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ENVIRONMENTAL PROTECTION AGENCY

Protecting Human Health and the Environment Through Improved Management

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

This report on the Environmental Protection Agency is one of a series of GAO management reviews of federal departments and agencies. Our purpose was to assess the agency's management, analyze problems and determine their underlying causes, and recommend actions to improve the management of environmental programs. The report illustrates how the agency can improve its management to achieve measurable environmental results, establish a more effective partnership with the states, better manage information resources to support policy and program goals, develop a modern financial management system, and address future environmental challenges.

We are sending copies of this report to the Administrator, Environmental Protection Agency; the Director, Office of Management and Budget; interested congressional committees and subcommittees; and individual members.

This work was performed under the direction of Sarah F. Jaggar, Associate Director. Other major contributors are listed in appendix V.

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Comptroller General
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Executive Summary

Purpose

The Environmental Protection Agency (EPA) operates in a highly technical and controversial arena. Its policies and programs affect virtually all segments of the economy, society, and government. Charged initially with cleaning up pollution of the environment, with early emphasis on air and surface water, its tasks have become increasingly complicated as we understand more about the dangers and pervasiveness of toxic wastes and pesticides in the environment. The more recent emergence of radon, global warming, stratospheric ozone depletion, and indoor pollution as matters of environmental and health concern suggests that the scope and complexity of the agency's responsibilities will continue to increase.

Against this background of evolving roles and responsibilities, GAO reviewed EPA's management to identify ways the agency might improve its operational effectiveness and provide the leadership essential to ensuring a clean and healthful environment.

Background

To better marshall and coordinate federal pollution control efforts, EPA was created in 1970 by executive reorganization from various components of other agencies. The agency is generally organized around the media and substances it regulates—air, water, land, hazardous wastes, pesticides, and toxic substances. Ten regional offices coordinate federal activities with state and local officials. EPA's estimated fiscal year 1988 budget is about $5 billion, supporting over 14,000 workyears. In addition, states have assumed an increasingly important role, having been delegated operational responsibility for implementing most EPA programs.

Results in Brief

Faced with budgetary constraints and growing responsibilities, EPA has launched a number of important initiatives intended to increase its management and operational effectiveness. These include (1) managing programs and activities with emphasis on achieving measurable environmental results, (2) establishing more effective working arrangements with the states, EPA's key partners in implementing environmental programs, and (3) obtaining improved financial, management, and programmatic information to better set priorities, administer programs, and assess progress.

Although these initiatives are underway, GAO identified problems that, unless resolved, will hinder the agency's ability to effectively implement them. Specifically, EPA should accomplish the following:

- Fill important gaps in its efforts to manage for environmental results. For example, (1) priorities need to be stated in measurable terms and then ranked, so that the most pressing issues receive the most attention, (2) the planning process needs to be linked more directly to budget decisions, so that it has a greater impact on allocation of limited budgetary resources, and (3) EPA's ability to measure environmental program benefits needs improvement, to further help the agency identify the most efficient use of its resources.
- Establish a more effective partnership with the states. GAO makes recommendations to deal with a number of long-standing concerns in EPA's relationship with the states, such as, appropriate division of roles and responsibilities. In light of EPA's past difficulties in dealing comprehensively with these problems, GAO also offers a new proposal, "recertification," for consideration by the Congress, EPA, and the states.
- Support policy and program goals through better management of information resources and develop a modern financial management system with strong management support.

Principal Findings

Manage for Measurable Environmental Results

The EPA Administrator's resolve to manage the agency's resources to achieve measurable environmental results is based on a recognition that environmental problems are both complex and interconnected. For example, the process of removing contaminants from public sewage systems or industrial smokestacks can create sludge and waste that themselves can be toxic and lead to further air, water, or land pollution. Thus, EPA must have the best possible information on the nature of environmental problems and the effectiveness of measures taken to deal with them. It also needs to use such information in allocating limited resources where they will do the most good—to those problems that pose the greatest risk and are most amenable to remedy.

EPA management has worked to communicate and implement the Administrator's initiative, but the agency is challenged by the long-term nature of the solutions to its efforts and the differing legislative requirements for addressing environmental concerns. A number of problems also need resolving if the agency's way of carrying out its responsibility is to change significantly:

- The goal of managing for measurable environmental results, which has not been clearly defined or uniformly understood, needs to be given more precise meaning. The relationship between that goal and other key goals and management themes and existing legislative requirements also needs to be clarified. Without these actions, EPA may be unable to translate the Administrator's goal into reality. (See ch. 2.)
- EPA's stated agency-wide priorities have not been framed in a manner that makes progress in meeting them readily measurable. This complicates decisionmakers' efforts to shift resources among priorities to where they are most needed. Similarly, (1) operational links between actions taken and results desired are missing and (2) the planning process does not sufficiently link to or influence budget decisions, thereby reducing its impact on allocation of resources. (See ch. 3.)
- Limited progress has been made in developing measures of environmental quality and in linking such measures to EPA program activities. This, combined with reductions in environmental monitoring activities and problems with the quality of the data that are collected, hamper EPA's ability to detect and assess changes in the environment. In the absence of such measures and quality data, it becomes a matter of judgment as to how efficiently and effectively EPA's resources are being used to address the nation's environmental problems. (See ch. 4.)
- Design and implementation problems and information gaps have limited the effectiveness of EPA's research and development program and its demonstration projects—two important analytic resources for assessing environmental risk, testing new ideas and techniques for environmental problem solving, and developing measurement tools for gauging environmental results. (See ch. 5.)

Build an Effective EPA/State Partnership

Recognizing the states' growing importance and capability in implementing EPA programs, as well as the changing nature of environmental management, EPA has attempted to develop a partnership that (1) is responsive to state desires for greater flexibility and less EPA intervention, yet (2) acknowledges the accountability the Congress demands of EPA as the agency primarily responsible for achieving national environmental goals. A major constraint limiting this effort is that these two objectives often appear to EPA staff to be in conflict or competition. For example, greater flexibility and less EPA intervention imply less detailed EPA control and more trust of the states. On the other hand, being held accountable suggests the need to exercise greater control and influence.

GAO cites a number of actions that it believes EPA could take to improve its relationship with the states. These include (1) determining where

cases of detailed review of state program transactions by EPA could be eliminated or replaced by other oversight techniques and (2) improving state program performance evaluations by giving greater emphasis to measuring environmental improvement achieved. (See ch. 6.)

EPA's long-standing difficulty in building an effective relationship with the states suggests, however, that EPA may need a new approach. GAO outlines such an alternative for EPA, congressional, and state consideration—one that better recognizes and balances, rather than individually addresses, EPA's competing objectives. This concept, which GAO refers to as "recertification," seeks to provide the assurance, influence, and input that EPA needs through periodic evaluations of state performance to determine whether to recertify them for delegation. EPA should then be able to reduce its involvement and control over day-to-day delegated program actions and allow capable states more operating flexibility. (See ch. 7.)

Manage Information Resources to Support Policy and Program Goals

Institutional barriers, such as the agency's traditional focus on media-specific applications, have constrained EPA's efforts to improve the management of its information resources. For example, with an organization set up along media lines, EPA's program managers are reluctant to invest in cross-media projects to achieve better environmental results for the agency. This, in turn, makes it difficult for officials in information resources management to deploy and use integrative information systems across program lines. In addition, EPA has not yet fully developed data standards, thus causing data requirements to differ from program to program. For instance, with no common definition existing across media lines for what constitutes an "enforcement action," each program reports an enforcement action differently. To advance the long-range agency aim of managing for measurable environmental results, changes are needed in planning and budgeting information resources and in EPA's infrastructure for information resources management. (See ch. 8.)

Develop a Modern Financial Management System

If EPA is to satisfy expectations of improving and providing better financial management information, it must provide sustained leadership through its Comptroller, as the chief financial officer, and continued top management support for development of its new integrated financial management system. Because development of such systems can be impeded by unexpected problems, GAO highlights some factors that are critical to the success of such projects. EPA must also prepare financial statements and provide for an annual audit of these statements. GAO

believes that an annual financial audit will foster increased organizational discipline to maintain proper operating financial management systems and improve program and financial accountability. (See ch. 9.)

Attention to Challenges in the Years Ahead

Tomorrow's environmental issues and imperatives are almost certain to challenge EPA's resourcefulness and determination and its ability to enlist the cooperation of other parties in developing effective solutions to problems that transcend local jurisdictions as well as state and national boundaries.

In looking to the future, GAO identified several areas that are likely to require sustained attention. These include (1) increasing public involvement in and support for the agency's environmental protection mission, (2) managing research and development with a view toward enhancing the scientific basis for environmental decision making, (3) dealing effectively with long-standing organizational and legislative issues to achieve a more anticipatory, integrated, and risk-based approach to protecting the environment, (4) promoting greater cooperation among governmental and industrial organizations to deal with environmental concerns, and (5) developing a work force embodying the skills needed to accomplish the tasks of today and the challenges of the years ahead. (See ch. 10.)

Administrator's Recent Actions

GAO briefed Administrator Lee Thomas regarding shortcomings in EPA's efforts to implement its management initiatives and offered ways they might be overcome. The Administrator has begun a number of actions. These include (1) long-term planning to identify research needs for cross-media and other issues, (2) developing a center for risk analysis techniques, (3) adjusting the planning process to better respond to regional variations and priorities, and (4) including cross-media issues as an important focus of the agency's spring 1988 planning session.

Matters for Congressional Consideration

Clarification of congressional expectations for EPA and state sharing of authority, responsibility, and accountability in the management of delegated environmental programs could further EPA efforts to establish an effective partnership with the states. GAO offers for consideration ways that the Congress can define its expectations for the EPA/state partnership. (See ch. 7.)

Recommendations

EPA's success in accomplishing its goal of managing for measurable results across EPA programs has been limited by weak or missing links between the agency's planning and budget systems, the need to develop or improve ways to monitor and measure environmental progress being made, and the need to strengthen the analytic base used in assessing and managing environmental risk. Therefore, among GAO's recommendations are that the Administrator, EPA, rank agency priorities and state them in measurable terms, develop environmental measures and link them to program activities such as inspections, and establish a focal point to provide institutional visibility and top management leadership needed to deal with these and other issues requiring sustained efforts.

GAO makes other recommendations to the Administrator to help put in place the management tools and processes EPA needs to strengthen its partnership with the states. GAO also makes recommendations to improve information and financial systems. These include, for example, requiring an annual audit of EPA's financial statements.

Agency Comments

EPA generally agreed with GAO's findings and recommendations, noting that the report will be useful in helping senior agency management shape current initiatives and plan future ones to achieve improved program effectiveness.

EPA stated that it has the capacity to manage its programs more effectively and that more can be done. EPA also said that it had initiated or planned actions to (1) more clearly communicate its goals and direction and better integrate its planning and budgeting processes, (2) develop environmental indicators, (3) improve program implementation by strengthening its relationship with the states, and (4) ensure that its new financial system meets the administrative and program requirements for sound financial management. The full text of EPA's comments is included as appendix I.

Contents

Figures

Abbreviations

AIRS	Aerometric Information Reporting System
ASIWPCA	Association of State and Interstate Water Pollution Control Administrators
ASTSWMO	Association of State and Territorial Solid Waste Management Officials
CEQ	Council on Environmental Quality
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFC	chlorofluorocarbons
DDT	dichloro-diphenyl-trichloro-ethane
DNA	deoxyribonucleic acid
EPA	U.S. Environmental Protection Agency
FMFIA	Federal Managers' Financial Integrity Act
GAO	U.S. General Accounting Office
HSWA	Hazardous and Solid Waste Amendments
IEMP	Integrated Environmental Management Program
IRM	information resources management
NPDES	National Pollutant Discharge Elimination System
NWQSS	National Water Quality Surveillance System
OIRM	Office of Information Resources Management
OMB	Office of Management and Budget
PCBs	polychlorinated biphenyls
PSI	Pollution Standards Index
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
SPMS	Strategic Planning and Management System
STAPPA	State and Territorial Air Pollution Program Administrators
TCE	trichloroethylene

Introduction

The Environmental Protection Agency's (EPA) diverse and wide-ranging regulatory activities affect almost everyone. EPA carries out these activities as part of its responsibility for administering nine major environmental statutes. The nation's greater awareness of pollution hazards and the importance it attaches to health and environmental protection provide broad support for EPA's mission but also mean greater scrutiny of and higher expectations for its activities.

Created in 1970 to clean up a badly polluted environment, EPA has faced a host of difficult pollution problems, further complicated by population increase and continued growth in economic activity. Nonetheless, EPA's future challenges may be even more formidable. For example, it is entering a period when it must

- protect human health and the environment against the adverse effects of a growing number of complex and potentially toxic chemicals,
- address global environmental problems of a highly political, economic, and technical nature, including problems of ozone depletion, acid rain, and global warming,
- develop and implement national programs for a set of problems that have generally been considered local in responsibility, control, and solution—for example, groundwater pollution, radon gas in homes, wetlands protection, and nonpoint source water pollution (runoff from farmlands, urban areas, mining sites, etc.), and
- work with the Congress, states, industry, interest groups, and the general public to achieve consensus on the difficult technical and policy questions of risk assessment and risk management: How clean is clean enough? What level of cleanliness can our society afford? What level of risk to human health are we willing to accept?

In addition, it must continue to administer programs already in place to protect the air, water, and land from pollution.

EPA's Purpose

EPA's basic purpose is to "protect human health and the environment." Above all, EPA is a regulatory agency responsible for setting and enforcing the environmental standards called for in statutes. Currently EPA administers the nine major federal laws enumerated in table 1.1.

Table 1.1: Major Laws Administered by EPA

Law	Regulated action
1. Clean Air Act of 1963, as amended	Protect and enhance air quality in order to promote public health and welfare.
2. Federal Water Pollution Control Act of 1956, as amended (Clean Water Act)	Restore and maintain the chemical, physical, and biological integrity of the nation's waters.
3. Safe Drinking Water Act of 1974, as amended	Protect the quality of all sources of drinking water—surface and groundwater.
4. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (Superfund)	Finance emergency cleanup measures for releases of hazardous substances.
5. Federal Insecticide, Fungicide, and Rodenticide Act of 1947, as amended	Regulate the manufacture, distribution, and use of pesticides.
6. Resource Conservation and Recovery Act of 1976, as amended (RCRA)	Regulate the generation, transportation, treatment, storage, and disposal of hazardous wastes.
7. Toxic Substances Control Act of 1976, as amended	Regulate commerce in order to protect human health and the environment by requiring testing of and use restrictions on certain chemical substances.
8. Marine Protection, Research, and Sanctuaries Act of 1972, as amended	Regulate the dumping of all materials into oceans and prevent or strictly limit the dumping of material that adversely affects human health or the marine environment.
9. Uranium Mill Tailings Radiation Control Act of 1978, as amended	Protect public health and the environment from radioactive materials in tailings discarded from uranium processing mills.

To carry out these laws, EPA administers a wide range of regulatory and nonregulatory programs, nearly all of which involve research, standard-setting, regulations promulgation, permit granting, compliance, and enforcement activities.

EPA's Genesis and Organization

EPA was established in the executive branch as an independent agency pursuant to President Nixon's Reorganization Plan No. 3 of 1970, effective December 2, 1970. In response to a need to marshal federal environmental activities under a strong, independent agency, EPA was created to establish and enforce environmental protection standards; conduct environmental research; provide assistance to state and local governments, private groups, individuals, and educational institutions combatting environmental pollution; and assist the Council on Environmental Quality[1] in developing and recommending to the President new policies for environmental protection.

[1]The Council was established in the Executive Office of the President by the National Environmental Policy Act of 1969 to provide the President expert advice on environmental matters.

EPA was formed by combining various components from the Departments of Agriculture; Health, Education, and Welfare (now Health and Human Services); and the Interior and the Atomic Energy Commission, the Federal Radiation Council, and the Council on Environmental Quality. The major responsibilities transferred to EPA were as follows.

Table 1.2: Major Responsibilities Transferred to EPA by Reorganization Plan No. 3 of 1970

Department/group	Transferred responsibility
Department of Agriculture	Pesticide registration and monitoring
Department of Health, Education, and Welfare	Air pollution control Solid waste management Radiation Drinking water Tolerance levels for pesticides in foods
Department of the Interior	Water pollution control Pesticide research
Atomic Energy Commission	Environmental radiation protection standards
Federal Radiation Council	Environmental radiation protection standards
Council on Environmental Quality	Ecological systems studies and research

EPA is headed by an administrator and a deputy administrator, who are appointed by the President with the advice and consent of the Senate. Nine assistant administrators (who manage specific environmental programs or direct other agency functions), a general counsel, and an inspector general also are named by the President, subject to Senate confirmation. In addition, 10 regional administrators are responsible for coordinating with state and local governments to ensure that regional needs are considered and that federal environmental laws are properly implemented. EPA's organizational structure is shown in figure 1.1.

EPA's Budget and Range of Activities

EPA's fiscal year 1988 budget is estimated at about $5.0 billion, supporting over 14,000 workyears. This amount includes about $2.3 billion in construction grants for municipal waste treatment facilities and about $1.2 billion for the Superfund program[2] to finance cleanup of toxic waste sites. The remainder—about $1.5 billion, or almost 30 percent of the budget—is for basic operating programs. These programs include nine major program areas concerning research and development and pollution abatement, control, compliance, and enforcement. An additional area, management and support, includes program, agency-wide, and regional management and administrative/support functions.

[2]The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 created the Hazardous Substance Response Trust Fund (Superfund), which is financed primarily with a tax on crude oil and certain commercially used chemicals.

