are needed to allow upper level management to track the activities and progress of various EPA programs in addressing and achieving specific groundwater protection objectives. To accomplish this, it stressed that EPA needed to develop administrative procedures to incorporate groundwater protection into the ongoing management processes and systems of the agency. These procedures would include conducting annual evaluations of progress made by both EPA and the states in implementing groundwater programs and a process for revising and replanning future efforts.

¹⁵EPA's regulatory programs have historically protected groundwater resources by addressing specific sources of contamination on a site-by-site basis, such as addressing contamination from a hazardous waste site, rather than taking a comprehensive approach to groundwater management that includes an assessment of the total impact of all sources of contamination on groundwater in a given area.

Most of the regional and state groundwater officials we interviewed agreed that effective management systems are needed at both the federal and state levels to get groundwater policies implemented. They also agreed that these systems are especially important for the groundwater program, since groundwater is competing for resources with other programs that have established environmental program indicators that can be used to measure program progress.

Current Balance of Limited Resources Stresses Remediation

Once groundwater is contaminated, it is extremely difficult and expensive to clean up. The Congressional Budget Office has estimated that it may cost over \$150 billion to clean up hazardous waste contamination at federal facilities over the next three decades. Additionally, EPA expects to spend \$40 billion cleaning up the 1,200 most dangerous abandoned hazardous waste sites across the country. Though the entire cost of remediating these sites cannot be attributed to cleaning up groundwater contamination, most of the sites have actual or potential groundwater contamination, and concern over groundwater contamination is one of the major factors used in ranking a site for remedial efforts.

Citing the difficulties and expense of cleaning up groundwater contamination after the fact, almost all of the state and EPA regional officials we interviewed agreed that EPA's priorities and resource allocations were too heavily weighted toward the remediation of groundwater contamination. Indeed, this view has also been expressed by other EPA officials in the past. In a May 1989 interview, for example, EPA's former Administrator, Lee Thomas, told us he believed more attention should be given to the prevention of groundwater contamination as opposed to remediation. He suggested that a better approach for addressing groundwater contamination may involve shifting limited resources from costly programs that correct identified problems to more cost-effective strategies that prevent groundwater contamination. Similarly, the 1988 DRA white paper concluded that a significant shortcoming of EPA's groundwater program was that EPA did not direct enough resources and attention to the prevention of contamination. The paper noted that a vast majority of the agency's resources are directed at remediation or cleanup after contamination has occurred.

Though there is only limited information on the costs of preventing groundwater contamination compared with the costs of cleaning up such contamination, EPA has estimated that the costs of implementing a prevention program, such as the Wellhead Protection Program, can be significantly less than the costs of some cleanup options, such as installing

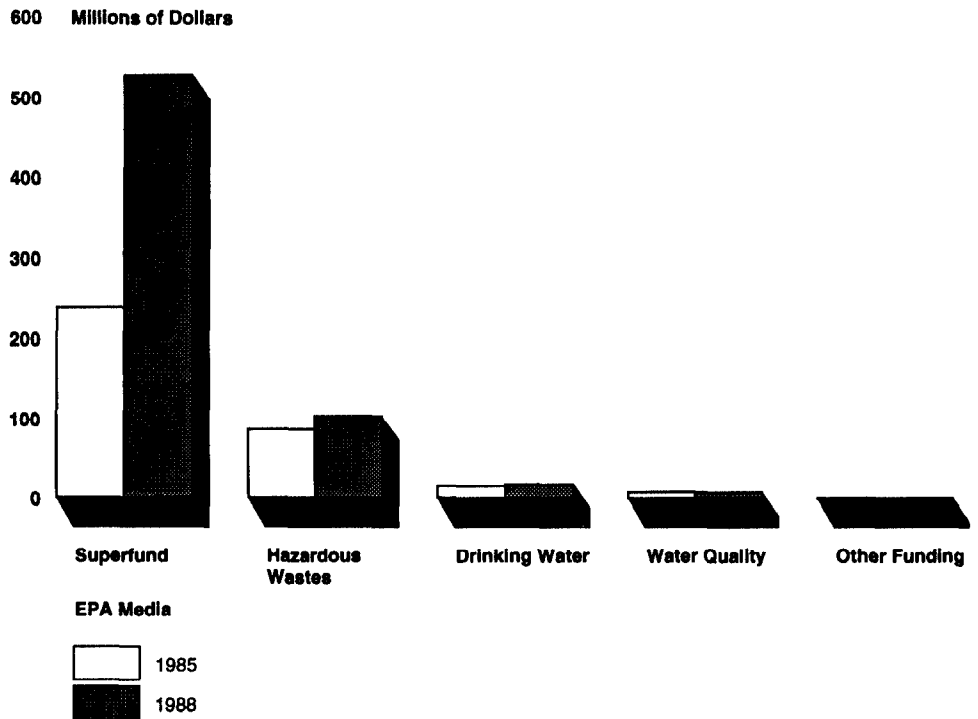
a new drinking water well. For example, a former acting Assistant Administrator for EPA's Office of Water testified before the Congress that some communities have implemented protection programs at approximately 5 to 10 percent of the costs of installing a new drinking water well.¹⁶ She explained that "in many cases, the cost[s] of operating a protection program are generally less than the cost of cleaning up a contaminated site or replacing public wells or wellfields." She specifically mentioned the town of Littleton, Massachusetts, which annually spends about \$100,000 to protect all five wells that supply the town of around 7,000 people with drinking water. She noted that if only one of the five wells were to become contaminated, it would cost the city \$1 million to develop a new well. Thus, the city would have to spend 10 times what it is currently spending on preventive measures to remedy a situation involving only 1 contaminated drinking water well.

Though EPA acknowledges the benefits of prevention, its allocation of resources between programs has consistently been weighted heavily toward remediation. In 1988, for example, EPA's senior budget officers for groundwater-related programs participated in an analysis of EPA's total investment in groundwater for fiscal years 1985 and 1988. The analysis, as shown in figure 2.1, indicated that EPA's overall investment in groundwater from fiscal year 1985 to fiscal year 1988 demonstrated an increasing orientation toward remediation. While EPA's Superfund program (a program that the Congress created in 1980 to clean up abandoned or uncontrolled hazardous waste sites, including sites with groundwater contamination) accounted for \$238.4 million, or 68.3 percent of the agency's total funding for groundwater programs in fiscal year 1985, its share increased to \$527 million, or 80.3 percent, in fiscal year 1988.

¹⁶Testimony of Rebecca W. Hanmer before the Subcommittee on Superfund, Ocean, and Water Protection, Senate Committee on Environment and Public Works, Aug. 1, 1989.

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Figure 2.1: Trends in Groundwater Resources by Media



Note: Extramural funding includes funds for contracts, grants, and cooperative agreements for pollution abatement, control, and compliance activities.

Source: EPA.

In contrast to the billions spent on cleaning up Superfund sites, one of EPA's primary programs for preventing groundwater contamination, the Wellhead Protection Program, has received a total of approximately \$10 million in federal funding since its inception in 1986 through fiscal year 1991. To provide perspective, this amount represents less than one-half of the current estimates of the average cleanup cost for only 1 of the 1,200 hazardous waste sites located across the country.

Other important groundwater programs with preventive approaches have also been substantially affected by limited funding. For example, an EPA official from the Office of Water's Office of Enforcement and Compliance Monitoring explained that another one of EPA's prevention programs, the UIC program, had not received any funding for a major

new initiative to regulate Class V wells.¹⁷ One state groundwater official from Texas also cited the lack of priority for Class V wells, noting that these wells probably pose the largest threat to groundwater in the state because the wells act as conduits for hazardous waste, allowing the waste to go directly into drinking water.

**Funding for Nonpoint
Source Pollution
Underscores Low Priority
for Prevention**

Our recent report on nonpoint source pollution has also cited questionable priority-setting as a factor contributing to inadequate progress in addressing nonpoint sources of contamination.¹⁸ This is important from a groundwater perspective because (1) nonpoint sources are primary contributors to groundwater contamination and (2) the only way to deal effectively with diffuse sources of nonpoint source pollution, such as pesticide contamination, may be through prevention.

Our October 1990 report on nonpoint source pollution also noted that EPA budgets have overwhelmingly emphasized water quality programs that control point source pollution, even though the agency's own analysis shows that nonpoint source pollution poses significantly higher ecological risks. We found, for example, that about 94 percent of EPA's fiscal year 1990 water quality funding was devoted to point source pollution control, while less than 6 percent was allocated to controlling nonpoint sources of pollution. EPA's proposed budget for fiscal year 1992 continues to deemphasize efforts to prevent nonpoint source pollution, as it reflects over a 50-percent cut in its nonpoint budget from fiscal year 1991 levels.

We further noted that these funding shortages accounted for the lack of progress in many elements of EPA's nonpoint source control program. Among the examples of slow progress that we cited was the lack of development of technical information to help states set standards for groundwater quality. The states need these standards to measure the impacts of groundwater contamination and the effectiveness of efforts

¹⁷EPA's UIC program establishes five classes of injection wells. Class V wells include those associated with activities, such as septic systems and agricultural and storm drainage, which may discharge directly into shallow aquifers and may cause groundwater contamination. The other classes of wells are used for disposing of various types of hazardous and nonhazardous wastes.

¹⁸See *Water Pollution: Greater EPA Leadership Needed to Reduce Nonpoint Source Pollution* (GAO/RCED-91-10, Oct. 15, 1990).

to deal with the problem.¹⁹ Accordingly, we had recommended in a previous report that EPA provide the needed technical information through a "criteria document program."²⁰ The agency responded, however, that such a program would be too costly in light of funding constraints and maintained that this need could instead be met by consolidating existing information regarding substances found in groundwater. We responded at the time that without the expanded information base that would be available through such a program, states are left to develop groundwater standards without needed information.

EPA's emphasis on point source groundwater-related programs also leads states to focus their own limited resources on remediating a select number of point sources of contamination, such as Superfund sites and other hazardous waste sites, rather than preventing a broader range of contamination problems. For example, an October 1989 Urban Institute study of state groundwater programs revealed that spills and cleanups invariably dominate and capture large percentages of state budgets. The study found that this problem is a reflection of what is happening at the federal level, where remediation overshadows prevention.

Conclusions

EPA has made some progress in preventing groundwater contamination through its support of state groundwater protection programs and through its efforts to identify and establish controls for most major point sources of groundwater contamination. However, its success in using its 1984 groundwater strategy to help states prevent groundwater contamination has been limited by a number of barriers.

First, EPA has been unable to fully coordinate groundwater-related policies and programs across the agency. This lack of coordination has led to inconsistent efforts by EPA program offices to implement initiatives to prevent groundwater contamination, and has prevented EPA from focusing resources in the most comprehensive manner to promote groundwater protection. In some cases, this lack of coordination has led to conflicting guidance to states from different EPA offices on groundwater standards and other groundwater-related issues. For example, EPA

¹⁹A 1989 report by the National Governors' Association made similar observations, noting that while EPA had made some progress in providing health risk guidelines for some agricultural contaminants, the limited number of guidelines complicated the efforts of many states to protect their groundwater. See *Managing Agricultural Contamination of Groundwater: State Strategies* (Washington, D.C.: National Governors' Association, 1989), p. 18.

²⁰See *Groundwater Standards: States Need More Information From EPA* (GAO/PEMD-88-6, Mar. 16, 1988).

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programs use different standards for cleaning up and protecting groundwater, which, in turn, can lead to varying degrees of protection of public health at the state and local levels.

Second, without management and accountability systems focused on the prevention of groundwater contamination, managers of various groundwater-related programs within EPA have generally given the problem low priority, opting instead to address issues for which their performance is being measured. In addition, EPA program areas are not setting joint groundwater protection priorities, which can lead to inefficient use of the agency's groundwater resources.

Finally, EPA's efforts to carry out basic program objectives have been hindered by the current balance of limited resources, which stresses remediation at the expense of prevention-oriented activities.

EPA's New Strategy Is Oriented Toward Prevention, but Underlying Barriers Will Continue to Hinder Its Implementation

In response to the DRA white paper and EPA's desire to review its progress in protecting groundwater, the agency established a task force to review and clarify its groundwater policy. The task force, formed in July 1989, was to develop an agencywide strategy for groundwater protection for the 1990s. In July 1991, it recommended a strategy that, among other things, attempts to deal with weaknesses of the 1984 strategy and stresses the need for an improved balance between remediation and prevention activities.¹

EPA is now taking steps to implement the new strategy, including plans to (1) establish mechanisms to improve coordination between and better integrate groundwater policy throughout all EPA programs with groundwater responsibilities and (2) incorporate its new approach into agency programs by improving its management and accountability systems. However, while EPA's actions represent a significant effort to improve the agency's groundwater program, the potential for success in preventing groundwater contamination through the new strategy is limited by certain persistent fundamental barriers.

On the basis of our review of the new approach and interviews with officials from EPA, state environmental offices, and state and environmental groups, a primary problem continuing to face EPA and the states is a continued focus of limited resources on remediation efforts (e.g., Superfund cleanups) at the expense of prevention-oriented activities.