Figure 1.1: EPA's Organization

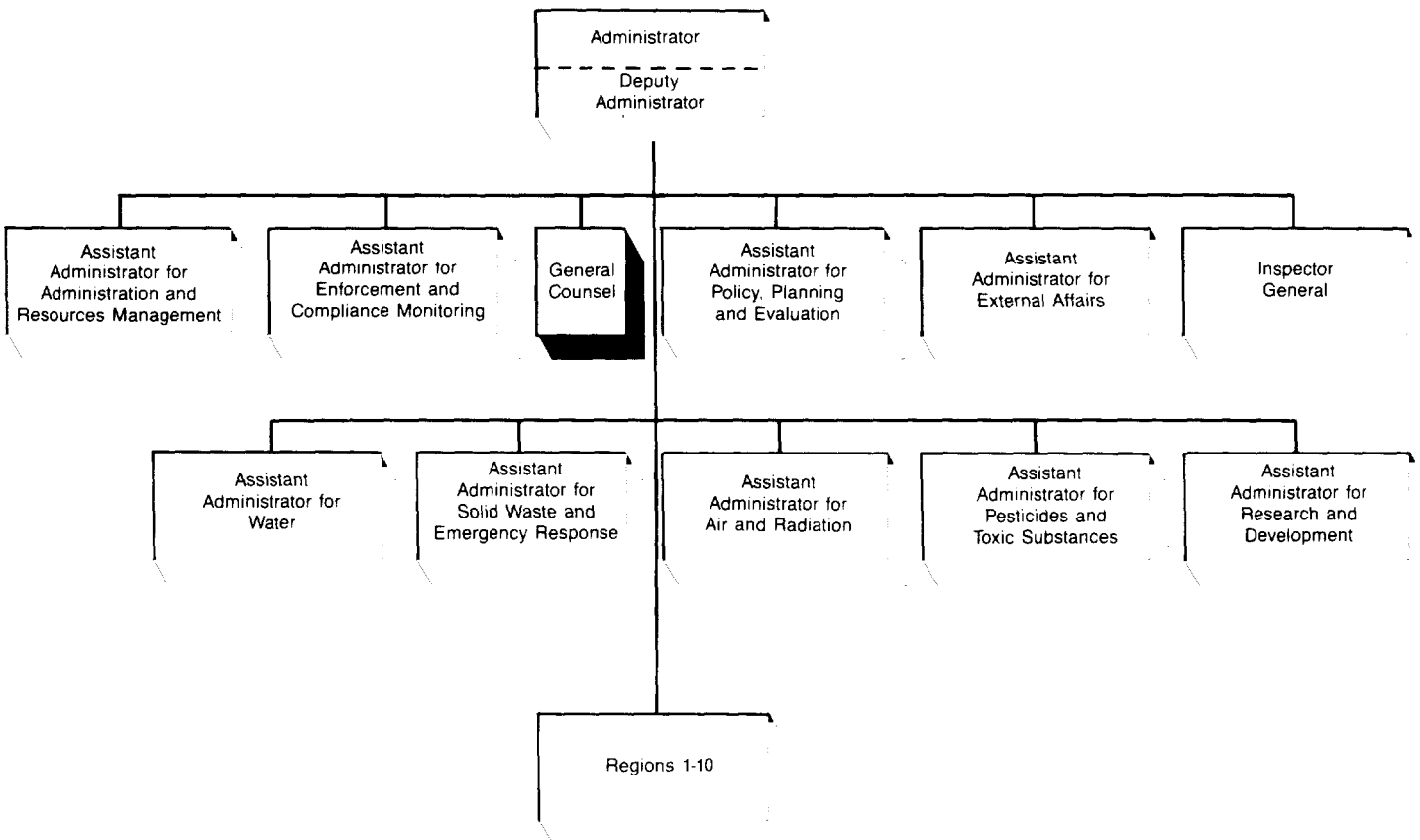


Table 1.3: Fiscal Year 1988 Budget for EPA's Operating Programs by Major Program Area

Dollars in millions

Program areas	Budget amounts
Air	$246.3
Water quality	258.9
Drinking water	108.1
Hazardous waste	262.8
Pesticides	84.3
Radiation	18.1
Interdisciplinary	60.7
Toxic substances	130.4
Energy	55.8
Management and support	355.6
Total	**$1,581.0**

As shown in figure 1.2, the 1988 budget for operating programs, expressed in real dollars, is at its highest level. The figure also shows that, in spite of increasing responsibilities brought about by new legislation and emerging environmental problems, budget amounts have experienced little change over the last 4 years in terms of constant dollars.

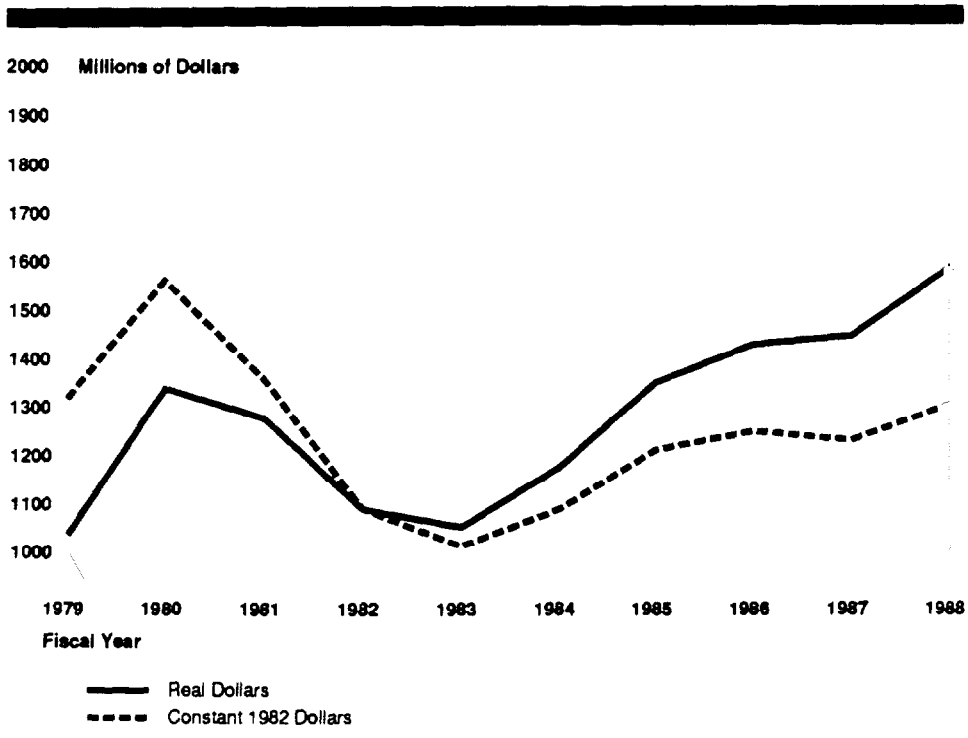
EPA programs must address a large variety of complex environmental problems and concerns such as acid rain, asbestos in schools, hazardous waste management/cleanup, and municipal waste incineration. This spreads available resources across a number of activities and efforts.

Environmental Program Delivery Network

The national environmental network includes a wide and diverse group of entities. Within this network, EPA sets the standards, and state environmental protection agencies largely carry out the permit granting, compliance, and enforcement activities to put them into effect. Industry and other pollutant-emitting sources that make up the regulated community are responsible for taking much of the direct action involved in applying the standards to their operations. In addition to setting the standards, EPA conducts research, provides technical support to the states and regulated community, and provides financial assistance to state and local governments.

The environmental network is also comprised of numerous public interest groups that help identify environmental problems and priorities, influence policies and standards, and monitor environmental quality and the success of national and state programs. The Congress, which sets the

Figure 1.2: Budget Amounts for EPA's Operating Programs—Fiscal Years 1979-88



national goals and oversees the total environmental protection effort, has over 90 congressional committees and subcommittees that deal with environmental matters.

The final participant in the network is the American people, who more and more are taking a role in the environmental effort. In addition to their influence as citizens and voters, the decisions they make—whether to buy certain items, how to dispose of their waste, where to locate landfills, etc.—have a big impact on the success of pollution control endeavors. In the end, they underwrite environmental protection efforts through tax dollars or a higher price for goods and services.

Objectives, Scope, and Methodology

We believe that policy development, program implementation, systems integrity, and preparation for future issues/problems are the major components with which the EPA Administrator, or any agency head, is concerned when managing and directing the agency toward accomplishing its mission. Thus, the overall objective of our management review of EPA was to identify how the agency can make and sustain management

improvements to strengthen policy development, better achieve program initiatives, improve the integrity of management support systems, and enhance planning for future environmental issues. Our specific objectives were to assess and develop ways to improve

- EPA's use of risk assessment, risk management, strategic planning, and other techniques for "managing for measurable environmental results" to better achieve agency policies and management initiatives,
- the balance of responsibility/accountability sharing between EPA and the states in formulating, implementing, maintaining, and overseeing programs with a view toward increasing effectiveness and efficiency,
- the integrity of EPA's systems for financial and management control and for the collection, handling, and use of environmental quality, program, and administrative information, and
- EPA's identification of and preparation for major environmental issues of the future.

We selected "managing for measurable environmental results" as an issue because it is the current EPA Administrator's primary management goal for the agency. In addition, we believe that its successful implementation will provide EPA the means to more effectively use its limited resources to address the many environmental concerns and problems that it faces.

The issue of EPA/state roles in carrying out national environmental programs was selected because improving the EPA/state partnership is also an EPA top management initiative. Furthermore, the states, as the day-to-day implementors of many EPA programs, are playing an increasingly important role in whether the agency accomplishes its mission to protect human health and the environment.

We examined the integrity of systems for financial and management control because they are important to the management of EPA. They provide the financial, environmental quality, programmatic, and administrative information needed by management to make decisions, formulate policy, plan, and ensure adequate control over funds and operations.

To accomplish the above objectives, we reviewed documents and files and interviewed a wide range of EPA officials and representatives of the Office of Management and Budget, congressional committees, industry and public interest groups, and state and local governments. In total, we met with representatives of almost every major office at EPA headquarters, 8 of 10 regional offices, and 11 states. In addition, we discussed EPA

management with outside experts and former EPA officials, including all four former EPA administrators (see table 1.4).

Table 1.4 : Former EPA Administrators Interviewed

Administrator	Tenure
William D. Ruckelshaus	12/70 - 4/73
Russell E. Train	9/73 - 1/77
Douglas M. Costle	3/77 - 1/81
Anne M. Burford	5/81 - 3/83
William D. Ruckelshaus	5/83 - 1/85

For each major review area, we selected specific EPA programs and/or activities for more detailed examination. Table 1.5 summarizes where our work was done for the issues of managing for measurable environmental results, EPA/state program roles, and information resources management. In all cases, substantial work was also done at applicable offices of EPA headquarters. For the issue of managing for measurable environmental results, we also visited project locations in Baltimore, Maryland; Philadelphia, Pennsylvania; and Santa Clara, California.

We discussed our objectives, scope, and methodology with and obtained comments on the draft of this report from our consultants panel, comprised of Donald Wortman, John D. Young, and Alfred M. Zuck, members of the National Academy of Public Administration.

Table 1.5: Location of Detailed Work Done for Selected Assignment Objectives

Objective	Programs/activity	Regional office	State environmental agency
Managing for environmental results	Water quality Pesticides Toxics Groundwater Comparative risk project Statutory review project	Region I Region III Region IX Region X	California Maryland New Jersey Oregon
EPA/state program roles	National Pollutant Discharge Elimination System Public Water System Supervision Underground Injection Control Groundwater Resource Conservation and Recovery Act	Region IV Region V	Alabama Florida Georgia Illinois Ohio
Information resources management (IRM)	IRM policies and plans Data-sharing project	Region II Region III Region IV Region VII Region IX Region X	California Missouri Oregon Washington

Our financial management systems work was performed mainly at EPA headquarters. We assessed EPA's progress in correcting overall problems identified in earlier internal EPA, GAO, Inspector General, Federal Manager's Financial Integrity Act (FMFIA), and other studies to identify further improvements that can be made and/or identify potential obstacles and pitfalls. We also evaluated EPA's efforts to develop an integrated financial management system. In performing this assessment, we interviewed EPA headquarters officials within the offices of the Assistant Administrator for Administration and Resources Management and the Comptroller and officials of the Office of Management and Budget and congressional offices.

In June 1987, with the concurrence of the Assistant Administrator for Administration and Resources Management, we began, as a separate effort, an audit of EPA's financial reports for fiscal year 1987. According to the Assistant Administrator, EPA must make key decisions concerning its integrated financial management system project, and our work could provide important, timely information to assist EPA managers in their system improvement efforts.

During our work we identified a range of environmental issues that are likely to require the increasing attention of EPA and the Congress. These

issues were grouped into five areas: (1) public participation and involvement in environmental decision making, (2) research and development needs, (3) EPA organizational and legislative matters, (4) EPA's role in fostering effective domestic and international cooperation to address environmental problems, and (5) EPA human resource management. To further develop these issues, we held discussions with former top EPA officials, representatives of public interest groups, and other concerned organizations.

We conducted our audit work between August 1986 and October 1987 in accordance with generally accepted government auditing standards. We closely coordinated this work with top EPA management officials. In January 1987 we discussed the programs and initiatives selected for detailed review and our planned scope and methodology with the Administrator, Deputy Administrator, and Assistant Administrator for Policy, Planning, and Evaluation. We also provided the Administrator and Deputy Administrator with a July 1987 briefing on our results to that point.

Report Organization

This report is divided into four parts. Part I, which includes chapters 2 through 5, discusses EPA's progress in implementing the initiative "managing for measurable environmental results." Part II, consisting of chapters 6 and 7, involves EPA's efforts to establish an appropriate relationship with the states. Chapters 8 and 9, which comprise part III, discuss EPA actions to revise and modernize its information resources management and financial management systems. The final part, part IV, containing chapter 10, poses questions about emerging environmental issues that we believe will grow in importance and urgency in the years ahead.

Better Manage to Achieve Measurable Environmental Results

Although considerable attention has been devoted by Administrator Lee Thomas to his policy goal of achieving measurable environmental results, progress has been slow.

- Chapter 2 describes the important relationship of political, environmental, and economic factors to the success of the Administrator's long-term policy goal and the importance not only of communicating the goal but ensuring its linkage to legislative requirements and to other agency goals, programs, priorities, and management themes.
- Chapter 3 identifies existing problems in EPA's planning and budget systems that hinder efforts to translate the policy goal of managing for environmental results into the planning guidance and resource allocation decisions key to directing what the agency does. Our recommendations for change range from stating the agency's priorities in measurable terms to strengthening the links between the planning and budget systems.
- Chapter 4 shows that over the years EPA has had limited success in determining the extent, severity, and cause of environmental problems and whether EPA programs and activities are making a difference in environmental quality. Establishing a framework for deciding the measures and types of data needed, and linking program activity to environmental measures are two of the recommended changes.
- Chapter 5 identifies limitations in EPA's research and development and its demonstration projects that reduce or limit the credibility and soundness of its effort to achieve measurable results. Focusing research on the long-term efforts needed to fill information gaps for assessing and monitoring environmental risks and evaluating the results of demonstration projects to identify common achievements, limitations, problems, and lessons learned are two recommended ways to enhance the value of these analytic tools to EPA. A designated focal point to address these and other recommendations in chapters 2 through 4 is also recommended.

EPA's Operating Context and Its Efforts to Communicate Its Goal of Managing for Environmental Results

To address the complexities of environmental problems and solutions, EPA Administrator Lee Thomas has fostered a policy goal to manage the agency's resources and activities so that they lead to achieving or realizing measurable environmental results. His initiative, building on the philosophy of his predecessors, recognizes that environmental problems are interrelated and attempts to allocate limited resources to those problems that pose the greatest risk.

Through "measurable risk management integrated across environmental media," the Administrator is seeking a policy approach that recognizes and treats the environment as an interrelated collection of media (air, land, and water). This implies that environmental protection programs and activities must be designed to consider the whole environment in the most effective and efficient way.

Political, environmental, and economic factors heavily influence the outcome and success of the Administrator's goal and his attempts to institutionalize it. Although the Administrator has devoted considerable attention to communicating his policy goal of achieving measurable environmental results, we found that confusion and a lack of consensus exist among senior EPA officials and congressional staff on important elements of the policy initiative, how it is to be implemented—given differing legislative requirements for achieving environmental results—and how it relates to other EPA policies, initiatives, and concepts.

Achieving Measurable Environmental Results: The Political, Environmental, and Economic Influences on EPA Policy Development

In a 1985 speech on his future agenda, Administrator Thomas presented the management theme "obtaining measurable environmental results" and stated that EPA's goals could not be met without "measurable risk management integrated across environmental media." His later speeches reflect the difficulties of dealing with media-specific statutes, noting the need for EPA to reexamine the basis of its environmental policy and to develop a framework for setting priorities on the basis of achieving measurable environmental results.

The Administrator's statements contain three specific elements. Agency actions should be

- in accord with an integrated environmental program,
- based on managing risk, and
- designed to produce measurable environmental results.

On the basis of statements made by Administrator Thomas and other environmental and regulatory experts, we constructed the following definitions or interpretations of the three elements.

An integrated environmental program accounts for all sources and interactions of pollutants simultaneously. It recognizes that pollutants may travel or be transferred, as a result of a pollution control action, from one environmental medium (air, water, or land) to another. An integrated program also addresses control of all pollutants in a consistent and comprehensive manner.

Risk management is a process of evaluating alternative regulatory options to deal with a pollution hazard. This process can include consideration of political, economic, social, engineering, and risk-related (risk assessment) data. In addition, decisions based on risk should encompass cross-media considerations to be consistent with an integrated environmental program approach.

Measurable results are a quantification of the extent and consequences of pollution and the effectiveness of EPA programs to control it. This entails developing environmental indicators to determine a baseline, or current status of, environmental quality and trends in that quality both because of and apart from current and previous environmental program actions.

The Administrator's efforts to institutionalize a policy that includes these elements are influenced by a variety of internal and external political, environmental, and economic factors. These factors constitute the operating context for his initiative. Ultimately, EPA's success in achieving its goal of managing for measurable environmental results will depend, in part, on its ability to recognize and accommodate these factors.

Political Considerations Sustain the Status Quo of Concentrating on Media-Specific Problems

In one way or another, environmental protection is an issue that affects all people, all levels of government, and nearly all types of businesses. People are affected by the physical environment in which they live; they expect and want their environment to be restored and protected from past and future environmental hazards. As a result, environmental protection is an important, and oftentimes emotional, issue to many, especially when health risks, such as cancer or birth defects, are involved. Consequently, political pressure, in the form of specific legislative mandates, may be put on EPA to take regulatory action without conclusive

evidence of cause and effect because factors other than risk are judged to justify corrective action.

Original Goal of Integrated Environmental Program Stymied by Lack of Scientific Knowledge and Statutory Basis

One of the organizing principles for EPA in 1970, under President Nixon, was development of an integrated environmental program from the collection of single environmental medium programs then in place. However, the integrated approach to environmental protection was not pursued. One reason, according to Environmental Quality: The 16th Annual Report of the Council on Environmental Quality (CEQ) of 1985, was that in 1970 the idea of an integrated program was considered impractical because the scientific information on how trace pollutants moved through the ecological chain did not exist. Problems of inadequate scientific data continue. For example, a March 1985 CEQ study, Report on Long-Term Environmental Research and Development, documents the continued existence of significant information gaps in EPA's analytic base.

Another reason an integrated program was not pursued, according to Alfred Marcus in The Politics of Regulations,[1] was the lack of a statutory basis for comprehensive management. He points out that the air and water programs, in particular, have different legal foundations; the former is based on health and welfare criteria while the latter is based on technological considerations. Further, the responsibilities of the federal government versus the states were reversed in the two programs.

EPA Continues to Attack Environmental Problems Mostly From a Single-Medium Perspective

The different programs under EPA have retained their identity. Although several organizational units were created to address cross-media problems, the essentially independent environmental programs, each with a single medium focus, have become entrenched, with EPA protecting each medium as directed by law.

The entrenchment of this single-medium program approach has been sustained, in part, by the development of various constituencies for each program that attempt to influence EPA actions. An example is the Association of State and Interstate Water Pollution Control Administrators, which is primarily concerned with water pollution issues and works actively to influence program issues in that medium. In addition, some EPA officials have expressed concerns that some agency personnel are so

[1] Alfred Marcus, "Environmental Protection Agency," in The Politics of Regulations, ed. James Q. Wilson (New York: Basic Books, Inc., 1980), p. 267.

focused on their single-medium program that they may be less attentive to overall agency goals.

EPA is also subject to the actions of other institutions. Over 90 congressional committees and subcommittees have oversight responsibility for 1 or more of EPA's programs. In addition, the Congress writes the environmental laws, the courts interpret them, the Justice Department is responsible for environmental enforcement litigation, and major proposed EPA regulations are subject to review by the Office of Management and Budget. Other federal departments and agencies, such as Defense, Interior, Energy, Agriculture, the Food and Drug Administration, and the Occupational Safety and Health Administration also have responsibility for matters affecting the environment.

A consequence that follows from the lack of an integrated approach to solving environmental problems is inconsistency among EPA's different programs. This inconsistency has been cited by agency officials as a barrier to achieving measurable environmental results.

Different Legislative Mandates for Considering and Regulating Risks and Numerous Short-Term Deadlines

EPA is responsible for implementing nine major environmental laws, each with its own requirements for regulating specific substances, standards to be considered, values to be used in analyzing the hazards, and other factors to be considered in regulating risks. The type of risk management approach used is usually controlled by the type of hazard being evaluated and by the particular legislative authority. As we noted in a recent report,[2] the risk management approaches most generally used are

- risk only,
- risk balancing, and
- technological control.

The risk-only approach characterizes analyses in which only the level of risk is considered in deciding whether a risk source should be reduced. Risk balancing considers other factors in addition to risk level, such as the economic costs or benefits of regulation. The technological control approach emphasizes the application of the best technologies available to reduce either a hazard or exposure to it and, thus, to reduce the associated risk.

[2]Health Risk Analysis: Technical Adequacy in Three Selected Cases (GAO/PEMD-87-14, Sept. 30, 1987).

Different statutes require the use of different approaches in developing and evaluating regulatory options. These different approaches sometimes create problems, such as fragmentation of effort, conflict in resource allocation, bias against new chemical/pesticide products, and multiple risk assessment documents for the same substance. For example, under the Clean Air Act, a standard that protects human health or some other value must be established, or some particular level of technical control must be applied. Cost considerations may be specifically prohibited during the development of the protective standard. Under the Toxic Substances Control Act and the Federal Insecticide, Fungicide, and Rodenticide Act, balancing of risks against benefits or costs of control of chemicals and pesticides is required or implied. This condition of different legislative mandates contributes to fragmentary and potentially inconsistent or confusing approaches to reducing environmental risks.

In addition, some of the environmental statutes tend to focus on a single environmental medium. According to the Director, Science Advisory Board, this characteristic encourages fragmentation of effort by exacerbating the normal problem of bureaucratic turf. Further, according to the Director, the question often arises as to which medium deserves the greatest application of resources. As a result, EPA frequently directs scientific and other issues with a medium-specific mind-set.

A related problem, according to the Director, concerns the conflicts that arise between specific statutory programs. For example, protecting drinking water from chemical pollution is a purpose of RCRA and the Superfund law, as well as the Safe Drinking Water Act. A dichotomy exists between the goals and needs of these programs and the purposes of drinking water standards that were developed to comply with laws that govern objectives other than hazardous waste cleanup. Another example of statutory conflict is in the pesticide regulatory area. A pesticide could be subject to a standard of zero risk under the Federal Food, Drug, and Cosmetic Act, which may conflict with the standard for the same pesticide on the basis of the risk-benefit provision in the Federal Insecticide, Fungicide, and Rodenticide Act.

Another problem of inconsistency resulting from implementing some provisions of the environmental statutes, as pointed out by the Council on Environmental Quality and others, is known as "new source bias." New source bias is the application of different, sometimes more stringent, standards for new products (chemicals/pesticides) versus those for existing products. Implementing both the Toxic Substances Control Act and the previously mentioned pesticide statute in particular may result

in this bias by requiring premarket reviews of new products while old products, which had been allowed on the market under a less stringent review, may remain in the marketplace until a review can be done. The existence of a new source bias in implementing any of the environmental statutes would be inconsistent with a risk-based approach.

EPA recognizes that part of the difficulty in comparing options for managing risks across programs arises because risk reduction does not appear as an explicit concept in several of the agency's statutes. However, EPA believes that the differences in mandate and program structure do not excuse it from developing consistent approaches in the areas of risk management where the statutes are silent.

Another impact of the different legislative requirements is that different EPA program offices sometimes issue their own risk assessments for the same substance (e.g., dioxin and asbestos). Issuing multiple risk assessment documents for a single substance, as well as seeking separate scientific reviews by the Science Advisory Board for each document, is not an efficient use of EPA or Board resources, according to the Board.

In 1983 then EPA Administrator Ruckelshaus initiated the Statutory Review Project. Originally the project focused on developing a single environmental statute; but subsequently a number of projects emerged, including model legislation integrating certain functions, such as enforcement, monitoring, and research. However, EPA has no specific plans to submit draft legislation either for integrating certain functions or a single integrated statute to the Congress.

Other aspects of environmental laws posing a challenge to EPA are the numerous and specific deadlines imposed on EPA, the states, and the regulated communities. A 1985 study compiled 328 statutory deadlines for the statutes EPA is responsible for implementing.[3] Since 1985 additional deadlines have been imposed through major amendments of several environmental statutes. Such deadlines, some agency officials argue, interfere with the allocation of resources among research projects, creating a bias to conduct short-term research to support these deadlines instead of long-term research focused on reducing information gaps not tied to any deadline.

[3]Environmental and Energy Study Institute and the Environmental Law Institute, Statutory Deadlines in Environmental Legislation: Necessary But Need Improvement (Washington, D.C.: Sept. 1985). The institutes carried out this study, under a cooperative grant agreement, at EPA's request.

Complexity and Extent of Environmental Issues Suggests the Need for an Integrated Approach

In addition, the nature and extent of environmental issues continue to change. Groundwater contamination and the destruction of wetlands are examples of new environmental issues that historically have been overshadowed but still demand attention.

The Complexity Considerations

Developing an integrated program will require a long-term effort by EPA. Its implementation is complicated by the following: the uncertainty surrounding the science of estimating risks; the limited knowledge of the long-term effects of exposure to commonplace chemicals; the ability to detect minuscule quantities of contaminants without knowing the health and environmental consequences of these trace contaminants; the effect of uncontrollable factors (i.e., climate, weather, and business cycles) on the environment; the expanding recognition of the need for international cooperation to address certain global environmental problems (i.e., ozone depletion, global warming); and as discussed in chapter 5, the limited analytic and data resources to make risk-based decisions.

The CEQ, the National Academy of Public Administration, and EPA officials have indicated support for an integrated environmental approach. These groups have also pointed out the inconsistency in implementing the environmental programs and the emergence of new environmental concerns.

Environmental Problems Are More Extensive and Difficult Than Originally Believed

Since EPA's formation in 1970, the number and extent of known pollution problems has grown. Recent environmental concerns relate to toxic substances in groundwater, air, water, and the workplace; indoor air pollution; depletion of the earth's protective stratospheric ozone layer; and acid rain, to mention some major ones.

EPA's initial environmental program concentrated on controlling the large point sources[4] of pollutants. As CEQ and EPA experts point out, however, the nature of many of the newer pollution problems will require EPA to address the behavior of large numbers of dispersed sources, such as individuals and farms, that now constitute a significant source of pollutants, i.e., nonpoint sources.[5] For example, the original air

[4]Point source is a stationary location where pollutants are discharged, usually from a factory or processing plant.

[5]Nonpoint source is a contributing factor to water pollution that cannot be traced to a specific spot, like agricultural fertilizer runoff.

pollution control program consisted primarily of attempts to control air pollutants emitted from automobiles and industrial facilities. However, today's concerns about indoor air pollution, which includes tobacco smoke, pesticides, toxic substances, and radon gas, may best be controlled through the individual actions of the many who live or work in the polluted environment.

Another problem that makes solving pollution problems more difficult is that pollutants often are not destroyed by pollution control practices but are simply transferred from one environmental medium to another. For example, the process of removing contaminants from public sewage systems or industrial smokestacks creates sludge and waste, which themselves can be toxic and lead to further air, water, or land pollution. Administrator Thomas has described this cross-media transfer problem as a symptom of a flaw in the general environmental strategy of single-medium programs.

Potential Threats From Newly Identified Problems Will Take Significant Efforts to Address

Another measure of change is the extent of risk posed to human health and the environment by these recently identified pollution problems. Although difficult to quantify, these newer risks could be substantial.

To deal with these new risks will require significant additional effort on EPA's part. For example, EPA estimates that depletion of the stratospheric ozone layer could lead to increased ultraviolet radiation exposure and could eventually be responsible for substantial increases in skin cancer, cause malfunctions of the human immune system and cataracts, damage crops, deplete aquatic life, and contribute to global warming. Another EPA study concluded that nonpoint sources are the major causes of remaining water quality problems and that further point source control efforts will probably not improve conditions. Other recent environmental concerns include indoor radon, global warming, and accidental releases of toxic substances. In all, these estimates of risk posed by the newer pollution problems suggest that they too must be considered in deciding how best to distribute limited resources.

Incomplete Knowledge on the Status of the Environment Makes It Difficult to Manage for Environmental Results

Data exist showing that the quality of the environment has improved, despite continued industrial and population growth. Administrator Thomas has presented some specific measured gains for the period 1975 to 1983: among air pollutants, particulates declined 20 percent; sulfur dioxide declined 36 percent; carbon monoxide declined 33 percent; and national levels of lead in the air have declined 67 percent. Also, organic

wastes discharged in water from industrial sources have declined 38 percent.

However, despite these achievements, much remains to be investigated and understood. For example, a 1985 EPA report on the quality of the environment shows that even with lower concentrations of most air pollutants, many Americans were still exposed to unhealthy air. Ozone, in particular, a pollutant resulting chiefly from auto emissions,[6] is one for which current control efforts have had little success. The report also stated that data for some, especially newer, programs are virtually nonexistent.

Measures of environmental results could help indicate to EPA managers whether new programs or solutions are needed to deal with old and new pollution problems alike.[7] Incomplete knowledge of the status of the environment resulting from current environmental programs makes it difficult to assess how well agency resources are contributing to risk reduction. This information is essential if the agency is to get the most environmental protection it can from its available resources.

Balancing Environmental Protection, Economic Growth, and Budgetary Constraints Encourages a Manage-For-Results Approach

A third external EPA factor—economic considerations—also tends, on balance, to influence EPA toward managing for environmental results. According to a former EPA Assistant Administrator for Policy, Planning, and Evaluation, EPA's bottom line is "environmental results—maximum feasible risk reduction given the resources society is willing to devote to the environment." Society's limited resources coupled with EPA's increasing responsibilities constitute the economic factors that affect EPA's need and ability to manage for measurable environmental results.

The current federal budget deficit affects the level of resources allocated to EPA. A recent decline in EPA's operating budget (in real terms) has coincided with increases in the federal budget deficit. A comparison in real terms of two 4-year averages, 1978-1981 and 1984-1987, shows an increase in the federal budget deficit of 248 percent, while EPA's operating budget (excluding construction grants and Superfund) declined by 15 percent.

[6]The pollutant ozone is formed when certain chemicals—primarily hydrocarbons and nitrogen dioxide from vehicles and industrial sources—react to sunlight. This ozone in the atmosphere should not be confused with and is not directly related to the depletion of the earth's protective stratospheric ozone layer.

[7]Chapter 4 discusses the role and importance of environmental results measures.

Another economic factor influencing EPA's efforts to efficiently achieve measurable environmental results relates to the need for the public and private sectors to together develop coherent plans for allocating scarce resources for pollution control. The extent of public and private sector involvement in pollution control activities is substantial. According to the CEQ, the nation's attempts to solve and prevent environmental problems have been very costly. Some estimates now put the nation's cost (public and private costs) for addressing environmental problems as high as $70 billion per year. The economic consequences of this cost are that the nation consumes less in other goods and services in order to expend more for pollution abatement.

The Administrator Has Articulated Goals, Priorities, and Management Themes

Since his confirmation in 1985, Administrator Lee Thomas has stressed, through his statements and speeches, the central theme of "achieving environmental results." Communicating this goal and linking it to the agency's other themes is important in building consensus for change and, ultimately, in making the goal an integral part of EPA's decision-making process. Hence, if EPA is to implement an integrated approach to addressing environmental issues, the concept must be articulated to and understood by those within and outside the agency. EPA officials and others influencing environmental programs need to understand the goal and its consequences, so they can participate in achieving it.

In the fiscal year 1987 Agency Operating Guidance, which guides development of annual plans, the Administrator laid out the following agency goals, with the first one emphasizing managing for measurable environmental results:

"First and foremost, we must continue implementation of EPA's basic programs with a focus on achieving environmental results.

"My second goal is to ensure a strong enforcement presence in all of our Agency programs.

"Third, we must continue to decentralize our programs and delegate authority to the Regions and States and others where it makes sense to do so.

"My fourth goal is to maintain our scientific credibility and identify research priorities as part of our program planning.

"My fifth goal is to reach out to the public and interested parties.

"My last goal is perhaps the most important. We must invest more in the human resources that are so essential to the performance of our programs."

In addition, the Administrator instituted an annual planning meeting for top agency executives to set program priorities for the upcoming fiscal year for achieving the goals. EPA's priority list for fiscal year 1987 follows.

EPA's Priority List for Fiscal Year 1987

1. Reduce risks from exposure to existing pesticides and toxic chemicals.

2. Reduce risks from disposal of hazardous waste and stabilize imminent threats from uncontrolled hazardous waste sites.

3. Reduce exposure to unhealthy air quality conditions, both indoors and outside, giving highest priority to the control of hazardous air pollutants.

4. Maintain and improve water quality by addressing point and nonpoint sources of pollution.

5. Reduce damage to sensitive environmental areas.

The Administrator also has set forth seven priority themes for improving agency management, as shown below. In February 1987 about 350 senior agency-wide executives convened for the first senior management forum to discuss these management themes. One of the purposes of the 1987 forum was to broaden an understanding of the seven management themes and how they provide a framework for achieving the agency's overall mission.

EPA's Seven Management Themes

1. "Risk Reduction: EPA's basic mission is to reduce the level of risk to health and to the environment posed by pollution. Toward that end, the Agency will focus its resources, and those of society at large, where pollution causes the most damage.

2. "Balance Environmental Gains Against Other Goals: Environmental protection actions should be designed to achieve the greatest social benefit. The Agency will strive to manage its resources to achieve the greatest overall benefits for the public.

3. "Environmental Federalism: We recognize that each level of government has a proper role in public health and environmental protection, and that the concerted and coordinated efforts of federal, state, and local agencies will best serve the public interest.

4. "Better Environmental Science: We will work to expand the knowledge available to manage health and environmental risks. This priority involves improving the scientific basis for environmental protection decisions.

5. "Negotiation and Consultation: In finding solutions, we will expand the use of negotiated regulations and consultative proceedings with a wide range of representatives from industry, environmental organizations, state and local government, and the general public.

6. "Enforcement: We will enforce environmental laws vigorously, consistently, and equitably to achieve the greatest possible environmental results.

7. "Human Resources: We will promote excellence and growth in EPA staff at all levels."

The Administrator Needs to Further Clarify His Policy Goal of Managing for Environmental Results

Although the Administrator has devoted considerable attention to the policy goal of managing for environmental results, our review of his speeches and key policy documents, plus interviews with senior agency officials, as well as congressional staff, revealed that confusion and a lack of consensus exist on important elements of the initiative and how it relates to existing legislative requirements and other policies, initiatives, and concepts. We found that the goal of managing for measurable environmental results has not been defined or used consistently. Further, the relationships among that goal and other key agency policies (such as the priority list and the seven management themes) have not been articulated. For example, one senior EPA planning official indicated that the concept of "managing for measurable environmental results" served only as an overall mission-oriented statement. Another official told us that he attached no particular significance to the "managing for measurable results" concept, explaining that, what he pays attention to is what the Administrator emphasizes in meetings with him.

EPA officials also showed confusion in linking the concept of "managing for measurable results" with other agency policy statements. For example, one official said the priority list represents the most important

issues, while the management themes represent how to carry them out. But others told us the relationships among the policy goal of managing for measurable results, existing legislative requirements, the management themes, and the priority list were not clear. One senior official said "no neat matrix" exists for interrelating these concepts. Because some of the statutes present inconsistent signals, according to some EPA officials, not all in the agency are ready to fully embrace the agency's move toward risk-based management. Another EPA official told us that some people in the agency were treating the effort more as a fad rather than as a principal future direction for EPA.

Discussions with staff members of some Senate and House committees having responsibility for environmental matters disclosed concerns regarding EPA's efforts to move toward the goal of "managing for measurable environmental results." Some of the staff members said achieving this goal, if it can be achieved, will require a long-term effort, suggesting that lack of data and resources prevents the agency from implementing the concept at the present time. Further, they stressed the need for EPA to work with the Congress as a prerequisite to extending the use of risk assessment and risk management to all agency programs, shifting resources between media or programs, and obtaining the legislative changes needed to carry out the initiative.

Our review indicated that clarifying the concept of managing for measurable environmental results and its relationship to agency goals, priorities and themes, and particularly to legislative requirements would help facilitate its use in developing priorities and making program-related decisions. By doing so, we see the opportunity to further clarify other concepts and principles (such as how to balance numerous factors in making risk-based decisions, i.e., cancer and noncancer human health risks; ecological risks; benefit-cost considerations; and overall legislative, technical, and administrative feasibility questions). Further, clarifying the results management goal will help EPA in proposing legislative changes and in establishing appropriate management systems for planning and budgeting, measuring performance and environmental results measures, and developing the analytical/scientific base needed to implement this initiative, as discussed in chapters 3, 4, and 5.