To some extent, EPA and the states may be able to alleviate the funding shortfall through existing state groundwater-related grant programs. These include, for example, grant programs for nonpoint source pollution and drinking water protection. While it is unlikely that a large share of these funds could be redirected from their present uses, federal and state groundwater officials suggested to us that there may be some opportunities for shifting a portion of these groundwater-related grants to place a greater emphasis on preventing groundwater contamination.

¹Though EPA provided an "early release" version of the strategy during congressional testimony in early May 1991, the strategy was not finalized until July 1991.

EPA's New Strategy Emphasizes Prevention as Part of a More Comprehensive Approach to Groundwater Protection

EPA's new approach to protecting groundwater resources more clearly defines the agency's overall policy on protecting groundwater by including a new emphasis on preventing groundwater contamination and establishing a more comprehensive approach to groundwater protection. EPA's "Ground-Water Protection Principles" are intended to set forth an aggressive approach toward preventing groundwater contamination, including a commitment to achieve a better balance between preventive and corrective activities. The agency recognized the difficulty and great expense of cleaning up contaminated groundwater and has decided to emphasize pollution prevention where appropriate. In determining agency strategies for preventing groundwater contamination, EPA will continue to take into consideration the use, value, and vulnerability of groundwater resources, as well as the social and economic values of these resources. The agency plans to incorporate this approach into EPA policies, programs, and resource allocations which guide EPA, state, and local actions in protecting groundwater resources.

EPA also states that it is moving toward a more comprehensive approach to managing groundwater resources. This comprehensive approach involves assessing and addressing all potential causes of groundwater contamination within a specified area (including areas around public water wells or areas located over aquifers), as opposed to previous efforts, which focused on controlling specific point sources of contamination such as hazardous waste sites, underground injection wells, and underground storage tanks. According to the agency, while point sources of national significance have received a considerable amount of attention as a source of groundwater contamination, nonpoint and small dispersed sources of groundwater contamination may actually represent the greatest threat to drinking water supplies (and therefore human health) at the local level. Thus, EPA's new approach will more comprehensively address groundwater contamination by targeting both point and nonpoint sources of contamination.

Implementation of New Strategy

EPA's plan for implementing this new approach is based on the principle that states have the major responsibility for managing groundwater resources. Thus, EPA will continue to support the major state role in protecting groundwater by assisting state efforts to establish comprehensive state groundwater protection programs.² The comprehensive state programs, which will be built around current state groundwater protection activities and programs, will provide the groundwork for ensuring

²These programs will be referred to as "comprehensive state programs."

that all federal, state, and local groundwater protection activities are based on a common understanding of local priorities and groundwater conditions.

To establish comprehensive state programs, EPA plans to get state input on the agency's preliminary list of program elements needed to establish the state programs.³ Also, EPA plans to get state input on the criteria needed to determine an acceptable range of the elements needed to establish an adequate state program and on the procedures needed for EPA's review of state programs to determine whether they are adequate. Additionally, EPA regions are currently working with the states to develop profiles of state programs, identifying what additional elements the states need. All regional officials indicated that they are already developing or have completed such profiles. Part of EPA's review of the state programs will include determining whether the states have developed and implemented preventive elements of their programs, including whether the states have identified their most valuable and vulnerable groundwater aquifers, and evaluated or ranked their highest priority sources of groundwater contamination. During fiscal year 1992, EPA plans to work with the states to complete the state program profiles using the finalized state program elements and criteria as a baseline for determining whether a state's program adequately protects groundwater. To the extent authorized by EPA statutes and consistent with EPA program objectives, states that are considered to have adequate programs will then be given greater flexibility to establish their own policies, priorities, and standards for implementing EPA groundwater-related programs.

Additionally, starting in fiscal year 1994, EPA will use its determinations of program adequacy as a basis for allocating groundwater-related grant funding to the states. States that demonstrate exemplary progress toward developing adequate comprehensive programs will receive a greater share of the grants, while states showing little progress will receive reduced funding. As part of the current effort to fund the states, EPA regions are being asked to review an inventory of existing groundwater-related grants (see app. IV) and to coordinate these grant authorities with the goal of better assisting state efforts to identify and fill gaps

³EPA's preliminary list includes four main elements: (1) setting goals and documenting progress, (2) characterizing groundwater resources and setting priorities for action, (3) developing and implementing prevention and control programs, and (4) defining roles within a state and the relationship to federal programs.

in their comprehensive state programs. As an example of this coordinated funding, the Offices of Ground Water and Drinking Water and Pesticide Programs issued fiscal year 1991 grant guidance for funding provided through Clean Water Act and FIFRA grants to encourage states to develop plans to better manage pesticide use in their states.

EPA Efforts to Improve the Coordination of Groundwater-Related Policies and Programs

As part of its new strategy, EPA plans to take a number of steps to deal with the coordination problems identified in chapter 2. At the headquarters level, EPA plans to establish the Groundwater Policy Committee, which will work to coordinate groundwater policy across all EPA groundwater-related programs. This committee's major responsibilities will include overseeing the implementation of the strategy's groundwater principles into EPA programs and the implementation of the comprehensive state programs, as well as developing overall policy direction within EPA. This committee will report to EPA's Deputy Administrator and/or the Assistant Administrators and Regional Administrators on a semiannual basis.

One primary difference between this Groundwater Policy Committee and EPA's former Assistant Administrator/Regional Administrator Oversight Committee is that EPA plans to establish two agency implementation work groups that will work with the Groundwater Policy Committee to develop policy and program proposals for implementing the new approach. EPA plans to chair the work groups with selected representatives of EPA's Deputy Assistant Administrators, as well as key office directors and regional division directors or their representatives. The implementation work groups include a state programs implementation work group and a groundwater regulatory work group.⁴

The state programs implementation work group will work to incorporate state input into all of EPA's Groundwater Policy Committee activities. While the Assistant Administrator/Regional Administrator Oversight Committee had no such work group, EPA's Groundwater Policy Committee will use this work group as a mechanism for providing state input into the process of establishing comprehensive state programs. This work group will oversee the completion of the elements needed in the programs and the criteria for determining adequacy for each element, thus ensuring that state input is considered by the committee. Several state officials mentioned that EPA's establishment of a state programs

⁴EPA often refers to this regulatory work group as a groundwater "regulatory cluster implementation work group."

implementation work group will help to address state concerns, including how EPA will develop its final list of elements for the comprehensive state programs, what criteria EPA will include in its definition of an "adequate" program, and what happens to the states if they do not meet these criteria and thus, are deemed to have an inadequate state groundwater program. The state programs implementation work group will also work to ensure that EPA's groundwater-related programs are using annual operating guidance and grant guidance to support the development of comprehensive state programs.

EPA plans to use the groundwater regulatory work group as a forum for officials from EPA's groundwater-related programs to evaluate regulatory initiatives. This work group will assist the Groundwater Policy Committee by developing a work plan that will include identifying upcoming regulatory actions affecting groundwater and whether the actions involve cross-cutting issues that need resolution. Additionally, this work group is expected to help bring consistency to EPA's efforts in developing EPA regulations affecting groundwater and determining how actions in one program might affect the efforts of other programs.

Effective coordination between the numerous EPA program offices may be difficult. Nevertheless, while it is too early to determine the effectiveness of these efforts, the majority of the regional groundwater officials we interviewed believed the policy committee and regulatory work group would improve the coordination of EPA groundwater-related programs. However, a number of EPA officials, including the Director of OGWDW, stated that the success of new initiatives, such as the regulatory work group, were directly dependent on the amount of support they receive from EPA's upper management.

Barriers Will Limit EPA's Success in Implementing New Strategy

EPA is planning to improve its groundwater program by establishing the Groundwater Policy Committee and a variety of administrative mechanisms to improve the coordination of groundwater-related policies and programs and through its efforts to improve its management and accountability systems. These steps are reorienting groundwater protection efforts toward a more preventive approach. However, EPA continues to face some of the same fundamental barriers that have inhibited progress thus far in preventing groundwater contamination.

A primary barrier, as identified by a large majority of state and regional groundwater officials, is that available funds continue to be oriented heavily toward remediation activities, primarily Superfund cleanups,

rather than prevention activities. In addition, state and regional officials told us that several problems complicate efforts to use a significant portion of groundwater-related state grant funding, including the numerous demands on the funding that may preclude its use for groundwater protection. Among other things, the limited availability of resources will hamper the agency's ability to provide additional financial and technical assistance to help the states establish comprehensive state programs. Limited resources will also hamper EPA's ability to develop the groundwater data needed for EPA's management and accountability systems to effectively measure and track progress in protecting groundwater.

EPA's New Approach
Includes Plans to Improve
Management and
Accountability Systems

EPA's new approach also includes plans to improve its management and accountability systems, including efforts to (1) better incorporate the regions and states in the annual planning and evaluation of groundwater activities into all EPA programs; (2) modify the agency's accountability systems, such as the Strategic Targeted Activities for Results System (STARS), to provide greater incentives to EPA program managers to incorporate groundwater into program priorities; and (3) encourage the states to provide groundwater data that could be used to better track and measure the nation's progress in protecting groundwater. However, while these efforts are an improvement over past efforts, delays in completing the new approach and the limited availability of resources needed to implement it will hamper the agency's ability to improve its management and accountability systems.

EPA Efforts to Improve Annual
Planning and Evaluation of
Groundwater Activities

EPA's new approach includes plans to better incorporate regional and state officials' input into EPA's annual planning and evaluation of groundwater activities. First, the agency plans to establish groundwater coordinating committees in each region to better integrate the regions and states into EPA's efforts to plan and evaluate activities in the groundwater area. Each committee will be chaired by the DRA and include key regional division directors. The main purpose of the committees will be to review all activities of EPA groundwater-related programs to determine how these programs might contribute to the development of comprehensive state programs. The reviews would include evaluating individual EPA program funding available for implementing the comprehensive state programs and regular annual evaluations of state, regional, and headquarters progress in implementing these state programs.

Additionally, EPA will work to establish an integrated state/EPA planning process in order to reach agreement on specific tasks and milestones for

developing and implementing comprehensive state programs. EPA regions are currently conducting the first part of this process through their efforts to conduct "profiles" of state programs. These profiles will help identify gaps in current state groundwater programs. Once these gaps are identified, the regions are to assist the states in filling these gaps.

Finally, as noted above, EPA's state programs implementation work group will work to ensure that EPA's groundwater-related programs are supporting the development of comprehensive state programs through annual operating guidance and grant guidance. This guidance helps to incorporate EPA's priorities into the agency's groundwater-related programs. Additionally, this work group is to help develop a budget strategy for supporting state groundwater-related needs and priorities within EPA's programs.

While all regional groundwater officials generally indicated to us that these efforts are an improvement over past efforts, some of the officials were concerned that delays in completing the new approach limited EPA's ability to incorporate a prevention emphasis into its current planning. Though the new strategy was originally expected to be issued by the end of 1990, it was not finalized until July 1991. One regional official explained that since the report was not completed prior to the region's release of state grant guidance, the region was unable to incorporate the report's recommendations into its funding guidance for fiscal year 1992. EPA has acknowledged that its inability to complete its new approach has limited its efforts to implement funding changes into fiscal year 1992. To rectify this situation, the agency plans to make mid-year amendments of regional grant agreements with the states and to provide technical assistance to promote the implementation of the new approach in fiscal year 1992. However, according to an OGWDW official, as of late September 1991, no regional grant agreements with the states had been amended.

EPA's New Strategy Plans to Incorporate a Shift in EPA's Accountability Systems

As part of its new approach to groundwater protection, EPA is planning to shift the emphasis in its STARS targets by changing EPA's process for setting priorities and by providing flexibility in adjusting the measures of performance for programs by 1993. As indicated earlier, STARS is EPA's primary management tool for establishing accountability for achieving key program objectives among program managers. This change reflects an attempt to better manage groundwater by assessing all potential sources of contamination and then prioritizing efforts to control the worst sources. As part of this effort, EPA included STARS measures for the

groundwater program in the Office of Water's fiscal year 1992 operating guidance that call for strengthening states' capabilities to develop and implement comprehensive state programs. The measures report progress in two areas: (1) EPA regional activities that help regional programs coordinate their efforts to support the states' groundwater programs and (2) state progress in moving toward the development and implementation of these programs. However, these new STARS measures have not been translated into targets for which EPA regional offices are held accountable. Since the comprehensive state programs are largely preventive in nature, these new STARS measures could, if translated into targets, help to increase program office and regional accountability for incorporating preventive activities into states' groundwater programs.

However, almost all of the state and regional officials we interviewed indicated that while redesigning STARS to achieve groundwater goals was desirable, the success in achieving these goals was still dependent on the availability of resources to pursue them. They stated that EPA was not providing the necessary budget and other resources needed to implement the new approach, and noted further that limited financial/staff resources and low priority in the past have been a major cause of EPA's lack of progress in its groundwater program.

EPA Plans to Request Additional State Groundwater Data

EPA's 1991 guidance for the 1992 reporting process under section 305(b) of the Clean Water Act encourages states to submit additional groundwater data as part of their 1992 reporting to the agency. Section 305(b) of the Clean Water Act requires that all states, on a biennial basis, develop and report information concerning the quality of their water resources to the EPA Administrator. Section 106(e)(1) of the Clean Water Act designates that groundwater quality information is to be included in these section 305(b) reports. EPA then summarizes this information into a report which describes the status of the nation's water quality and submits it to the Congress in a biennial report called the National Water Quality Inventory.