Conclusions

We found a lack of consensus among senior EPA officials and congressional staff on important elements of the policy goal of managing for measurable environmental results and their relationship to other EPA objectives and to existing legislation. To be successful in implementing

the policy goal, the Administrator must more clearly communicate the specifics of his policy goal. This goal should be linked to EPA legislation as well as to EPA goals, objectives, program priorities, and management themes as an important step in building consensus for change. In doing this, EPA will need to work with the Congress to obtain the legislative changes needed to carry out the initiative. Ultimately, the linking process will play a major role in making the goal an integral part of EPA's decision-making process at all levels.

Finally, given the political, environmental, and economic factors influencing EPA decision making, clarifying the policy goal of achieving measurable environmental results can serve as a first step in building the consensus needed to translate it into operating reality. Succeeding chapters 3, 4, and 5 offer further details on what is needed now and in the long term if EPA is to move toward managing for measurable environmental results.

Recommendations to the Administrator, EPA

To enhance and facilitate EPA's efforts to manage for measurable environmental results, we recommend that the Administrator, EPA,

- develop a clear and cohesive statement of the policy goal to guide all parts of the agency in moving toward managing for measurable environmental results,
- make clear the relationships between this policy goal and other agency goals and management themes and link them clearly to the annual priority list to establish a basis for tracking their progress in the agency's planning and budgeting systems, and
- set and communicate clear concepts on how the policy goal relates to current legislation and proposed changes and to agency efforts in addressing environmental problems that cut across several environmental media, using risk assessment/management tools, and developing and using environmental measures and indicators of progress.

Planning and Budget System Changes Are Needed to Translate the Goal of Managing for Measurable Environmental Results Into Operating Reality

Translating policy goals, such as achieving measurable environmental results, into required agency actions and resource needs depends in large part on the proper functioning and responsiveness of EPA's planning and budget systems. EPA's two major systems for translating the agency's policy into day-to-day activities are the Strategic Planning and Management System (SPMS) and the budget allocation system. SPMS is intended to provide the vehicle for short- and long-term planning and performance monitoring, while the budget or resource allocation system is the vehicle for translating plans into funding requirements.

EPA has recognized that changes are needed in the two systems and has made some revisions. In addition, cross-media planning was an important focus for the agency's spring 1988 planning session. However, we found that if EPA is to convert its policy goal into operating reality, it needs to change the processes and procedures supporting both systems so that (1) its planning system, SPMS, identifies the most significant priority issues, states them in measurable terms, and provides an operational link between work done and results to be achieved and (2) its budget system links priority issues to budget formulation and execution to translate plans into resource allocation decisions. In addition, consultation with the Congress is an important consideration in gaining approval for legislative and budget proposals needed to implement the Administrator's policy direction.

The Purpose and Components of EPA's Planning and Budget Systems

SPMS, instituted in 1984, is intended to provide the Administrator a (1) process for setting the agency's direction by articulating goals and priorities through long-term planning and development of the annual Agency Priority List, (2) means of translating the priority list into operational plans through the annual Agency Operating Guidance, (3) way to hold program offices and regions accountable for agency activities through measures and commitments reported quarterly, and (4) vehicle for evaluating progress through quarterly meetings between the Deputy Administrator and program assistant administrators and through semiannual meetings between the Deputy Administrator and each regional administrator. The Office of Policy, Planning, and Evaluation, which reports to the Administrator, is responsible for the design and implementation of SPMS. Figure 3.1 illustrates the key components of SPMS. Appendix II provides the time frames for key planning actions of the SPMS cycle for fiscal year 1988.

The Office of Administration and Resources Management directs EPA's budget process. During budget formulation, program offices consider

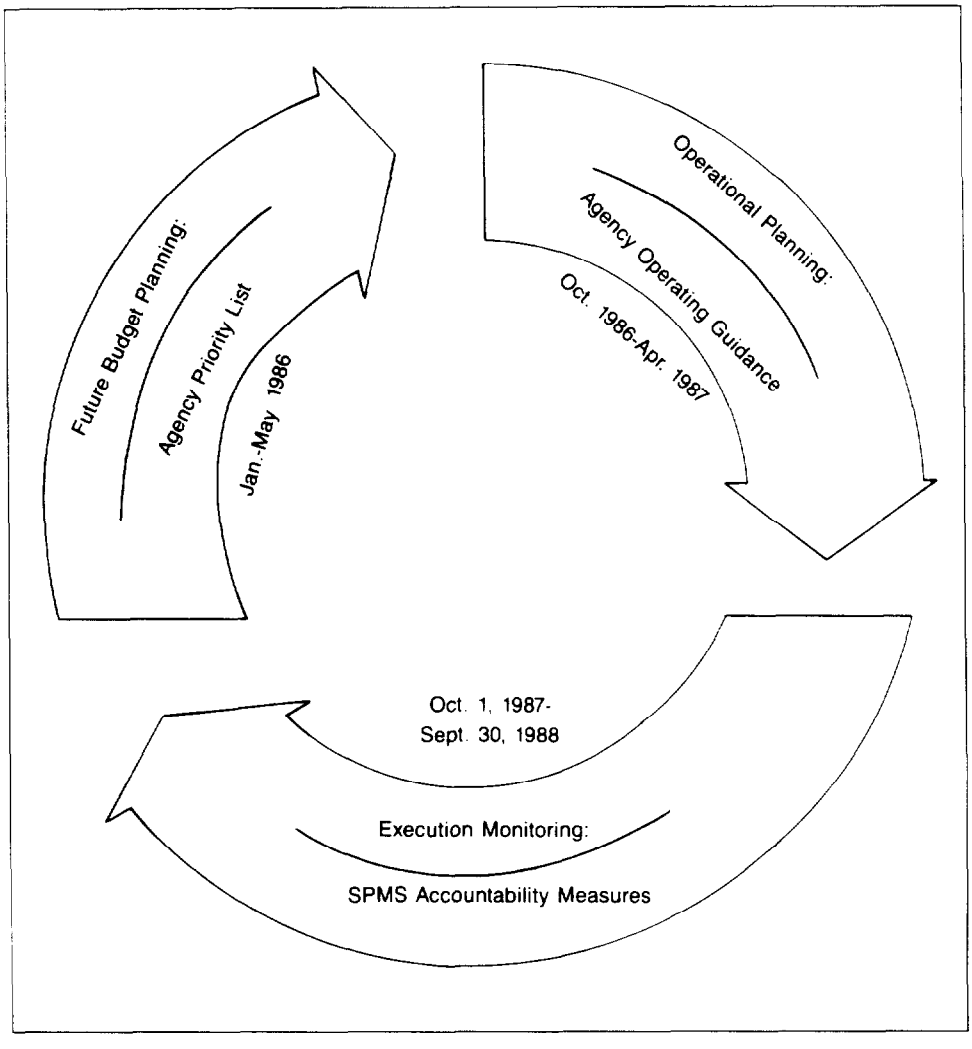
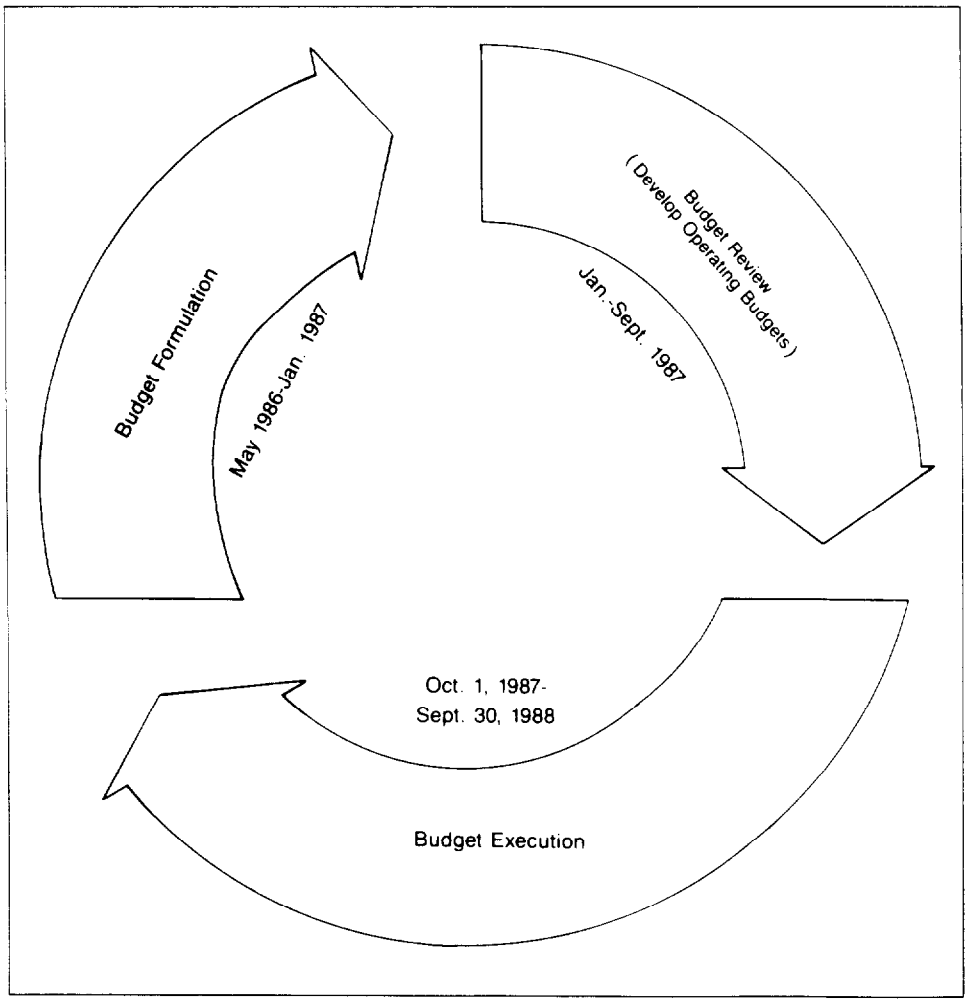


Figure 3.1: Key Components of EPA's Strategic Planning and Management System (Fiscal Year 1988 Illustrated)

how and at what level they will fund issues on the priority list, as well as the base program. Once budget formulation is completed, the budget goes to the Congress, through the Office of Management and Budget, for review and enactment. In the second part of EPA's internal budget cycle, national program managers and regional administrators develop operating budgets, which are consolidated into the agency-wide operating budget. The purpose of the operating budget is to develop detailed resource plans for using workyears and funds in the congressional budget request.

Once the agency-wide operating budget has been established and distributed, it forms the basis for the third component of the budget process—budget execution. The Comptroller's office issues "Advices of Allowance" to officials authorized to obligate funds. Resources are then expended by headquarters and regional offices in accordance with the operating budget, which specifies workyears and dollars available for each quarter by appropriation, program element, and object class. These activities are illustrated in figure 3.2 and in greater detail in appendix III.

Figure 3.2: EPA's Budget Process (Fiscal Year 1988 Illustrated)



To Identify the Most Significant Issues, Changes Are Needed in Developing and Using the Priority List

The purpose of setting priorities is to identify the most significant issues to be addressed in the future budget year and, when the future year comes, which issues should be emphasized in operational plans and performance measures. When priorities are stated in precise terms so that their relative importance and expected accomplishments are clear, decisionmakers can use the priority list to allocate resources between competing priority and nonpriority areas and to determine what measures and data will inform them on whether problems are being addressed. Identifying the most significant issues, articulating short- and long-term measurable goals for addressing priorities, and refining them on the basis of experience and increased knowledge is a first step to focus agency resources on achieving measurable environmental results.

In an address before a February 1987 symposium on multimedia aspects of pollution control, sponsored by the National Academy of Sciences, a former EPA Deputy Administrator discussed the importance of setting environmental priorities, stating,

"(T)he overriding business of EPA is to reduce risks of exposure to a wide variety of environmental contaminants as quickly and cost-effectively as possible. To do this, priorities must be established based on risk. . . . The agency agenda is so cluttered it is physically impossible to proceed against all risks and some important ones are bound to be ignored." (emphasis added)

This former official also stated that EPA needed, first, a strategic design to determine where to put its resources; second, to use risk as the "common currency" in setting priorities in a coherent way—on the basis of minimizing health and environmental risks; and, third, strategies to address the priorities.

Key EPA planning and program office staff told us that the priority list needs to be better focused, stating that lists have been too open-ended, allowing program offices to interpret them to include just about everything EPA does. Over the last few years, EPA has undertaken a number of initiatives to focus the priority list on better achieving measurable environmental results. These initiatives include greater participation by regional offices and states, recognizing that they are closer to the problems; the Comparative Risk Project; and Strategic Planning Initiatives. We found, however, that if EPA is to identify the most significant issues that will address its goal of achieving measurable environmental results, each of the initiatives needs improvement and EPA needs to state the priorities in measurable terms and rank them in order of relative importance.

Greater Regional and State Input Would Enhance Priority-Setting

Since 1982 EPA has increased regional and state involvement in agency planning and budgeting through actions such as implementation of Environmental Management Reports, which provided information on significant regional problems; designation of "lead regions" to coordinate regional input to each program office on planning and budgeting issues; and involvement of the states and regions in ranking environmental problems for the priority list.

However, officials in three regions we visited told us that their expectations for influencing priority-setting have not been met, largely because they see little recognition of environmental problems in their region in the priority list or Agency Operating Guidance. According to regional officials, submission of the Environmental Management Reports, which presented detailed profiles of regional problems, was expected to change the way EPA carried out its business, that is, help change the agency's perspective from a programmatic perspective (air, water, etc.) to one that placed more emphasis on cross-media/program problems and solutions. According to regional and national office officials, the Environmental Management Reports were discontinued in 1985, because EPA's Office of Policy, Planning, and Evaluation could not resolve many of the problems raised by the regions and decided that other avenues for regional input could be used.

EPA sought to increase regional input into the priority-setting process as part of the development of the fiscal year 1989 priority list. Regions were asked to add regional problems, not included in a listing of 28 national problems sent to them, and to rank the problems in terms of severity and feasibility of EPA action to ameliorate them. However, the regions' rankings were not utilized to develop a presentation on what the agency's priorities might look like if viewed in a cross-media context. Rather regional input was used to support program office presentations on the priorities of water, air, pesticide and toxic substances, and solid and hazardous waste.

For example, a consolidated regional ranking showed that groundwater contamination was the number one regional priority. Groundwater is a key cross-media issue because contamination of groundwater, which is currently or likely to be the major source of drinking water for much of the country's population, can be caused by a variety of water and land pollution problems, including seepage from hazardous waste sites. However, groundwater was not proposed as a priority by the headquarters program office (Office of Water, where the Office of Groundwater Protection is located), nor was it included in the agency-wide priority list

put together by EPA's Office of Policy, Planning, and Evaluation for fiscal year 1989.

According to an official in Region 10 (Seattle), EPA's lead region for water programs, when the headquarters program office developed its priorities, it considered the regions' capabilities to address environmental concerns and current legislative mandates. Groundwater, according to the official, had not been identified as a priority area because there is no specific groundwater statute and regions lack the capabilities to address groundwater contamination concerns.

While we do not take a position on whether groundwater should or should not be on EPA's priority list, we do believe that because of the regions' proximity to the problems, and a growing multimedia perspective among the regions, the process for developing the priority list could benefit from broader-based involvement. For example, EPA could continue the regional ranking process begun for the fiscal year 1989 priority list, but rather than limiting regional input to support of program office presentations, a separate regional analysis could be developed to provide the basis for meetings between regional and national program office officials before the annual planning meeting,[1] which could also include the Office of Policy, Planning, and Evaluation and the Deputy Administrator. In addition, an analysis of regional rankings could be presented separately at the annual planning meeting, so they could be given equal weight with the program office presentations to the Administrator and Deputy Administrator.

The Comparative Risk Project: A First Step Toward Improved Priority-Setting

The purpose of the Comparative Risk Project, initiated by the Administrator in 1986, was to compare human health and environmental risks, for 31 problem areas across programs and media, to determine which problems were most important. Office of Policy, Planning, and Evaluation officials saw the project as providing an analytic framework to understand and assess environmental risks of both traditional and cross-media problems and as input for the fiscal year 1989 priority list. At the same time, agency officials in charge of the Comparative Risk Project acknowledged that there are currently three paradigms for decision making in EPA: legal mandates and equity considerations, such as the right to clean air and water; political forces, including public opinion and

[1]The Administrator instituted an annual planning retreat, held in April in Shepherdstown, West Virginia, for assistant administrators and their deputies and regional administrators and their deputies, to discuss priorities for the future budget year.

deeply held societal values; and scientific approaches based on risk, feasibility, controllability, costs, and benefits. In a briefing on the Comparative Risk Project for EPA executives, an official in EPA's Office of Policy, Planning, and Evaluation said EPA uses all three approaches simultaneously but that the Comparative Risk Project was a step toward bringing all three together in a better balance.

In assessing the risks of the 31 environmental problems, EPA obtained the judgment of about 75 career managers and experts representing all EPA program offices. The participants assembled and analyzed existing data on pollutants, exposures, and effects. Each of the problems was ranked separately on four criteria—cancer risks, noncancer health risks, ecological effects, and welfare effects—however, no attempt was made to consolidate these four ratings into a composite score, because no decisions were made on the relative importance of the four types of risk.

The study had important limitations. For example, because of the scope of the project, the following elements were not considered: the economic or technical controllability of the risks, the degree to which risks were voluntarily incurred, the benefits of the activity causing the problem, and the existence of a basis for dealing with the risk. In addition, all risks were assessed as they existed, that is, it was assumed that all existing programs would continue at the same level. Finally, the effort faced extensive data problems, because of data gaps and difficulty in comparing data that were generated somewhat differently.

Despite its limitations, the project results have received generally favorable reviews within the agency, as well as by the Congress and interest groups, as a good first effort. Some congressional staff and experts we interviewed saw the Comparative Risk Project as a valuable effort to reconsider environmental priorities in a cross-media framework and identify areas where additional policy choices and further analysis were needed. Among the areas where further policy is called for is a basis for making trade-offs between human health and the well-being of plant and animal life. EPA has used the study findings by incorporating most areas identified as relatively high risks but low EPA effort into the priority list for fiscal year 1989. Three regional projects using risk to assess the problems in a given geographic area have also been initiated as a follow-up to the Comparative Risk Project.

We believe that the Comparative Risk Project has been an important step toward improving EPA's priority-setting process and that the agency could build on this effort by

- articulating decision rules for balancing efforts directed at human health and those aimed at preserving and maintaining the environment,
- developing short- and long-term research agendas to fill data and analytical gaps encountered in the course of the study,
- undertaking a second study in 2 or 3 years, when some of the data and analytical gaps will have been filled,
- undertaking risk studies in all 10 regions to build the analytical base for regional office participation in the development of the priority list and Agency Operating Guidance, and
- ensuring that, as priorities are refined through additional analysis, they are linked to proposals for legislative changes and resource requirements, as well as to the Agency Operating Guidance, allocation of resources to the regions, and SPMS measures.

EPA Can Utilize Strategic Planning Initiatives to Better Focus Plans and Operating Activities

In the spring of 1985, the Administrator directed that five Strategic Planning Initiatives be undertaken to improve the understanding of environmental problems by focusing on key emerging issues with cross-media implications. Long-term objectives were to be developed, innovative approaches used, and interested parties—including other EPA and federal offices, states, and outside groups—included to build consensus for planning and budget decisions. Strategic Planning Initiatives were undertaken in five areas—wetlands, near coastal waters, air toxics, agricultural chemicals in groundwater, and waste management—involving all four program offices and the Office of Policy, Planning, and Evaluation.

While the projects fell short of expectations in several respects, overall they have produced some useful results that can guide agency action. For example, the agency developed a flow chart on the generation, treatment, and disposal of point sources of solid waste, which shows pathways affecting air, water, and land. While this flow chart shows major sources, pathways, and receptors for solid waste, it could be further refined to provide the basis for formulating future priorities by detailing the specific pathway—such as air—as well as those chemicals and contaminants that are to receive priority focus.

Another example of results that have broader application is the Near Coastal Strategic Initiative, which could also be used to articulate the

estuaries and near coastal waters priority in more exact terms, by specifying how many (or what percent of all endangered estuaries) would be addressed, with a specific environmental result, in a specified time frame. The Near Coastal Strategy analyzed and developed alternative approaches for addressing the broad problems of point and nonpoint source pollution on estuaries and near coastal waters, which act as "sinks" for collecting pollution runoff from myriad sources. The significance of this strategy is indicated by Census Bureau statistics, which forecast that, by 1990, three-fourths of the U.S. population will live within 50 miles of the coastline. The Near Coastal Strategy resulted in a comprehensive plan for ranking near coastal water bodies to identify priorities for action plans. In addition, provisions to implement the strategy, including funding to carry out the action plans, are included in the Water Quality Act of 1987.

According to planning staff, the Administrator intended, in the Strategic Planning Initiatives, to begin developing strategic plans in key emerging issues with cross-media implications. The ultimate objective was to have strategies for all major programs, which, when interrelated, would form an EPA-wide strategy. The results of the initial round of these strategic initiatives suggest agency-wide application as ways to identify cross-media problems and initiate analysis needed to set measurable priorities and identify tasks and resources needed to achieve measurable results. For example, EPA could (1) expand the flow chart on the waste system to include more pollution sources and their pathways and receptors to permit wider consideration of cross-media transfers and possible solutions and (2) adapt and apply the ranking system for estuaries to other programs in order to focus more on sites with the most environmentally significant problems.

Stating the Priority List in Measurable Terms and Ranking It Can Provide the Underpinning for Operating Guidance and Accountability

EPA's priority list for fiscal year 1988, the major categories of which are listed below, provides little direction for developing annual Agency Operating Guidance or annual SPMS measures of accountability.[2] It contains neither measurable statements of what is to be acceptable progress for each priority nor a ranking by relative importance.

[2]Appendix IV provides the complete priority list for fiscal year 1988, including subissues under each of the major headings.

Fiscal Year 1988 Priority List: Major Categories

- reduce risks from exposure to pesticides, toxic chemicals, and pathogens,
- reduce exposure to unhealthy air quality,
- prevent groundwater contamination and reduce other risks from hazardous wastes,
- improve protection of aquatic life and human uses of surface waters, and
- improve the agency's ability to manage risk.

The priorities as stated provide little guidance for decision making. For example, the priority "reduce exposure to unhealthy air quality" does not include a statement of how much of a reduction to achieve or a time period for the reduction. The priority "reduce risks from exposure to pesticides, toxic chemicals, and pathogens" does not indicate how exposure would be measured or which, if any, of these contaminants should be emphasized to achieve the greatest gain.

The following examples using a subissue under the fiscal year 1988 estuaries and near coastal water priority, included in appendix IV under "Improve Protection of Aquatic Life and Human Uses of Surface Waters," show how restating priorities in measurable terms could better focus attention on important management questions.

Example 1

Long-term: Restore and maintain for designated uses all national estuaries by the year 2000.

Short-term: By 1990 identify all nationally significant estuaries threatened by pollution, development, or overuse; begin development of comprehensive management plans for all priority estuaries mandated by law; and carry out scheduled priority corrective actions and compliance schedules for point and nonpoint pollution sources.

Example 2

Long-term: Protect health and the environment from any unreasonable adverse effects from pesticides currently in use by reviewing and assessing the risk of all existing pesticides by the year 2000.

Short-term: By 1990 call in and review data from pesticide registrants for pesticides currently in use. Identify those pesticides having the likelihood of the greatest harm to human health and the environment, complete the data analysis, and issue pesticide registration standards for no fewer than 25 per year.

By stating the priorities in specific and measurable terms, management attention can be focused, at every level, on such important aspects of program implementation as resources needed to achieve them, measures for evaluating programs, data requirements, and whether legislative mandates or internal agency expectations need to be changed. Stating the priorities in measurable terms serves to focus the task of implementing the priority on such questions as the following:

- Are legislative changes needed?
- Are budget and other resources available to achieve these priorities? If not, how will they be obtained?
- How extensive is the problem (for example, how much wetland is there, how much is damaged, how much is threatened)?
- What data are needed and available for implementing and assessing program activities?
- What criteria will be used to assess the problem and judge success?

In addition to stating the priorities in measurable terms, the usefulness of the priority list for decision making could be improved if it were rank ordered. Ranking would help provide guidance for translating the priority list into resource proposals, determining what SPMS measures are appropriate, developing operating plans, and allocating resources. In this regard, a major finding of a 1986 EPA study on SPMS addressed the issue of setting priorities:

"A number of respondents questioned whether the system, as operating now, is setting and tracking real priorities. Since everything is a priority, then nothing is a priority."

The SPMS study argued that the priority list should be ranked, concluding that the consequences of not ranking the list were that

"The priority list is both broad and horizontal. Since the priorities are not vertically ranked against one another, all are ranked equal. Also, given the number and scope of the priorities, most agency activities can be interpreted to fit under one of the priorities."

The SPMS study stated that a further consequence of not ranking the priorities is that the list

"is not useful for guiding choices among potential SPMS accountability measures . . .[;] virtually any proposed accountability system measure can be cogently

defended as reflecting an Agency "priority" . . . . Since the priority list cannot discriminate among competing measures it cannot be used to limit the number of measures in the system . . . . [The study concluded that] what we have considered the core purpose of the system suffers: the ability to set recognizable priorities and focus the Agency's energies on the most important work."

Ranking could be done on an ordinal basis, for example, by ranking 10 priorities 1 through 10, or by "banding" in categories of highest, medium, and lesser priority. Ranking could be implemented, as an example, in conjunction with the annual planning meeting, by having the regions utilize the results of risk studies undertaken as a follow-up to the Comparative Risk Project and asking regional and national program managers to rank problems across media.

Stating SPMS Measures in Operational, Measurable, and Productivity-Oriented Terms Would Provide a Link Between Work Done and Results Achieved

Once decisions have been made on what the most critical issues are and measurable objectives have been developed, those objectives must be linked to SPMS accountability measures. At the present time, SPMS accountability measures are generally defined so that they track various activities, such as the number of inspections made and the number of permits issued. While this manner of defining and measuring progress/success tracks the number of specific actions taken, it does not provide an operational link between work done and the results to be achieved. We see opportunities to tie existing measures operationally to specific objectives, thereby linking program activity and the ultimate goal of measurable environmental results. We also see opportunities to include productivity measures, so as to measure and evaluate changes in performance and strengthen accountability for program results.

The SPMS system can serve as the cornerstone for managing for measurable environmental results if the measures are stated so that they (1) are tied into the planning system, (2) reflect what the agency is trying to accomplish rather than enumerating the activities it performs, and (3) include data on the quality, timeliness, and efficiency of resource utilization. Chapter 4 discusses the need to then tie SPMS measures to environmental quality measures.

An Operational Link Between Work Done and the Results to Be Achieved Is Needed

Although SPMS has been criticized for its lack of environmental results measures, important aspects of the measurement system should not be overlooked. For example, a 1986 internal study of SPMS showed strong agency support for the system and general agreement that the accountability portion of the system was a powerful tool for driving work and

resources in the field. EPA managers, interviewed for the study, said they needed three types of information to know whether the agency's objectives were being accomplished: measures of (1) activities accomplished, (2) the quality of achievements, and (3) environmental results. Most managers reported being satisfied with the activities measures but less satisfied with the quality measures; they generally agreed that "only a small handful of the SPMS measures addressed environmental results."

The study concluded that SPMS had few environmental results measures, because the system was designed to create accountability over short-term activities and focus on resource management. In addition, because SPMS focuses on short-term commitments, quarterly reporting, and timeliness of data inputs, the study termed the system to be "a flawed instrument for tracking long-term environmental trends."

Our assessment of the fiscal year 1988 SPMS measures confirmed the study's finding that few of the measures were directed at obtaining information on the environmental impact of agency actions. We found that 141—98 percent—of the 145 measures related to either agency or pollution source actions.[3]

We agree with the study's conclusion that the SPMS measures do not constitute measures of environmental results. However, we believe the system can serve as the foundation for improving EPA's ability to assess program effectiveness if it links outputs with results and uses productivity information to promote effective and efficient use of limited resources.

Linking Outputs With Results to Evaluate Effectiveness

One of the major criticisms of the SPMS measures, as shown in internal EPA reviews, has been that they generally reflect what the agency does, not what it achieves. Our work supports this criticism. We extracted the following SPMS measures as examples from the fiscal year 1988 Agency Operating Guidance.

"Example #1

Office of Water—Underground Injection Control Program

Inspections:

[3]Agency and pollution source actions, as discussed in ch. 4, include, for example, issuing regulations, making inspections, and installing pollution control devices.

Measure

Track, by Region, progress against quarterly targets for the number of wells with field inspections conducted by EPA and by primacy states.[4] (Note: Data are lagged 1 quarter for primacy States.)

Objective

Achieve and maintain high level of compliance in the Underground Injection Control Program.

"Example #2

Office of Water—Enforcement and Permits Program

NPDES Inspections—major facilities:

Measure

Track, by Region, against targets the number of major permittees inspected at least once. (Combine EPA and State inspections and report as one number.)

Objective

Identify compliance problems and guide corrective actions through inspections.

"Example #3

Office of Water—Public Water System Program

Supervision

Measure

All micro, all turbidity, and TTHM M/R (trihalomethane, maximum residence time of the water in the system). Track, by Region, the number of community water systems that are SNCs [significant noncompliers] of a

[4]Existing legislation and EPA regulations allow states to request management responsibility for certain environmental programs. In those instances where responsibility is granted, the state is referred to as a primacy state.

microbiological MCL [maximum contaminant level] and/or M/R requirement, a turbidity MCL and/or M/R requirement, or a TTHM M/R requirement. . . . Establish a target for the percent change in the number of SNCs occurring as of 6/30/87 versus those occurring as of 6/30/88. . .

Objective

Ensure compliance with existing drinking water standards."

In example #1, the measure—number of inspections performed—does not include an expression of the change in the compliance to be achieved as the result of inspection activities, that is, although the number of inspections is measured, no operational link is made between the inspection activity and the objective of achieving and maintaining a "high level of compliance." As a result, inspectors cannot be held accountable for achieving improved compliance. In addition, the measure (number of inspections) implies that inspections should affect compliance rates but sets no measurement for the amount of impact. Example #2 evidences similar deficiencies. While the number of inspections is measurable, it is not operationally linked to compliance. In example #3, although the objective is not quantified in the measure itself, it recognizes that supervision activity, if properly conducted, should change the level of community water systems in significant noncompliance. In this instance, the desired result would be expressed, once the percentage change target is set, in measurable and operational terms.

Table 3.1 illustrates how measures and objectives in the three examples could be redefined in terms that are operational as well as measurable.

Table 3.1: Defining Measures and Objectives in Operational, as Well as Measurable, Terms

Measure	Objective/application
Frequency of total deficiencies per site inspection	In addition to identifying compliance problems, define annual inspection objective as reducing the average rate of deficiencies and/or reducing the average rate of severe deficiencies.
Frequencies of most severe deficiencies per site inspection	Monitor performance in meeting objective and compare with trends in environmental indicators. For example, if the deficiency rate is falling when indicators show environmental conditions are getting worse, management should evaluate whether it is doing the right kinds and numbers of inspection tasks. Classify deficiencies by regulatory areas; then analyze for patterns or trends. A low deficiency rate may indicate that a regulation is being effectively enforced—or that it is obsolete. Conversely, a high deficiency rate may signal inadequate enforcement or the need to clarify the regulation.
Quality of inspection report, based on compliance with standards on information to be included in reporting thoroughness	Define annual objective as maintaining (or improving) the level of compliance with inspection report quality standards and monitor individual reports for compliance. Marginal quality could signal, for example, that more training or better guidance is needed to ensure satisfactory performance.

Productivity Improvements Can Promote Effective and Efficient Use of Limited Resources

EPA could use productivity standards and goals to measure and evaluate changes in task performance levels while strengthening accountability for program results. In addition to measuring resource efficiency (output per unit of input), productivity improvement measures the quality and timeliness of program delivery, on the basis of standards that management defines. Service quality and timeliness are important because emphasizing efficiency at their expense stresses doing the task over achieving its objective—a situation that is ultimately counterproductive.

The need to increase government productivity is receiving increasing attention. In line with his deficit reduction goal, the President launched a government-wide effort to put productivity improvement into mainstream program services by issuing Executive Order 12552, February 1986. This is a challenge for many agencies, including EPA. By integrating productivity improvement with planning, we believe EPA would promote effective and efficient use of limited resources and strengthen accountability for program results.

Our analysis of SPMS for fiscal year 1988 shows that 43 (30 percent) of the 145 measures dealt with some aspect of productivity. The following examples illustrate each type of SPMS measure.

"Example #4

Office of Water

Underground Injection Control Program

Measure

Report, by Region and nationally, the number of proposed EPA orders, the number of final EPA . . . administrative orders, and the number of final State [administrative orders] issued.

Objective

None stated.

"Example #5

Office of Water

Water Enforcement and Permits Program

Measure

Track, by Region, against quarterly targets, the number of: 1) audits of approved local pretreatment programs conducted by EPA and the number conducted by approved pretreatment States; and 2) approved local pretreatment inspections conducted by EPA and the number conducted by the States for . . . Publicly Owned Treatment Works.

Objective

Effectively implement approved local pretreatment programs."

Example #4 illustrates a measure that, while collecting information on outputs, does not provide a criterion against which to measure performance. Example #5, although not stated as part of the SPMS measure, indicates that the audits and inspections done will be assessed against a general goal; however, it does not specify how the quality of the audits

and inspection activities will be assessed. Detailed below is some of the information that would be useful in assessing productivity of inspection activities.

Assessment of the productivity of inspection activities could be facilitated if EPA had data showing the number, types, and severity of violations; actual hours spent doing inspections; time spent traveling to and from inspection sites; time taken to maintain administrative records; and time lost as a result of not completing inspections as scheduled. Once it assembled adequate data, EPA could start developing productivity measures. Standards of quality, timeliness, and efficiency could be defined and used to set annual productivity goals as part of the current planning process and to strengthen accountability for program delivery. For instance, the Office of Water's inspection measure (example #2) could be stated as follows:

"Meet established standards of quality and timeliness for the delivery of inspection service while increasing resource efficiency by 10 percent (as measured by actual number of completed inspections in relation to hours spent)."

Defining the goal in this manner provides a framework to monitor performance and measure changes along each productivity dimension—quality, timeliness, and efficiency—essential to the delivery of public services.[5]

Planning and Budgeting Links Are Needed to Translate Administrator's Initiatives Into Resource Needs

For the Administrator to achieve his policy priorities, close linkages between the planning and budgeting systems are needed to ensure that priorities are translated into resource allocations both in formulating budgets for the future year and executing the budget in the operating year. The importance of the linkage between plans and budgets was aptly expressed by a participant in a conference on multimedia environmental issues, sponsored by the National Academy of Sciences in February 1987, who said that the real priorities in EPA are those reflected in the budget and in the conduct of agency activities.

We found that (1) budget formulation needs to more closely reflect the priority list, (2) operational planning needs to drive development of operating budgets, and (3) reprogramming authority available to the agency needs to be better utilized as an ongoing means to link planned

[5]Our report Superfund: Improvements Needed in Work Force Management (GAO/RCED-88-1, Oct. 26, 1987) discusses the need for EPA to use productivity measures in managing the Superfund program.

priorities and objectives to budget execution. EPA has acknowledged that improved linkages are needed between planning, priority-setting, and budgeting to better reflect agency goals and initiatives in annual resource decisions and that without a direct linkage to resource allocation decisions, many managers are reluctant to invest in analysis and planning.

Budget Formulation Needs to Reflect EPA's Priorities

In reviewing the priority lists and the agency's publication, "Summary of the Budget," which reviews key budget issues for each congressional budget submission, we found no consistent relationship between inclusion of an issue on the priority list and inclusion in the budget summary for fiscal years 1987 and 1988. For example, we found that of three air and radiation priorities that were included in both the fiscal year 1987 and 1988 priority lists, none were included in key issues in the budgets for either fiscal year 1987 or 1988, except under the 1988 research budget, where, for example, a small increase for indoor pollution research was requested. Similarly, reregistration of existing pesticides, which has been included in priority lists since fiscal year 1986, was not included among key issues in either the fiscal year 1987 or 1988 budget request.

Among five water priorities included in both the fiscal year 1987 and 1988 priority lists, three do not show up as key issues for either the fiscal year 1987 or 1988 budget, one shows up as a key issue for fiscal year 1987 with no change in funds, and one appears as a key issue in the fiscal year 1988 budget with an increase in funds. With respect to five hazardous waste control issues included in both the fiscal year 1987 and 1988 priority lists, one was not included in the key budget issues for either year, three were included in fiscal year 1987 key issues and received increases and one was included in the fiscal year 1988 key issues and received an increase. Among four research issues that were highlighted in the priority list for fiscal year 1988 for the first time, only one was a key issue for the fiscal year 1988 budget, with increased funding.