As we reported in August 1988, such environmental measures, along with measures of program activities, are essential for managing environmental programs because they (1) provide a means of assessing progress in meeting program objectives, (2) help allocate scarce resources, (3) serve as part of the agency performance and accountability system, (4) supply the basis for improving productivity, and (5) identify areas to

target resources and marshal support for current programs and new or increased initiatives.⁵

EPA's 1986 Ground-Water Monitoring Strategy acknowledged the importance of establishing environmental measures to evaluate trends in groundwater quality. As a result, in April 1989, the agency developed five indicators of groundwater quality which could be used for tracking progress and setting priorities in its groundwater program. The indicators include, among others, maximum contaminant levels, which serve as a measure of (1) the quality of groundwater that is used for public drinking water supplies, (2) the effectiveness of groundwater protection regulatory programs, and (3) the population put at risk by contaminated supplies. A second indicator, nitrate levels in groundwater, can be used to show potential areawide contamination from agricultural sources and septic systems. As EPA's guidance on the Clean Water Act's section 305(b) reporting process for 1992 indicates, EPA is requesting that states report this additional groundwater data as part of the Clean Water Act's section 305(b) requirements. EPA can use these types of indicators to establish a baseline for groundwater quality which can then be used to measure trends and determine progress in protecting the resource.

However, given the effect of resource constraints on states' monitoring capabilities in the past, it is questionable whether the states will be able to supply comprehensive and reliable data, pursuant to this new request. As we recently reported, states have been unable to assess the water quality of 71 percent of the nation's miles of rivers and streams because they lacked the staff and financial resources necessary to adequately monitor all their waters.⁶

EPA Efforts to Increase Financial and Technical Assistance Will Likely Be Insufficient

EPA's new groundwater strategy contains initiatives for increasing financial and technical assistance to help the states implement comprehensive state programs. These initiatives include helping the states better utilize existing groundwater-related grants, targeting a portion of the existing groundwater research and development resources to preventing contamination, and improving groundwater data management. Although EPA's efforts may help to better utilize existing EPA groundwater resources,

⁵See Environmental Protection Agency: Protecting Human Health and the Environment Through Improved Management (GAO/RCED-88-101, Aug. 16, 1988).

⁶See Water Pollution: Stronger Efforts Needed by EPA to Control Toxic Water Pollution (GAO/RCED-91-154, July 19, 1991).

there are concerns about the agency's ability to provide the resources needed to protect groundwater.

As part of EPA's efforts to encourage the states to develop and implement comprehensive state programs, EPA regions are conducting profiles of state programs to identify gaps in the programs and then looking for ways to provide technical and financial assistance to help fill these gaps. According to the task force report, EPA assistance to the states will come from better utilization of existing groundwater-related grants, rather than from new funding, and from better utilization of the agency's existing technical capabilities. For example, the report explains that by better utilizing the data in the geographic information systems (GIS)⁷ used by the regions and providing the states with improved access to this information, EPA hopes to improve the overall use of these data in decisionmaking. Combining this information would help to comprehensively manage and assess the quality of groundwater over a large geographic area.

In addition, EPA is attempting to better target some of its current research and development resources to groundwater prevention. For example, the task force report states that EPA's Office of Research and Development (ORD) has targeted two key research areas that will support the preventive efforts of EPA programs and provide technical information needed by the states. First, in September 1988, ORD entered into a 5-year agreement with EPA's Office of Water to help support state wellhead protection programs. ORD agreed to concentrate on four research priorities, such as developing groundwater-monitoring strategies for the state wellhead protection programs, including defining the best designs for state efforts in groundwater monitoring and sampling. Second, ORD is identifying data that will help establish a framework for the states and localities to use in developing pesticide management plans. This framework will include information such as the evaluations of all likely combinations of pesticides; models which predict how pesticides move through the soil; and GIS, for displaying and analyzing spatial information.

Furthermore, the new strategy outlined in the groundwater task force report includes recommendations for improving groundwater data availability to, accessibility by, and utilization by EPA, other federal agencies, states, and localities. For example, in the area of data collection, the report recommends that EPA concentrate on improving the consistency of

⁷The GIS is used by EPA regions to prioritize potential sources of groundwater contamination.

the groundwater data collected, its quality, how it is managed, and its dissemination. To make data more accessible to all users, the report recommends that EPA explore ways to develop an automated format for collecting specific types of data, including potential sources of groundwater contamination and monitoring data. The task force report acknowledges that, at the present time, no resources are available to implement these groundwater data management recommendations and states that EPA is making plans to secure this funding in the future.

Although EPA's efforts should help to better utilize existing groundwater resources, all of the regional officials we interviewed expressed concerns about the agency's ability to provide the resources needed to protect groundwater. One primary concern of some of the officials is that the magnitude of resources needed by state and local governments to prevent groundwater contamination is far greater than the resources available to deal with it. As an example, the \$2.5 million in grant funding available to the states in fiscal year 1990 for developing Wellhead Protection Programs represents an average of \$50,000 for each state. One state groundwater official commented that conducting detailed mapping of the aquifers in each water utility's jurisdiction (which represents only one of seven elements needed to establish a Wellhead Protection Program), would cost \$200,000 to \$300,000. The official added that since the corresponding state regulations would be carried out locally, these costs would be borne by the local governments, which can not afford them.

Balance of Limited Resources Continues to Stress Remediation

A major reason for continued funding problems in programs designed to prevent groundwater contamination is the likelihood that groundwater activities will continue to be oriented heavily toward remediation activities (primarily Superfund cleanups) rather than prevention activities. As noted in chapter 2, remediation of Superfund sites has absorbed an overwhelming and growing share of the federal funds spent on groundwater-related activities. Though EPA has not updated that analysis, indications are that groundwater activities continue to be heavily oriented toward cleanups. For example, EPA's proposed Superfund budget for fiscal year 1992 includes an increase of \$133.8 million (8.3 percent) over the fiscal year 1991 budget. In comparison, the proposed 1992 budget for one of the primary programs for preventing groundwater contamination, the Wellhead Protection Program, increased by \$75,000, or 3.7 percent, to approximately \$2.1 million.

Additionally, the majority of regional and state officials we interviewed expressed concerns that while EPA's new approach stresses an increased emphasis on prevention, it is not accompanied by a meaningful shift of funding priorities from remediation to prevention. One state official commented that without a shift in current funding, the new approach would become a paper exercise "just like the 1984 groundwater strategy." The majority of state officials did not believe that EPA was making the prevention of groundwater contamination a major funding priority. Several state and regional officials were concerned that the funding for the new approach was not additional funding, but rather funding derived from current groundwater programs. One state official explained that this was a concern because funding from one groundwater program with a preventive orientation (such as the UIC program) might be cut to provide funding for other preventive programs.

Though the agency's overall funding is oriented toward remediation, EPA is attempting to reorient a small portion of funding for preventive efforts. Starting in fiscal year 1991, the agency awarded funds totaling \$11.8 million per year for a 2-year period for 25 projects intended to stimulate new initiatives in pollution prevention. EPA made the funds for this one-time competitive grants process available by taking 2 percent of the agency's fiscal year 1991 extramural funding (excluding Superfund, construction grants, and state grants) and then allowing all EPA offices to submit proposals to compete for the funding. However, while the list of pollution prevention projects did include a project specifically targeted toward preventing groundwater contamination, which is a project to help the states develop plans for managing pesticides, the overall focus of the projects was to stimulate creative approaches to pollution prevention for all environmental media.

Thus, while EPA has undertaken minor initiatives to promote the prevention of groundwater contamination, and has indicated a desire to do more, it appears that funding constraints will substantially limit any real progress in this area. A major contributor to this problem is a continued and overwhelming emphasis within the agency on remediation as opposed to prevention. This emphasis does not appear to be changing, as the majority of EPA regional and state groundwater officials we interviewed expressed concerns that preventive activities continue to be underfunded.

EPA May Be Able to Reorient Some Grant Programs to Help Prevent Groundwater Contamination

To some extent, EPA, in cooperation with the states, may be able to exercise some options to help address state groundwater resource problems. States implement a variety of grant programs that may be used to protect groundwater resources. For example, appendix IV lists an inventory of groundwater-related grants that EPA has identified as potential funding sources for assisting the states in developing and implementing comprehensive state groundwater programs—programs that in many cases could be used to augment preventive activities. The inventory, which totaled approximately \$355 million in funding for fiscal year 1991, includes grant programs for nonpoint source management, public water system supervision, underground injection control, and pesticide enforcement programs.

State and regional officials told us that several problems complicate efforts to use a significant portion of these funds to prevent groundwater contamination. In particular, many of the officials noted that while some of these funds are ostensibly available for groundwater protection, the numerous demands on the funding may preclude their use for this purpose. For example, one regional official explained that the public water system supervision grants, used to implement state drinking water programs, are currently underfunded and will become more so as the states use them to meet new legislative requirements.⁸ Thus, he concluded, new initiatives to prevent groundwater contamination would receive low priority in this program. The following are among the other complicating factors cited by EPA and state officials:

- In some cases, grant funds that could be available for preventing groundwater contamination may be precluded from being used for this purpose by inflexible grant guidance. In such cases, specific uses may be required for the funds that do not accommodate an individual state's specific groundwater needs.
- Some of the funds under these programs that could be used for preventing groundwater contamination are often focused on remedial efforts. For example, an EPA-sponsored assessment of state groundwater strategies, conducted by the Urban Institute, found that while almost all of the strategies stated that a prevention-based approach to groundwater contamination was preferable to remediation, states' priorities were often established by the perceived need to address cleanups. The report further noted that the problem was a reflection of the priorities set at the federal level, where remediation overshadows prevention.

⁸The funding for these grants represents \$47.5 million, or 13 percent of the total funding for all groundwater-related grants listed in EPA's inventory.

Nevertheless, our discussions with these officials suggest that there may be some opportunities for shifting a portion of these groundwater-related grants to place a greater emphasis on preventive activities. Such a shift would not involve a major restructuring of funding for state groundwater-related activities, yet it could help states to implement more preventive groundwater protection programs. This type of reorientation could occur as an outgrowth of EPA's ongoing effort to identify groundwater-related grants programs that can help support state comprehensive groundwater protection programs. On the basis of our conversations with state groundwater officials, and particularly in light of the fact that each state's funding needs may be unique, we believe EPA should work with the states to identify ways in which at least some of the existing groundwater-related grant programs can be used to assist state efforts to provide a greater emphasis on preventive activities.

Conclusions

EPA's new approach outlines the agency's strategy for groundwater protection through the 1990s. Additionally, it attempts to address weaknesses identified in EPA's 1984 groundwater strategy. For example, the strategy more clearly defines EPA's overall policy on protecting groundwater by including a new emphasis on preventing groundwater contamination. It also establishes a more comprehensive approach to groundwater protection, which includes efforts to emphasize preventive elements of comprehensive state programs.

The new approach also includes plans to establish several mechanisms to improve coordination and better integrate groundwater policy across all EPA program offices with groundwater responsibilities. We believe these are important steps in the right direction.

EPA is also planning to incorporate its new approach to groundwater protection into agency programs through improved management and accountability systems. These improved systems would better incorporate the regions and the states in the annual planning and evaluation of groundwater activities, provide EPA program managers with greater incentives to incorporate groundwater initiatives into their program priorities, and better track and measure the nation's progress in protecting groundwater.

Nevertheless, while these improvements represent significant progress for the agency, they do not address more fundamental barriers to the success of the groundwater program. EPA regional and state officials

identified an overemphasis of limited funds on remediation activities at the expense of prevention as a problem facing EPA and the states. For example, this overemphasis may limit EPA's ability to develop the environmental measures needed for its management and accountability systems to effectively measure and track progress in protecting groundwater, thus limiting the agency's ability to evaluate the effectiveness of its environmental activities and programs.

We believe that EPA should work with the states to identify opportunities to shift groundwater-related grant funding in order to place more emphasis on preventive aspects of comprehensive state groundwater programs. Such a reorientation need not radically change the manner in which state groundwater-related funds are used, yet it could help the states implement at least some key preventive activities that have thus far had little impact because of funding shortages.

In addition, EPA should work with the cognizant authorizing and appropriations committees in its 1993 budget process to reorient funding priorities to provide a greater emphasis on preventing groundwater contamination. Congressional consultation would be particularly important for programs for which additional legislative authority might be required to transfer funding toward preventive activities.

Recommendation to the Administrator, EPA

To promote an improved balance between prevention and remediation in state groundwater-related programs, we recommend that the Administrator, EPA, work with the states to develop ways in which some of their existing groundwater-related grant programs can be reoriented to provide greater emphasis on preventive activities. Where congressional approval is needed, EPA should work with the cognizant authorizing and appropriations committees in the 1993 budget process to reorient funding priorities to provide greater emphasis on preventive activities.

Matter for Congressional Consideration

Because of the heavy emphasis of EPA resources devoted to remediation activities and the need to shift groundwater-related resources toward prevention activities, the Congress may wish to consider providing greater emphasis on preventive groundwater-related activities as it considers funding for EPA's groundwater-related programs during the 1993 budget process.