We identified several reasons for the lack of connection between the priority list and resource allocations in the budget requests, including (1) perceptions about the rigidity of legislative requirements, which reinforce traditional resource distributions, (2) difficulty in shifting significant amounts of resources from traditional program activities to new

activities, or from one program office to another, due to the strong single-media focus of EPA program offices and their dominance in the budget process, and (3) absence of growth in EPA's budget.

According to planning officials, shifting resources to new priorities is very difficult because the budget process is designed to support traditional, single-media programs and activities. Budget officials confirmed this view, indicating that the workload models, maintained by the program offices and used to determine staffing levels required by regions to carry out proposed program activities, are based on the levels of previous performance of activities, such as permit granting, inspections, and enforcement, for traditional programs. These models are a basic tool for determining program resource requirements during budget formulation. The models are, in turn, based on what agency officials believe to be congressionally mandated requirements for program implementation. Thus, the combination of perceived legislative mandates and the use of the workload models for pricing the "base program" makes the budget process extremely rigid, leaving little room for resource shifts to other problems.

This conclusion was confirmed by a program official who told us that no significant budget shifts to priority list problems have been made in his office in the last few years. According to this official, the major factor determining whether a program gets additional funds seems to be new legislation, rather than inclusion in the priority list. Senior program officials also indicated that lack of growth in the overall EPA budget was also a major reason why higher priority problems did not receive additional funds.

Priority issues need to be better linked to the budget formulation process if the Administrator is to implement his goal of achieving measurable environmental results. To do so, EPA can (1) consult with the Congress to identify and utilize existing legislative flexibility to shift resources and obtain Congress' support where changes are needed, (2) revise budget guidance to provide more trade-off options for the Administrator to consider, and (3) refocus its lead region approach to reflect cross-media planning and budgeting.

Working With the Congress to Utilize and Enhance Legislative Flexibility

In 1983 the Office of Policy, Planning, and Evaluation initiated its Statutory Review Project to identify, analyze, and encourage reforms to increase EPA's overall effectiveness and efficiency. The review concluded that the agency has considerable flexibility in how it conducts its work.

While the general conclusion that extensive flexibility exists has been shared with top agency officials, the general perception we got from our discussions with officials throughout EPA was that because of legislative mandates, EPA's budget is largely "locked in concrete," leaving little flexibility to move resources to issues on the priority list.

While no formal report was issued, the project's results persuaded top EPA officials that a significant amount of flexibility existed in how the statutes could be interpreted. For example, the Administrator, citing the Statutory Review Project at the first meeting of all EPA managers in February 1987, stated that EPA had more flexibility to resolve inconsistencies in legislative requirements then previously thought. At a subsequent meeting in April, the Administrator pointed to the agency's ability to respond to radon and the stratospheric ozone problem as examples of legislative flexibility. At the April meeting, the Administrator again emphasized that flexibility in the statutes existed and could be used to achieve measurable environmental results across media. According to officials of the Office of Management and Budget (OMB) and congressional staff on both authorizing and appropriating committees, considerable flexibility does exist to address resource requirements during budget formulation but that to utilize it EPA must take the initiative, including greater consultation with the Congress.

- While a key EPA budget official told us that OMB's ceiling for the agency's budget leaves little flexibility, OMB officials told us that the ceiling includes mandatory funding levels for only a few "significant policy issues"—such as acid rain and ozone problems. Except for these few issues and legislatively mandated activities, according to the OMB officials, EPA had flexibility to allocate its budget to meet its priorities.
- Congressional officials were aware of the demands inherent in the variety of legislated mandates, such as deadlines, on EPA's flexibility to shift resources. According to some staff members, these requirements were intended to resolve differences between the Congress and EPA on program implementation. At the same time staff members indicated their willingness to discuss options, such as prioritizing sites by environmental significance and addressing the highest priority sites each year, within the level of resources available for that issue. They confirmed that flexibility exists in areas, such as water quality permit granting, in which facilities that are not granted renewals by the time the permit

expires are still bound by the permit under the Administrative Procedures Act.[6]

- While congressional staff members did not always endorse the results of the Comparative Risk Project, some receptivity did exist to the idea of EPA's shifting modest increments of funds, in the range of 5 to 10 percent, if sufficient justification for such changes were also provided. According to one key staffer, shifts of funds from one media to another could be discussed with the authorizing committees, who, if they agreed, could then coordinate with the appropriating committees to support the shifts.
- The House Appropriations Committee, in its report for fiscal year 1987, stated,

> "The breadth of . . . problems . . . require[s] EPA to develop better methods for setting regulatory priorities and targeting resources at the most critical problems. Over the past two years the Committee has strongly supported EPA's initiatives to place greater emphasis on the role of risk assessment in environmental decision making."

EPA's Administrator, OMB officials, and congressional staff members with whom we spoke believe that EPA has flexibility to determine resource requirements on the basis of policy priorities and to formulate legislative proposals and annual budget requests accordingly. However, other than the Administrator's remarks to his top managers, little has been done. According to an EPA official, since the beginning of the Statutory Review Project, the agency has considered a detailed study to document the exact nature and size of the flexibility available but has lacked funds to do so.

In view of the seriousness of environmental concerns, the perceived conflict between legislative mandates and issues identified as priorities within EPA, and the relative stability of resources budgeted to many higher-risk issues over the last 10 years, it would appear that EPA needs to

- identify areas of legislative flexibility,
- work with the Congress to gain support where legislative changes are needed to meet changing priorities, and
- determine resource requirements to address its priorities for inclusion in its budget formulation process.

[6]The Administrative Procedures Act, 5 U.S.C., Sec. 551 et seq., details the procedures that agencies must follow in exercising their regulatory responsibilities. In the case of licenses involving activities of a continuing nature, the holder's application for renewal continues the existing license until such time as the regulatory agency takes action, 5 U.S.C. 558.

We recognize that the current federal budget climate may limit the amount of new resources available for EPA programs, although the Congress has been willing to fund new legislation using such methods as special taxes to avoid budget constraints. However, EPA's effectiveness in shifting resources to address its priorities depends on the agency's ability to better justify and link its priorities to legislation and budget requests.

Revising Budget Guidance to Provide the Administrator Budget Trade-Off Options

Each year the Administrator begins budget formulation for the fiscal year 17 months away, by transmitting budget guidance to program offices. For example, the budget guidance for fiscal year 1988 was transmitted in May 1986. The budget guidance contains the priority list and the range of resource levels within which program offices are to develop their budget request. For example, budget guidance for fiscal years 1988 and 1989 permitted the program offices to submit budget requests that were 100 percent and 105 percent of the current operating level. Limiting budget proposals to the amount currently available or 5 percent more would appear to reinforce budget formulation based on the status quo rather than in terms of relative risks and anticipated environmental results.

An alternative approach would be for the Administrator to ask the program offices how they would achieve priority issues and implement their current mandates within a wider range both above and below current budget levels, given existing legislative statutes; request that they consider/propose needed legislative changes; and specify measurable environmental results to be achieved for each increment of resources requested.

Refocusing EPA's Lead Region Approach to Reflect Measurable Results Across Media

Opportunities also exist to increase agency efforts to focus on priority list issues in regional participation in budget formulation activities. As early as 1982, regional officials expressed concern that the budget process did not sufficiently reflect state and regional office priorities in resource allocation decisions. Regional staff stated then that rather than addressing state and regional priorities, resources tended to be allocated on the basis of historical patterns. Reacting to regional arguments for more influence over budget allocations, the national office instituted the "lead region" concept. Under this concept regional offices rotate the role of coordinating input from all regions for programs under the purview of the four national program offices. For example, Region 10 was designated the lead region for water programs for formulation of the fiscal

year 1989 budget. Region 10 consulted with the other regions and with the Office of Water to provide information on regional needs and resource requirements for water programs.

While the approach provides an important link between headquarters and regional offices and focuses attention on the programmatic needs of each region, it also tends to reinforce the single-media focus with the accompanying continuation of traditional program activities at previous-year budget levels. Further, it tends to deny EPA the perspectives and information, especially in cross-media areas, that could be used to better support arguments for changes in priorities and to generate support for these changes.

Building on working relationships already established, EPA could have each lead region include a relative ranking of the particular program area it has the lead for against the cross-media priorities existing in the regions. For example, Region 10's focus on resource requirements for water programs could also include the relative importance of the water resources to others in the region. This could be achieved by requesting that the regions submit directly to the Office of the Administrator "pie charts," based on regional risk studies, showing how they would allocate among the several media various levels of resources, such as the current amount they receive and specific increments, with analyses on environmental results expected. This type of regional input could be analyzed by staffs of the Offices of Policy, Planning, and Evaluation and of Administration and Resources Management to present the Administrator with options along with those submitted by the program offices.

Annual Operating Budgets Need to Reflect Operating Plans

Once the budget for the next fiscal year has been transmitted to the Congress for review, usually in January for the fiscal year 9 months away, EPA begins the internal process of developing operating plans, which are modified to conform to congressional action on legislative and budget proposals affecting EPA programs. EPA has two systems for defining and communicating the work to be done in the coming fiscal year. The operational planning system, a component of the SPMS, is managed by the Office of Policy, Planning, and Evaluation; and the operational budgeting system, a component of the resources and budgeting system, is managed by the Office of Administration and Resources Management.

Obtaining the benefits of improved priority-setting is dependent on how well these two systems translate priorities into action. Better integration

of these systems would help ensure that resources allocated in the operating budget reflect EPA's operating plans for the fiscal year. Our review shows that operational plans could be better reflected in annual operating budgets if EPA (1) revised the budget and planning guidance to clarify the link and (2) changed the timing of the operational planning and budgeting cycles so planning decisions precede budget decisions.

Revisions to the Planning and Budget Guidance Are Needed to Link the Systems

EPA's Resource Planning and Budgeting Manual describes the desired relationship between the planning and budgeting systems as follows.

"In relating the budget process to these management processes, it should be noted that the focal point of the budget process establishes realistic resource targets while the focal point of the strategic planning and performance management process establishes performance goals (or targets). Therefore, in relating the two processes, the resource targets must be related to performance targets. Ideally, the activities for which resource targets are set in the planning and budgeting process are the same activities for which performance is measured or evaluated. The effectiveness of strategic planning will depend upon the extent to which the activities are consistent from budget formulation through budget execution and the extent to which priorities listed in the Agency Guidance are reflected in the allocation of resources."

While the passage cited above recognizes the need for compatibility between the two systems and the importance of focusing on priority list issues, we found that neither compatibility nor the desired priority support is effectively being achieved.

Our analysis of EPA's planning and budgeting documentation disclosed the lack of a specific requirement for linking planning and budgeting decisions and activities. For example, the Office of Policy, Planning, and Evaluation's reference paper on the planning system does not address how planning decisions should relate to budget decisions. The Office of Administration and Resources Management's more formalized and detailed Resource Planning and Budgeting Manual is ambiguous on the relationship envisioned between the two systems.

In addition, the resource manual states that the Office of Administration and Resources Management reviews the use of resources in terms of priorities in the Agency Operating Guidance and advises the Office of Policy, Planning, and Evaluation of apparent discrepancies. However, it also states that (1) the planning system's goals and objectives are not directly related to the budget process, (2) the planning system priorities are not related to budgets except insofar as they are based on budgeted activities in the budget submissions of the various offices, (3) and no

formal or direct connection exists between the planning system reviews of program target achievement and the budget process.

The following example, using the issue of the wetlands protection priority list, illustrates the impact of the disconnection between these two systems.

The fiscal year 1988 priority list describes the wetlands issue as follows:

"Protect wetlands. Aggressively implement the Wetlands Protection Strategy. Increase emphasis on use of advance identification and strengthen enforcement for protection of priority wetlands."

The fiscal year 1988 Agency Operating Guidance calls for, among other activities, increasing the level of protection afforded wetlands beyond that available through implementation of the base program of permit review, enforcement, and advanced identification by securing maximum protection of all wetlands and increasing the understanding of wetland values. EPA has described the significance of expanding protection to wetlands, stating that up to two-thirds of the wetland losses that have occurred are not covered by EPA's legal authorities. The expanded program calls for new, innovative approaches, including both outreach to the public and working with state and local governments.

Although on the priority list since fiscal year 1985, our analysis of regional staffing for the wetlands program showed only one increase in resource levels since that year. Seven workyears were added in fiscal year 1986, bringing the regional total to 62.6 workyears. Recognizing that significant changes in program direction under the new wetlands program initiative were occurring or would be required, the program office selected, among others, the workload model for the "Dredge and Fill" program element, which covers wetlands activities, for updating in fiscal year 1988.

To do the updating, the program office formed a work group, composed of regional and headquarters representatives knowledgeable about wetlands, to determine the level of resources needed to implement the basic program and new initiatives in the regions. According to an Office of Wetlands official, the workload model developed by the group estimated that nearly 6 times the present field staff would be needed to carry out all elements of the new initiative. The workload model showed that nearly 129 workyears, about twice the 62.6 allocated in fiscal year 1987, would be needed in the near future. However, the Comptroller's Office

determined that no additional resources were to be made available for this program and the group fell back on the prior year's distribution. Very little change therefore took place, leaving the work group frustrated. For example, the group report, cited below, shows that the group saw little relationship between the final budget resource allocation of 62.6 workyears and the priority list or the operating plan's discussion of the importance of protecting the wetlands.

> "The workgroup agreed that the anomaly precluding a . . . model derived resource distribution lies in the static resource base of 62.6 Regional workyears in the face of a greatly expanded list of Headquarters priority initiatives and in the absence of any additional fiscal year 1988 resources to support these initiatives. The group consensus was that a model derived distribution of 62.6 workyears could only result from a model which significantly and unacceptably, distorted the categories of activities and related pricing factors and activity counts, rather than one which objectively distributed resources on the basis of senior headquarters and Regional managers' goals and priorities."

Thus, at least for fiscal year 1988 EPA would not devote more than 62.6 workyears to the regions for protecting the wetlands, not withstanding its status as a priority list issue and calls for increases beyond the base program in the fiscal year 1988 operating plan. The net result of the group's deliberations was to shift a total of 2.2 workyears from two regions and redistribute them to four others—two regions received increases of 0.2 each, another received 0.3, and the fourth received 1.5 workyears.

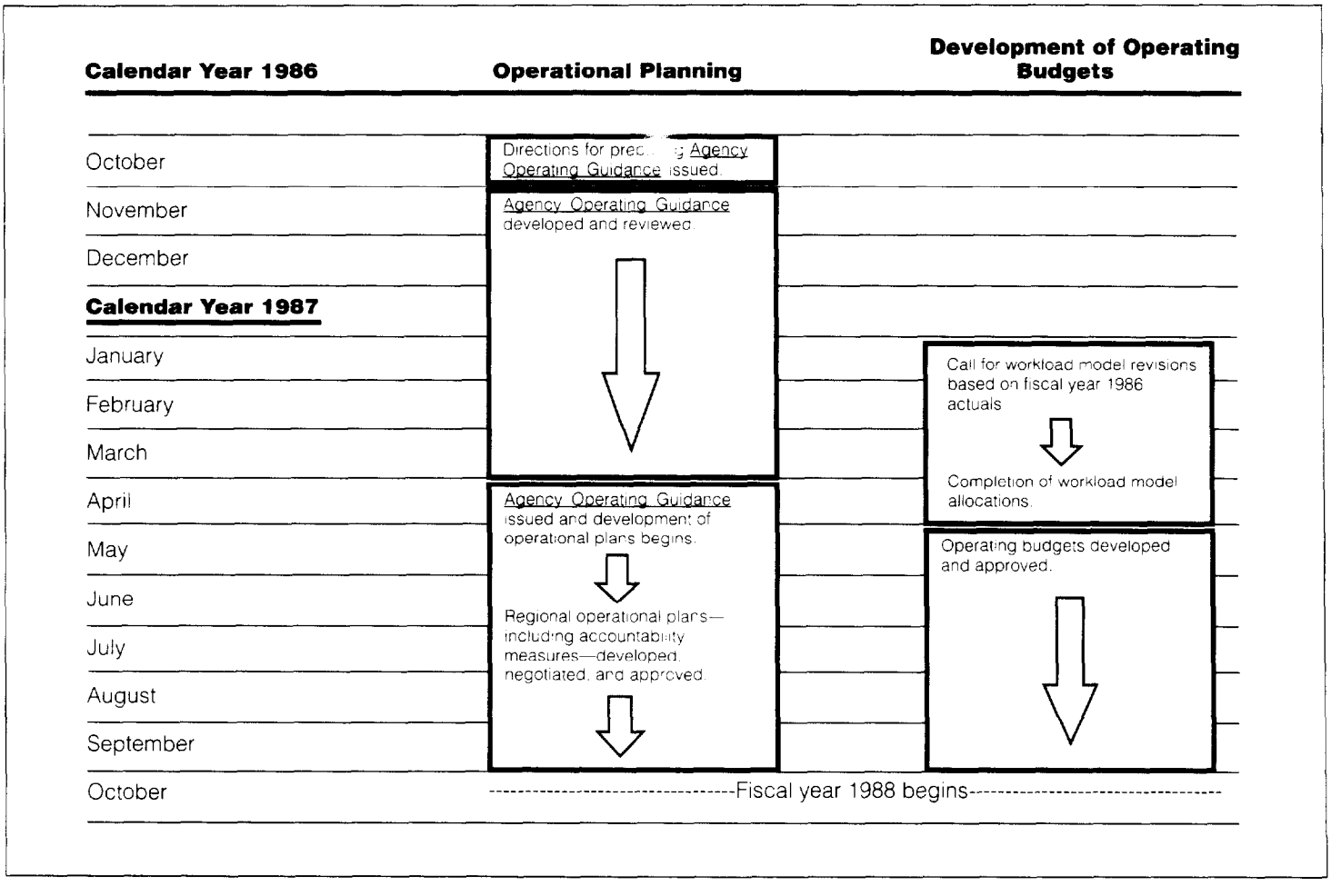
As evidenced by the above, it is unclear how EPA can ensure that priority list issues, generated by the planning system, are supported by budget resources without making it a stated objective of the two systems. What is needed, in our opinion, is for EPA to build an institutional mechanism between the Office of Policy, Planning, and Evaluation and the Office of Administration and Resources Management, the two offices responsible for planning and budgeting, and make their relationships explicit in the agency by

- issuing a joint manual or revising the existing manual and reference paper to better articulate the relationship between the planning and budgeting systems, and combining the guidance for developing annual operating plans and budgets and
- instituting joint reviews of proposed plans and budgets by the Office of Policy, Planning, and Evaluation and the Comptroller's Office to ensure the two processes are serving their appropriate roles of supporting priority list issues.