EPA Statutory Authorities With Groundwater Protection Provisions

Resource Conservation and Recovery Act	<ul style="list-style-type: none">• Provides the authority to prevent hazardous wastes from leaching into groundwater from hazardous waste facilities and sources such as municipal landfills, impoundments, and underground storage tanks.
Comprehensive Environmental Response, Compensation, and Liability Act, or Superfund	<ul style="list-style-type: none">• Provides the authority to clean up abandoned hazardous waste sites that present a major threat to human health or the environment.
Federal Insecticide, Fungicide, and Rodenticide Act	<ul style="list-style-type: none">• Provides the authority to control the availability and use of harmful pesticides, including those with a potential to leach into groundwater.
Toxic Substances Control Act	<ul style="list-style-type: none">• Provides the authority to control the availability and use of harmful toxic substances, including those with a potential to contaminate groundwater.
Safe Drinking Water Act	<ul style="list-style-type: none">• Provides the authority for (1) setting and enforcing drinking water standards for surface and groundwater public drinking water supplies, (2) controlling underground injection practices, and (3) establishing state wellhead protection programs.
Clean Water Act	<ul style="list-style-type: none">• Provides authority for federal grant programs to assist states in developing groundwater protection strategies and nonpoint source pollution programs.

EPA Offices With Groundwater Responsibilities

Office of Solid Waste and Emergency Response

- Office of Emergency and Remedial Response. Implements the Superfund program to clean up abandoned hazardous waste sites posing a threat to human health and the environment, including groundwater.
- Office of Solid Waste. Regulates a variety of waste-related sources of groundwater contamination under the Resource Conservation and Recovery Act (RCRA), including landfills. Regulates the transport, treatment, storage, and disposal of hazardous wastes under RCRA which have the potential to contaminate groundwater.
- Office of Underground Storage Tanks. Implements a program under RCRA to prevent groundwater contamination from underground storage tanks.
- Office of Waste Programs Enforcement. Enforces the Superfund and RCRA programs and inspects RCRA-regulated facilities for compliance with regulatory requirements, including those for groundwater monitoring.

Office of Pesticides and Toxic Substances

- Office of Pesticides Programs. Regulates the use and availability of pesticides with the potential to leach into groundwater and implements EPA's Pesticides and Groundwater Strategy.
- Office of Toxic Substances. Regulates the use and availability of toxic substances with a potential to contaminate groundwater under the Toxic Substances Control Act.

Office of Water

- Office of Ground Water and Drinking Water. Oversees implementation of EPA's 1984 Groundwater Protection Strategy; implements the Wellhead Protection Program, Sole Source Aquifer Program, and Sole Source Aquifer Demonstration Program under the 1986 Amendments to the Safe Drinking Water Act (SDWA); implements the groundwater strategy grant program and portions of the nonpoint source program under the Clean Water Act; implements the Underground Injection Control Program, which is designed to protect underground sources of drinking water from contamination by injection wells; implements the Public Water Supply Program under the SDWA, which includes setting and enforcing primary and secondary drinking water standards and water supply monitoring requirements for both groundwater and surface water.

Office of Policy Planning and Evaluation

- Undertakes special projects to support the agency's groundwater policy-making and provides policy and economic expertise during program development.

**Appendix II
EPA Offices With
Groundwater Responsibilities**

**Office of Research and
Development**

- Conducts a wide variety of research projects to support EPA's regulatory development, including research on groundwater monitoring, fate and transport of groundwater contaminants, aquifer restoration, technical assistance, source control, and health effects.

Other Major Federal Agencies' Roles in and Responsibilities for Groundwater Protection

Department of the Interior

- U.S. Geological Survey. Maps and characterizes principal aquifers and groundwater usage across the country, collects and analyzes hydrogeologic information, and conducts research on the fate and transport of organic and inorganic chemicals, and on the hydrology and hydraulics of groundwater.
- Bureau of Land Management. Inventories hazardous waste sites and manages groundwater resources on public lands.
- Bureau of Reclamation. In coordination with EPA and the U.S. Geological Survey, conducts a groundwater recharge project and analyzes impacts of Bureau of Reclamation projects on groundwater quality and quantity.
- National Park Service. Conducts groundwater-monitoring studies at national parks.
- Fish and Wildlife Service. Inventories hazardous waste sites on all Fish and Wildlife Service lands and facilities.
- Bureau of Indian Affairs. Inventories hazardous waste sites on or near Indian reservations.

Department of Agriculture

- Soil Conservation Service. Develops detailed soil maps used in groundwater protection efforts and develops best management practices for preventing groundwater contamination by pesticides and livestock operations.
- Extension Service. Provides general education programs to farmers on the importance of groundwater and the effects of agricultural chemicals on its quality.
- Forest Service. Conducts research projects on the fate and transport of pesticides.
- Economic Research Service. Conducts research on the relationship between pesticide and nitrate use, cropping patterns, and groundwater contamination.
- Agriculture Research Service. Conducts research on the fate and mobility of fertilizers and pesticides in the environment and on their impacts on groundwater quality. Also, conducts research on strategies for managing chemicals to minimize groundwater contamination.

Department of Energy

- Operates programs for identifying, regulating, and decommissioning contaminated nuclear materials storage and processing facilities, as well as conducting site-specific hydrogeologic investigations.
- Conducts research on the fate and transport of energy-related organic and inorganic chemicals and radionuclides.

**Appendix III
Other Major Federal Agencies' Roles in and
Responsibilities for Groundwater Protection**

Department of Defense

- Identifies and evaluates hazardous waste disposal sites on military installations and undertakes remedial action.
- Develops water quality criteria for certain munitions compounds.
- Assists EPA in the cleanup of designated Superfund sites on military installations.

**Department of Housing
and Urban Development**

- Conducts environmental assessments, which consider groundwater, for housing projects.

**National Science
Foundation**

- Conducts policy-related research projects and diverse hydrogeology projects.

**Nuclear Regulatory
Commission**

- Conducts research on the fate and transport of radioactive substances and regulates source and by-product material from uranium recovery operations.

EPA's Groundwater-Related Grants

Statutory Authority	Match ^a	ELIGIBLE ACTIVITIES	LIMITATIONS	FY91 & APPROPRIATION
CLEAN WATER ACT				
106	None	<u>General:</u> Prevention & abatement of surface & ground-water pollution. <u>Specific:</u> Permitting, pollution control studies, planning, surveillance & enforcement, assistance to locals, training, & public information.	Allotment based on extent of pollution problem, not the quality of the State program. No authorization ceiling in FY91.	\$81.7 million (Ground-water portion: \$12.2m)
104(b)(3)	None	<u>General:</u> Pollution prevention, reduction, & elimination programs. <u>Specific:</u> Research, experiments, training, demonstrations, surveys, studies, investigations.	Not for program operation.	\$16.5 million
205(g)	None	Delegated administration of construction grants program, 402 or 404 permit program, 208(b)(4) planning program, & construction grants management for small communities.		0 (Congress cut off funding)
205(j)(1) 604(b)	None	Develop water quality management plans.	Not for implementation; 40% to regional comprehensive planning agencies.	0 \$16 million
205(j)(5) 201(g) (1)(b)	None	Develop & implement nonpoint source management programs.	201(g)(1)(b): Construction grant deobligations and reallocation funds available.	0 (Congress cut off funding)
319(h)	40%	Implement nonpoint source management programs.	No more than 15% of total available to any one State Financial assistance for demonstrations only (cannot be used for cost sharing programs). Limits on administrative costs.	\$51 million
319(i)	50%	Carry out ground-water protection activities	\$150K per State.	See 319(h)

Appendix IV
EPA's Groundwater-Related Grants

Statutory Authority	Match ^a	ELIGIBLE ACTIVITIES	LIMITATIONS	FY 918 APPROPRIATION
FEDERAL INSECTICIDE, FUNGICIDE AND RODENTICIDE ACT				
23(a)(1)	15%	<u>General:</u> Implement pesticide enforcement programs.		\$26.8 million (Ground-water portion: \$5m)
TOXIC SUBSTANCES CONTROL ACT				
28	25%	<u>General:</u> Establish & operate toxics control programs. <u>Specific:</u> Monitoring analysis, surveillance & general program activities (currently used for asbestos & SARA Title III activities).	Authorization expired in 1982. Appropriations committees should be notified before funds are used for new ground-water program.	\$8.1 million
RESOURCE CONSERVATION AND RECOVERY ACT				
3011	25%	<u>General:</u> State hazardous waste management programs. <u>Specific:</u> Planning for hazardous waste treatment, storage & disposal facilities.		\$83 million
SAFE DRINKING WATER ACT				
1443(a)	25%	Public water system supervision; State drinking water programs.	Funds available only to States with primacy.	\$47.5 million
1443(b)	25%	<u>General:</u> Underground injection control programs. <u>Specific:</u> Program costs, inventories, data management, technical assistance, etc.	Funds available only to States with primacy.	\$10.5 million
COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION & LIABILITY ACT				
104(b)	10%	<u>General:</u> Superfund activities under core program cooperative agreements. <u>Specific:</u> Implementation, coordination, enforcement, training, community relations, site inventory and assessment, administration of remedial activities, legal assistance relating to CERCLA implementation.	Not for site-specific activities.	\$14 million

Note: M = million.

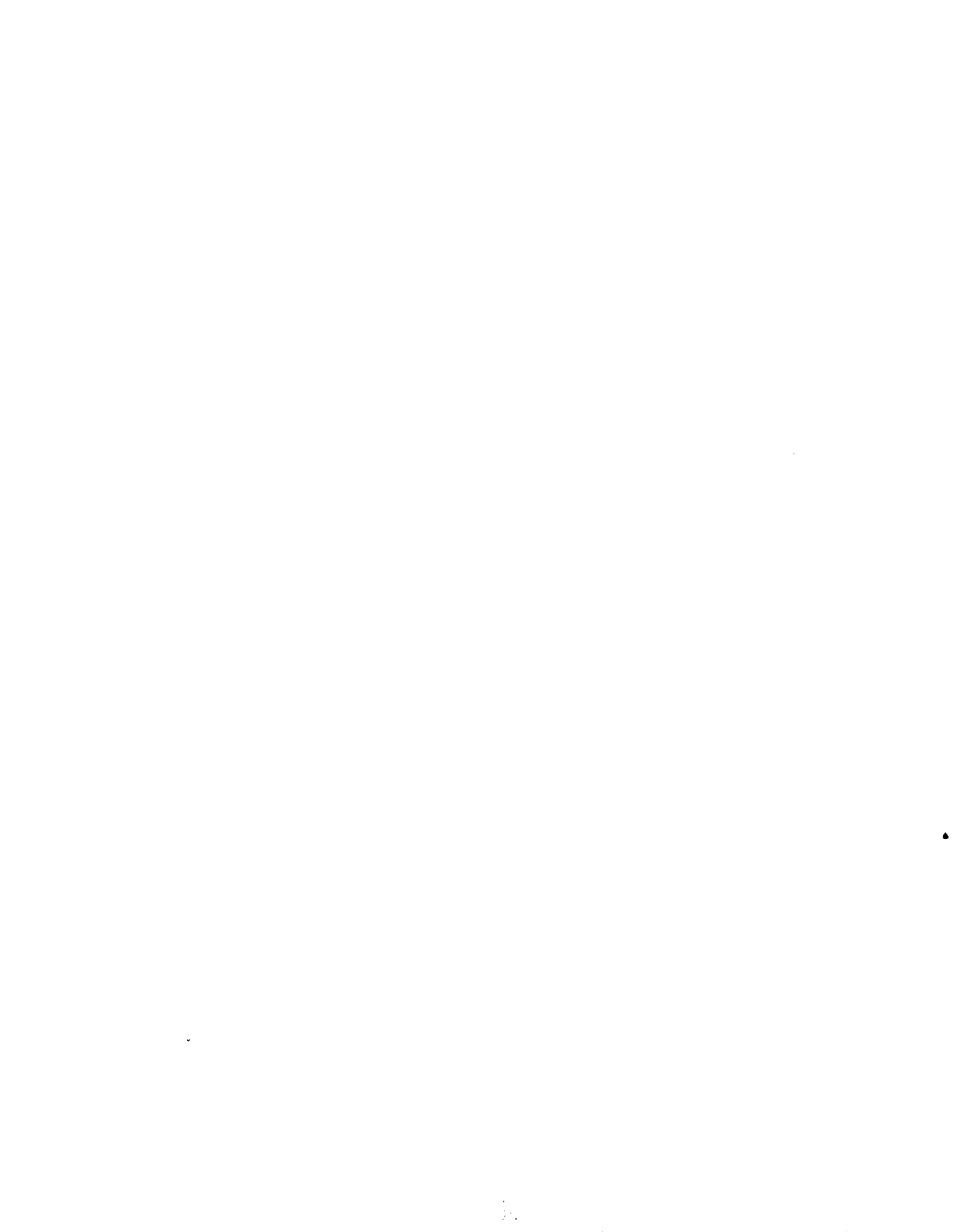
^aRequired state match.

Source: Protecting the Nation's Ground Water: EPA's Strategy for the 1990s (The Final Report of the EPA Ground-Water Task Force).

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