Operational Planning Decisions Need to Precede Development of Operating Budgets

The key component of the operational planning system is the development of the agency operating guidance, which is used to prepare more detailed plans by program and regional offices. The operational planning cycle begins with the Deputy Administrator's "call" for development of the Agency Operating Guidance. This call takes place about 5 months after the priority list for the future fiscal year has been developed and distributed within the agency. As shown in figure 3.3, development and review continues through the fall and winter, culminating in the issuance of the Agency Operating Guidance in late March or early April. One of the stated purposes of this process is to ensure that the guidance addresses the action required at the headquarters, regional, and state levels to implement the priority list.

Figure 3.3: Operational Planning and Operating Budget Time Lines (Fiscal Year 1988 Illustrated)



Transmittal of the agency operating guidance initiates the next phase of the operational planning cycle—development of state and regional plans. Because state fiscal years generally start on July 1, state plans for grant agreements take precedence over development of regional plans. As shown in figure 3.3, regional plans and targets for performance are developed, negotiated, and approved by the end of September. Development of the operating budget begins in January, for the fiscal year beginning the next October. This process is initiated with transmittal of the call for workload model revisions.[7] Workload models are important to the budget process because they are used to allocate virtually all regional staff resources. By the end of March, distributions of resources to the regions have been calculated, although development of detailed operating budgets for the program offices continues into September. The resources allocated through the operational budgeting process determine, define, and communicate the work regional offices will undertake.

Figure 3.3 details the timing sequences of the operational planning and budgeting processes. As shown, development of regional operating plans begins in April, subsequent to the March or early April promulgation of the agency operating guidance. This phase of the planning cycle culminates in establishing regional performance targets in September. However, decisions on resource distributions to the regions would have been made in the previous March. Because budgeting decisions are made before operational plans are completed, the regions do not have an opportunity to consider how best to allocate their resources to address the priority list issues when they prepare their operating plans. Thus, the process, as it currently functions, locks regions into performing those activities upon which the workload models were based, activities that may or may not reflect the priority areas specified in the Agency Operating Guidance. Therefore, EPA needs to correct the timing problem between the two systems by changing either the planning or budgeting process so that planning decisions precede budget decisions.

[7]Workload analysis is performed to identify key activities in a program and to estimate the level of activity and resources (workyears) required to support that level of activity. EPA uses the workload models, based on this analysis, as the mechanism to distribute workyears to the regions. Data on actual time spent for various activities for the fiscal year just completed are used in revising the models for developing operating budgets.

Adjusting the Operating Budget Through Reprogramming Provides a Way of Supporting Priority List Items

Because of the time that elapses between formulation of the future-year budget within the Executive Branch and implementation of a budget enacted by the Congress, situations may occur that require adjustments to the planned program and operating budget. In addition, opportunities may arise, through greater than expected productivity in one area, to shift some resources to achieve greater environmental results in high priority areas.

Expanding the use of EPA's authority to reprogram funds—the process of formally shifting appropriated funds, from one purpose to another within the agency's operating budget—would help link the priority list to budget execution. To do this will require EPA to better define the conditions and circumstances under which reprogramming would be appropriate, in consultation with the Congress, communicate this to headquarters and regional office officials, and monitor its use during budget execution.

Reprogramming can take two forms: (1) shifting funds between program elements[8] within a single appropriation and (2) shifting funds between program elements in different appropriations.[9] As discussed later in this chapter, shifting funds between program elements within the same appropriation can occur without formal congressional approval, if each reprogramming action is under $1 million. However, the appropriations committees expect to be advised of any major shifts. Shifting funds between program elements in different appropriations requires a formal request that must be approved by OMB and the Congress.

EPA's Budget Structure Promotes Reprogramming Authority

EPA's operating budget is comprised of 7 major appropriations and managed through the use of about 400 program elements. Most program elements are allocated funds from only two appropriations, Salaries and Expenses ($700 million in fiscal year 1987) and Abatement, Control, and

[8]The EPA Resource Planning and Budgeting Manual, 1985 edition, defines a program element as the lowest level of control in the EPA program budget structure. It also states that some are very large, covering many workyears and tens of millions of dollars, p. 2-18.

[9]An appropriation is an authorization by an act of Congress to incur obligations and to make payments out of the Treasury for specified purposes. The appropriations often have built-in limitations on how and for what purposes they can be expended.

Compliance ($600 million in fiscal year 1987).[10] These two appropriations contain nearly 90 percent of EPA's fiscal year 1987 budget for its operating programs, excluding Superfund and construction grants appropriations, and cross all national program offices and regions.

Because most program elements are funded from only two appropriations, the agency has considerable authority to shift funds from one program to another within a given medium, such as water, as well as from one medium to another, such as from solid waste to air pollution. For example, EPA could shift amounts under $1 million, from program elements under "hazardous waste research" (about $14 million in 1987) to the program element "ambient air quality monitoring" ($3.5 million in 1987), since these program elements are funded from the Salaries and Expenses Appropriation. In addition, there is no limit on the number of reprogramming actions permitted during the year without prior approval of the appropriations committees, as long as each action shifts less than $1 million.

Opportunities Exist to Expand the Use of Reprogramming to Support Agency Priority List Areas

Using fiscal year 1987 reprogramming actions in the Salaries and Expenses Appropriation as an example, we found that EPA shifted few funds between program offices. For example, our analysis of reprogramming actions in five major program areas, involving $323 million, showed that none of the program areas were increased or decreased by more than 2 percent as the result of reprogramming. The percentage change for air was 0.7 percent; for water quality, -0.7 percent; for hazardous waste, -0.3 percent; pesticides, -0.2 percent; and toxic substances, 1.3 percent.

Table 3.2 shows the results of our analysis of reprogramming actions for priority and nonpriority areas for fiscal year 1987. Our analysis showed that program elements related to priority list areas did not generally benefit from increases due to reprogramming actions. For example, only 43 percent of the program elements related to areas on both the fiscal year 1987 and 1988 priority lists were increased, although 59 percent of the nonpriority list elements were. Further, for program elements relating to areas on the fiscal year 1988 priority list but not on the fiscal year 1987 list, 33 percent were increased and 67 percent were decreased as the result of reprogramming action.

[10]The Salaries and Expenses Appropriation finances salaries and related costs associated with administering the programs within EPA, exclusive of grant programs and program-specific contractual agreements. The Abatement, Control, and Compliance Appropriation finances contracts, grants, and cooperative agreements for pollution abatement, control, and compliance activities.

Table 3.2: Analysis of Reprogramming Actions Shows Opportunities to Better Support Priority List Areas

		Number of programs and direction of net reprogramming changes by program element											
		On both FY 87 and 88 priority lists			FY 88 list only			Unknown[a]			Nonpriority list items		
Major media	Program elements	+	-	Tot	+	-	Tot	+	-	Tot	+	-	Tot
Air	18[b]	1	3	4	2	1	3	2		2	6	3	9
Water quality	20	2	5	7	1	3	4	1		1	5	3	8
Hazardous waste	11	3		3	1	3	4				2	2	4
Pesticides	9[b]	1	2	3					1	1	3	2	5
Toxic substances	10	3	3	6		1	1				1	2	3
Total	**68**	**10**	**13**	**23**	**4**	**8**	**12**	**3**	**1**	**4**	**17**	**12**	**29**
Percent		43	57		33	67		75	25		59	41	

Legend
+ = Number of program elements with increases due to reprogramming actions
- = Number of program elements with decreases due to reprogramming actions

[a]We could not determine whether these were associated with specific priority list items.

[b]Does not include program elements with no changes.

Reprogramming Use and Applications Need to Be Better Defined and Monitored

While our analysis does not conclusively demonstrate that EPA makes little use of reprogramming authority to support priority areas, it does show that opportunities exist for more extensive use of this important management tool. If EPA is to make better use of its reprogramming authority to shift current operating budget resources to emerging priority list areas, then conditions and circumstances under which reprogramming would be appropriate need to be defined and its use monitored during budget execution.

Our discussions with officials in the Administrator's office and program offices indicate that while EPA does reprogram funds during the year, the extent of authority available is not well understood and its potential for focusing resources on priority list items is not fully utilized. Our discussions showed also that program office officials do not generally view reprogramming as a tool to better support agency priorities but rather see it as a device used by the Comptroller's Office to move funds to meet situations where spending patterns differ from the budget plan. For example, four program office budget analysts told us that most reprogramming efforts originate in the Office of the Comptroller as the result of periodic budget reviews. None of the analysts viewed the changes resulting from the budget review process as efforts to fund priority list areas.

Our discussions also showed that program office budget analysts may not be fully aware of EPA's budget flexibility. None of the budget analysts evidenced an accurate and up-to-date understanding of EPA's reprogramming authority. One analyst told us many agency staff rely on the Comptroller's Office to accept or reject reprogramming requests they submit, contending that any misunderstanding they have of the process will be corrected when the request is reviewed. However, their lack of awareness of EPA's reprogramming authority could make them hesitant to submit such requests.

In addition, the general consensus among these officials was that reprogramming was not used more often to support agency priorities because program offices tried to protect their resource allocation shares. When asked, these officials indicated that the priority list did not have a major influence on the shifting of funds. For example, one analyst told us that as a general rule, the tendency is not to reduce one program to add to another, even if it has a higher priority.

EPA's planning and budget manual focuses on the mechanics of reprogramming but provides little guidance on the circumstances under which it should be used. For example, it describes the internal process, agency approvals required, congressional limitations, and the forms to be used. While the manual states that reprogramming can be used to shift funds from one program element to another, it does not address the potential of reprogramming as a tool for linking priorities to budget resources. The most instructive statement on the use of reprogramming is that the Administrator and the Deputy Administrator

"may become involved in deciding on major reprogrammings . . . (or) may initiate the call for a reprogramming . . . as a means of ensuring the timely implementation of a major change in policy . . . ."

Further, those portions of the manual describing management oversight of agency performance, such as the quarterly planning system reports and the meetings the Deputy Administrator holds with program and regional offices, do not suggest the role reprogramming could play in correcting performance deficiencies. For example, the planning and budget manual describes the relationship of the planning system's quarterly reports and the budget process as follows.

"The [planning system's] Quarterly Reports reflect progress (or lack thereof) of Regional performance against National goals. There is no formal connection to the monthly budget review process conducted by the Office of the Comptroller. Should

an activity be severely behind schedule, the Deputy Administrator or [the Office of Management Systems and Evaluation (OMSE), an office within the Office of Policy, Planning, and Evaluation] may consult the budget staff to determine the budget status of that activity. The converse may also occur; that an activity which is under- or over-obligating as compared to the plan will draw the attention of the Office of the Comptroller, who may in turn check with OMSE. However, there is no built-in mechanism for comparing planned performance with planned dollars."

With only a limited number of appropriation accounts, reprogramming of up to $1 million per action without prior approval of the Appropriations committees, and even more with congressional approval, EPA has the flexibility to use reprogramming to better link budget resources to priority areas. We believe that if EPA is to take advantage of its reprogramming authority, the following actions need to be taken.

First, the Resource Planning and Budgeting Manual needs to stress the use of reprogramming as a method of responding to agency priorities. For example, the section on reprogramming, as it applies to budget execution, needs to emphasize its potential for shifting funds from nonpriority to priority list areas. That discussion also needs to describe the circumstances under which reprogramming should be used.

Second, through meetings and, if necessary, formalized training, officials in the various program and regional offices need to be informed of the use of reprogramming and how it works.

Third, the quarterly planning reviews need to monitor areas on the priority list—both the current and future year lists—that could benefit from reprogramming actions and determine if these needs could be met by shifting funds from other programs or activities.

Fourth, top management needs to assess the extent to which various levels of management are using reprogramming as a way to move resources to priority areas to ensure that agency guidance is understood and being implemented. Monitoring the use of reprogramming would help overcome some of the parochial attitudes disclosed during the course of our review and highlight the importance that top management attaches to linking resources to priorities. In addition, where agency oversight activities are discussed in the planning and budgeting manual, reprogramming's role as a link between performance and the budget system needs to be stressed.

Finally, changes in resources allocated to various programs through reprogramming actions should be incorporated in the next budget

request submitted to the Congress, which is the most appropriate vehicle for reallocating resources.

Conclusions

EPA's planning and budgeting systems are critical for translating the Administrator's goals into operating reality. The planning system must provide a mechanism for annually identifying the most significant environmental issues and stating them in terms specific enough to provide support and justification during the congressional review process and to guide the development of future-year budget requests, operational plans and budgets, and the measurement of accomplishments. Similarly, the budget system must be driven by decisions on what issues are the most important for the agency to address and flexible enough to respond to changing priorities. At the same time, linkages between planning and budgeting require close coordination between the Office of Policy, Planning, and Evaluation, which directs the planning process, and the Office of Administration and Resources Management, which directs the budget process.

Since 1984 EPA has sought to develop its Strategic Planning and Management System, directed by the Office of Policy, Planning, and Evaluation, to better identify issues where environmental results can be achieved by undertaking initiatives, such as the Comparative Risk Project, Strategic Planning Initiatives, and including greater participation of regional offices and states. While progress has been made, we found that additional steps are needed. Regional input to development of the annual priority list needs to change from assisting headquarters program offices in developing their priorities to providing a cross-program perspective on the relative importance of all the media-specific programs. To do so will provide balance to deliberations on the priority list, which are dominated by the perspective of the program offices. Similarly, follow-up is needed to realize the potential of the Comparative Risk Project and Strategic Planning Initiatives for building a cross-media perspective.

We also found that the priority list, developed annually to guide budget formulation and operational planning and budgeting, provides little direction for decision making because it has been too all-encompassing, vague, and not ranked by importance. The list is not stated in terms that indicate how managers will know when the priorities will have been accomplished or how their achievement will be measured. As a result basic questions regarding budget requirements, the magnitude and nature of the problems to be addressed, criteria for judging success, and data needs cannot be answered.

Once decisions have been made on what the most critical issues are and measurable priority statements have been developed, these statements must be linked to accountability measures used to track progress during the year. We found that EPA's accountability measures do not provide an operational link between work done and the results to be achieved. Revising its accountability system by defining the measures used and the objective to be achieved in operational and measurable terms is one way to provide this link. EPA also needs to build in productivity measures that will provide feedback on the quality, timeliness, and efficiency for delivery of services.

While the planning process needs to provide guidance for determining resource requirements for current and future years, a strong linkage between planning and budgeting is also needed for the Administrator to make the resource allocation decisions to achieve his policy priorities. The agency has acknowledged the importance of this linkage. In reviewing and comparing the planned priorities and the budget issues for the future year, we found that most of the priorities were not included in the agency's publication summarizing key issues in its congressional budget request. Agency officials explained that the budget process is designed to support traditional, single-media programs and activities and that higher priority issues are likely to receive additional funds only when new legislative requirements are enacted or the agency requests an increase in funds. In this regard, we found that the agency has more flexibility than it is using to shift funds to higher priority issues in budget formulation. In addition, EPA can take steps to (1) work with the Congress to identify and document existing areas of legislative flexibility and to gain the Congress' support where changes are needed to shift resources, (2) revise its budget guidance to provide more resource tradeoff options for the Administrator, and (3) refocus the lead region concept to better utilize the cross-media perspective of the regions.

We also found that linkages are needed in the next stage of the budget process—development of operating budgets for the upcoming fiscal year. As it is now, the development of operating budgets drives operational planning, rather than the other way around, and as a result, resources continue to be focused on traditional program activities rather than on reflecting policy decisions on the agency's priorities. To correct this problem, the timing of certain budget-related activities, such as use of the workload models to allocate program resources to the regions, needs to be changed so that regional plans are developed first and then used to determine resource requirements. In addition, greater coordination is needed between the Office of Policy, Planning, and Evaluation

and the Office of Administration and Resources Management in issuing guidance for developing operating plans and budgets and in linking planning and budgeting systems to ensure that resources allocation supports accomplishment of the Administrator's priorities.

Further, in reviewing program and budget execution activities, we found that EPA is not utilizing the reprogramming authority it has to shift funds to higher priority areas and that, like the relationships between planning and budgeting in other parts of the management cycle, the two functions were not well integrated. Although appropriations committees expect to be advised, EPA has the authority to move up to $1 million between program elements within the same appropriation, and funds crossing program lines are included in only two major appropriations, leaving considerable flexibility for responsiveness to changing priorities during budget execution.

Recommendations to the Administrator, EPA

To better identify the most significant issues to be addressed in order to achieve an integrated, cross-media program for accomplishing measurable environmental results, we recommend that the Administrator, EPA, better utilize and build on the results of the Comparative Risk Project, Strategic Planning Initiatives, and initiatives for greater participation by regional offices and the states. This should include

- beginning the planning to undertake a second Comparative Risk Study in 2 or 3 years, when some of the data and analytical gaps have been filled,
- articulating decision rules for balancing efforts directed at human health and those aimed at preserving and maintaining the environment,
- undertaking risk studies in all 10 regions to build the analytical base for regional office participation in the development of the priority list and the Agency Operating Guidance,
- ensuring that, as priorities are refined through additional analysis, they are linked to proposals for legislative changes and reflected in budget formulation, the Agency Operating Guidance, allocation of resources to the regions, and accountability measures,
- using the waste system flow chart developed by the Office of Solid Waste and Emergency Response in its Strategic Planning Initiative as a technique to include more pollution sources and their pathways and receptors to permit wider consideration of cross-media transfers and possible solutions,
- utilizing the experience of the Near Coastal Waters Strategic Planning Initiative in developing strategies in other program areas. Specifically,

the problem definition, consideration of options, and ranking system used to classify estuaries and near coastal waters by severity of the problems can be adapted to better focus attention on sites with the most environmentally significant problems, and

- involving the regions more effectively in the development of agency priorities by having them develop and rank their own priorities and give a regional presentation at the annual planning meeting.

To provide better guidance for developing resource requirements and making trade-offs during budget formulation, developing operational plans and budgets, and selecting appropriate accountability measures, we recommend that the Administrator revise the priority list to (1) state priorities in measurable short- and long-term statements to provide the missing link between policy guidance in the priority list, the Agency Operating Guidance, and managerial accountability and (2) provide a way to determine relative importance by ranking the priority list.

To provide an operational link between work done and results to be achieved, as indicated by measurable priority statements, we recommend the Administrator, EPA, refine planning system accountability measures by

- stating measures and objectives in terms that are both operational and measurable and
- including productivity goals in the measures as a way of assessing quality, timeliness, and efficiency of service delivery.

To better link decisions on what areas are of greatest importance to the agency, as indicated in the priority list, with the formulation of the future-year budget, we recommend the Administrator make greater use of existing flexibility to shift resources to higher priority issues by

- consulting regularly with the Congress to identify areas of flexibility under current law and gain congressional support where changes are needed,
- utilizing the Statutory Review Project to document existing areas of legislative flexibility, inform executives and managers, identify legislative barriers to be addressed, and prepare proposals for legislative changes required,
- using flexibility consistent with current and proposed legislation to shift a percentage of the total agency budget annually from issues of lower priority to those of higher priority,

- increasing the Administrator's options for shifting resources across media and program offices by modifying the budget guidance to ask Assistant Administrators to submit, with their proposed budgets, information on how they would accomplish their work within a percent range of fewer resources in lower-priority activities and how additional resources could achieve greater measurable results in higher-priority activities, and
- refocusing the lead region approach to reflect cross-media planning and budgeting and to enhance regional participation in budgeting.

To ensure that operational planning drives the development of operating budgets and to improve linkages between agency planning and budget systems so that resource allocation supports accomplishment of the Administrator's priorities, the Administrator should

- correct the timing of the development of operating budgets, including the use of workload models for allocating regional resources, so that the development of operational plans to carry out the Agency Operating Guidance precedes allocation of resources,
- build institutional mechanisms between the Office of Policy, Planning, and Evaluation and the Office of Administration and Resources Management by combining annual guidance for operational planning and developing operating budgets into a single document that clearly links the two; and instituting joint reviews of proposed plans and budgets by the Office of Policy, Planning, and Evaluation and the Comptroller's Office to ensure that the two processes are serving their appropriate roles in supporting the priority list, and
- correct the current lack of integration of planning and budgeting in the Resource Planning and Budgeting Manual and the Strategic Planning and Management System Reference Paper by issuing a joint, comprehensive, consistent document or correcting/more adequately reflecting both systems in separate documents on each.

To more fully utilize its reprogramming authority to shift resources to priority issues during the execution phase of the management cycle and better link oversight activities regarding achievement of planned goals, including planning system targets, and the use of resources, we recommend the Administrator accomplish the following:

- Provide guidance on reprogramming flexibility available and, through meetings and training sessions, inform program and regional office officials about the conditions for using this flexibility.

- Revise the Resource Planning and Budgeting Manual to stress the use of reprogramming as a method of responding to agency priorities. For example, the section on reprogramming, as it applies to budget execution, needs to emphasize its use as a way to shift funds to priority list areas.
- Use the quarterly planning system reviews as a combined progress review on performance targets and review of resource utilization to identify opportunities to reprogram funds from lower to higher priorities. This could include (1) considering issues in the priority list for the operating year, as well as for the future fiscal year, as candidates for resource shifts in quarterly reviews with national program managers and review sessions with regional offices and (2) reviewing the extent to which various levels of management are using reprogramming to move resources from lower priority areas to higher priority issues.

Environmental Measures and Links to Program Activities Are Needed to Assess Program Effectiveness

Achieving EPA's goal of managing for measurable environmental results is dependent on identifying and developing measures of environmental quality. A well chosen set of environmental measures would allow policymakers and the public to assess the general health of the environment and changes in its condition. Environmental measures, along with measures of program activities, are particularly necessary in program management in that they can provide a (1) means to assess 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 marshall support for current programs and new or increased initiatives. Without measures to serve as a decisional basis, EPA and the Congress are faced with subjective reasoning as their sole method of assessing the effectiveness of environmental programs.

Since 1974, EPA has taken several actions to develop and identify environmental measures that could be used to determine the extent and severity of pollution, the causes of the pollution, and the success of EPA programs in protecting and improving the environment. However, except for special cases, such as the development of the Pollutant Standards Index[1] for air quality, the actions have not achieved their intended objectives. As a result EPA is still facing difficulties in determining whether its programs are achieving measurable environmental results. We believe EPA's future efforts could be more effective if accomplished within a framework of specific actions that identify best available environmental measures and link these measures to program activity measures. Such identification and linkage would encompass obtaining the baseline data needed for developing necessary trend, management, and productivity reports as well as allocating the funding necessary for developing measures.

[1] Environmental Quality, 15th Annual Report of the Council on Environmental Quality (Washington, D.C.: U.S. Government Printing Office, 1984). The Pollutant Standards Index includes five pollutants: carbon monoxide, sulfur dioxide, total suspended particulate matter, photochemical oxidant or ozone, and nitrogen dioxide, p. 439. The report describes the index as the only indicator of environmental quality based on solid theory, widely used, and widely accepted in the environmental community, p. 450.

The levels can be grouped as follows: (1) measures of actions that EPA and the states take, such as making inspections (level 1), and actions that pollution sources take, such as installing control devices (level 2) and (2) measures of environmental quality, such as changes in discharge volume or ambient measures (levels 3 through 6). The first group of measures reflects EPA program activity and the specific actions taken by pollution sources as the result of programmatic or regulatory action but does not provide data for assessing program impact. The second group of measures reflect various ways the group one actions could be expected to affect health and the environment. Working within such a framework, EPA could better focus efforts on relevant measures, data collection, and linkage of program and source activities to environmental change.

The possible levels of environmental measures and data that might be collected are illustrated in table 4.1, a hypothetical example of a trichloroethylene (TCE) control program.

Table 4.1: Framework for Organizing and Collecting Management and Environmental Data

Group one—actions		Group two—environmental quality			
Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**
Actions by states/EPA	Actions by sources	Emission/discharge quantities	Ambient concentrations	Uptake/body burden	Health effects Ecological effects Other effects
Examples of measures for each level					
Regulations and permits issued	Retrofit liner, installed in storage pits	Annual reduction of TCE leaking from pits	Changes in TCE levels in the ambient water	Changes in TCE levels in humans	Cancer risk; reduced no. of animal species; materials damage

In the trichloroethylene example, as an action EPA would report (1) the compliance impact of inspection activities and/or (2) the number of new liners installed in surface storage pits. The activity data could be used for management and productivity purposes and reported under the planning system as discussed in chapter 3. Further, once the environmental measures were identified, the activity data could be linked to program results measures such as changes in (1) the quantity of trichloroethylene discharged, (2) the ambient quantities, (3) the level of the chemical in humans, and/or (4) the number of cancer cases in the population caused by the chemical.

Table 4.1 also shows the importance of measures of environmental quality and the role they could serve in defining and quantifying the ultimate goals of EPA programs. It is only through changes in these ultimate measures that the success of EPA's program and activities can be assessed. Changes in these measures also provide the major decisional basis for determining the future content and direction of EPA programs. While EPA has had some success in identifying and using environmental measures, the type of continuum envision by the framework shown in table 4.1 has not been achieved because of problems and limitations in measure identification and use.

Overcoming Problems and Limitations in Developing Measures of Environmental Quality

Our review shows that past efforts to develop measures of environmental quality have had limited success in identifying generally accepted measures. For EPA's current efforts, we found that, while limited, one region's efforts to identify measures for all its programs, may provide a basis for better understanding the problems in identifying and using such measures. Additionally, EPA's efforts to use live organisms to assess environmental quality are encouraging and could result in a new perspective on how to assess environmental quality. However, given the difficulty of obtaining general acceptability for specific measures and the diversity of measures available, we believe EPA could benefit from an approach that focuses on best available measures as the quantitative foundation to begin assessing environmental quality.

Past Efforts to Develop Environmental Measures Achieved Limited Success

EPA efforts to identify ecological effects began as early as December 1974, with the formation of the Environmental Measures Study Group to identify environmental measures, assess EPA's monitoring programs, and develop a system for reporting environmental quality information on a timely basis. The study concluded that although there was a need for measures of environmental quality, no comprehensive system of measures for the effects of emissions and discharges on ambient water, health, or the environment were in use within EPA. Further, the study concluded that "Agency environmental measures used [were] generated on a selective or ad hoc basis, which does not permit them to be fully used in program planning and evaluation."

EPA undertook another effort to measure environmental quality in 1980. The report, published in December 1980 and titled, National Accomplishments in Pollution Control: 1970-1980, Some Case Histories, contained 187 case studies of "successes" in solving environmental problems. The report posed the following questions to its readers:

How are we progressing in our efforts to achieve a cleaner, healthier environment?

To what extent have we succeeded in protecting public health and the environment from the liquid, solid, and gaseous pollutants that endanger the water, the air, and the land on which we and all living things depend?

The report did not, however, address either of the above questions. Further, the report stated that it was not "intended to be a comprehensive survey of nationwide progress or trends," rather it proposed only to provide some examples of environmental accomplishments that have occurred. No attempt was made to demonstrate a cause and effect relationship between environmental programs and the improvements reported, but a discussion of the activities by EPA, states, local governments and others, initiated to identify these relationships, was included as part of the case studies.

In April 1982, the Administrator of EPA sent a memorandum to all assistant and regional administrators announcing a workshop on managing for environmental results. In the memorandum, she stated that she wanted the agency managed for environmental results and placed the responsibility for this, including developing measures, on each program manager and regional administrator. EPA also conducted an in-house workshop in 1986 to develop environmental measures for managing groundwater protection, although no meaningful measures of environmental quality were developed as a result of the effort. Our discussions with a consultant familiar with this effort disclosed that the major reason why measures were not promulgated was that data collection costs were considered prohibitive.

Others, outside of EPA, have searched for measures of environmental quality, including the Council on Environmental Quality (CEQ). In 1975 the CEQ formed the Federal Interagency Task Force on Air Quality Indicators to bring together federal agencies involved in managing the nation's air quality and others with special expertise to develop a uniform air pollution index for local use throughout the United States. The

product of this task force was the Pollutant Standards Index, based on National Ambient Air Quality Standards and health-related criteria; the CEQ considers this to be the only index of environmental quality in general use.

Table 4.2 shows some measures that have been developed and used for specific purposes in the water quality area. While the value of these measures is limited because they measure only ambient conditions, rather than the full spectrum of the environment, and do not include measures of chemicals or other contaminants, they provide a valuable starting point for further development.

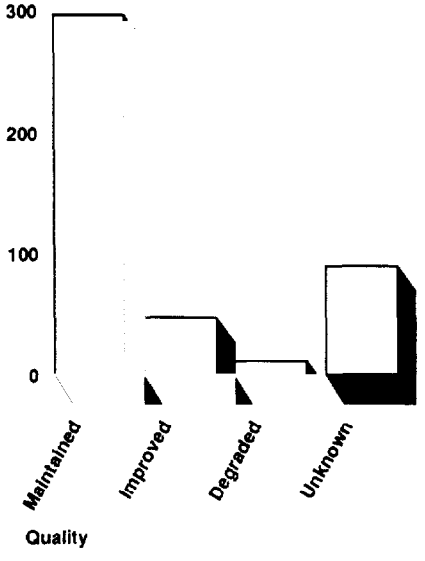
Table 4.2: Selected Surface Water Quality Measures

Measure	Purpose
Dissolved oxygen	Measures organic materials that deplete oxygen
Total suspended solids	Measures soil and other particles
Total dissolved solids	Measures soil, salt, and other solids
Oil and grease	Measures petroleum products
Phosphorus	Measures phosphorus
Heavy metals	Measures heavy metals

Figure 4.1 shows the results of a 1984 study by EPA and the Association of State and Interstate Water Pollution Control Administrators (composed of state directors responsible for implementing the clean-water program) of the quality of the 444,000 miles of the nation's rivers and streams. The study found the quality of most streams remained the same for the 10-year period 1972-1982.

The results, shown in figure 4.1, show that the quality of most streams had been maintained. However, the study and figure 4.1 leave many questions unanswered because the findings are not related to higher and lower level measures. For example: during this 10-year period have the levels of discharges of sewage, road salt, oil and grease, phosphorus and heavy metals increased or decreased? Are any changes in discharge quantities due to EPA activities and/or actions by source organizations? Did the changes occurring during this period have implications for the amounts of these substances found in the human body or for health and the environment? It is only when the entire continuum of measures is identified, data collected, and links established that programs to improve the environment can be evaluated.

Figure 4.1: Changes in Stream Water Quality Between 1972 and 1982



Note: Comparison is based on assessment of 444,000 stream miles out of an estimated national total of 1.8 million miles. This study has not been updated since 1983.

Source: Association of State and Interstate Water Pollution Control Administrators, America's Clean Water: The States' Evaluation of Progress, 1972-1982 (Washington, D.C., Feb. 1984).

Current Efforts to Develop Measures Highlight Targets of Opportunity

Some of the efforts currently being pursued to develop indicators include a project by the Conservation Foundation[2] in the area of water quality, work by EPA's Region 10 to identify measures for all its programs, and the use of live organisms by the Corvallis Laboratory to assess environmental quality. We see an opportunity to use each of these projects to improve EPA's ability to manage and evaluate the results of its programs.

[2]The Conservation Foundation is a nonprofit research and communications organization dedicated to improving the quality of the environment and to promoting wise use of the earth's resources.

Conservation Foundation Project Could Benefit From a Better Sense of Direction

EPA had an agreement for the development of environmental quality measures with the Conservation Foundation until the agreement's expiration on December 16, 1987. To be successful, however, conditions we found regarding the project's purpose would have had to change. For example, as shown in table 4.1 (see p. 84), environmental measures can include the amount of pollution or contaminants discharged into the air or water, ambient quantities of pollutants and contaminants, body burden, and health and ecological effects. Each level of measurement answers different questions about program impact, requires different data collection methods, and differs in cost. Thus, defining how the measures are to be used is an important step in the project—a step we did not find. Having defined use, realistic funding levels can be determined. Both EPA and Foundation officials told us the project had not made much progress, in part because of lack of funding, a constraint, whether real or not, that is easily perceived when the scope of a project is too broad and undefined. Provision of a framework to guide the Foundation's work, such as the one in table 4.1, could have served to better focus the scope of work required.

Region 10 Could Serve as a Site to Field Test Measures

EPA's Region 10 (Seattle) officials hold their managers accountable for developing environmental measures, although the project coordinator told us that EPA headquarters has not provided resources to support activities in this area. According to a Region 10 official, the region considers measures as necessary to determine if EPA activities are resulting in an improved environment.

Initially, the region developed measures of environmental quality (e.g., acres of shellfish grounds reopened for harvest; decrease in wetlands lost) in response to a headquarters request for a 1985 report on the most pressing environmental problems faced by the region. According to the project coordinator, in February 1986, the region tasked its offices to develop measures for their programs. She said that currently, the programs are at different stages in developing environmental measures. Some programs (Wetlands, Drinking Water, Puget Sound Geographic Initiative, Solid Waste, and Superfund) have decided on their measures. The Wetlands and Drinking Water Programs' measures provided us follow.

Wetlands Program Measures

- Number of Corps of Engineers' permits with mitigating plans (level 1)
- Number of enforcement actions reducing or eliminating impacts (level 1)

- Number of cubic yards of dredged material not allowed for in-water disposal because of EPA sediment criteria (level 3)
- Number of enforcement actions versus number of unpermitted fill actions (ratio of level 1 and level 2 measures)
- Acres of wetlands lost over time (level 6)
- Acres of wetlands restored and protected (level 6)
- Percent of mitigation goals accomplished (level 6)

Note: While the measures were developed by EPA's Region 10, the level of each measure was added by GAO on the basis of table 4.1.

Drinking Water Program Measures

- Number of enforcement actions (level 1)
- Number and percentage of surface systems using filtration (level 2)
- Number and percentage of groundwater systems with disinfection (level 2)
- Population served by systems with persistent violations (level 4)

Note: While the measures were developed by EPA's Region 10, the level of each measure was added by GAO on the basis of table 4.1.

The coordinator told us that other programs (Surface Water, Air, and Toxic Waste) have decided on some measures but are continuing to seek others, while still other programs (Pesticides, Construction Grants, and Groundwater) are in the developmental stage.

Our review of these measures indicate that they fall short of the continuum shown in table 4.1, focusing for the most part on agency and source activities (level 1 and 2 measures). Because the project is in only the development stage, it is too early to assess whether the region's efforts will overcome past problems in developing and using environmental measures such as lack of consensus and difficulties in obtaining accurate and reliable data. However, we believe Region 10's experience could help EPA improve its ability to manage for environmental results. Region 10 could serve as a test location to try out the application of the environmental measures emanating from the Conservation Foundation project and other sources. Tying together the environmental measurement project with field testing in Region 10 could help identify successes and obstacles relative to measurement, and speed implementation at the regional level.

Determining Environmental Health With Living Organisms Could Be an Important Development

EPA's Corvallis Laboratory is working on ecological effects measurement using living organisms. The purpose of Corvallis' work is to develop more economical and realistic biological measures for determining the environmental health of a geographical area. This approach includes the use of such organisms as worms and plants to sense harmful substances in the air and water and on land. Laboratory officials are hopeful these measures will be useful in establishing baselines, monitoring changes, and identifying key pollutants and polluters.

The laboratory separated the country into 76 ecoregions, regions containing ecologically similar areas, and developed standardized methods of testing aquatic organisms to determine the status of overall environmental conditions. This is done by testing the health of a range of biological organisms that make up what is termed "an index of biological integrity." Corvallis officials view the measures as (1) a cost-effective way of determining both the current status of the environment and the goals attainable, (2) a way of communicating progress, if any, in meeting environmental goals, and (3) a way of detecting new and emerging problems.

The biological indicators and ecoregions findings appear to be extremely useful tools that could help EPA manage for environmental results. Because these measures target the effects of pollution and contaminants on living organisms, they can provide the direct measures of environmental health that have been heretofore lacking. In addition, they may allow EPA to better target monitoring activities, especially in attempting to relate program activities to environmental changes. For example, they could show, if linked to program activities, where EPA programs are and are not succeeding in preventing ecological degradation. With this information EPA could better determine where resources and activities should be focused.

In February 1987 Corvallis officials informed EPA's Assistant Administrators for Water and for Policy, Planning and Evaluation that the new ecological assessment tools could be used by the agency in managing for environmental results. At the time our field work was completed, November 1987, EPA's Office of Research and Development had been asked to develop an implementation plan for using the ecoregion approach in managing for environmental results.

Developing and Using Best Available Measures

Because of past problems in obtaining general consensus on measures of environmental quality and for cost considerations, we see an opportunity for EPA to use what we call best available measures. Such measures would (1) reflect the best understanding today of environmental conditions and change factors and (2) represent a measurement baseline derived from

- general acceptance given the best scientific knowledge and judgment,
- available data, and
- geographic and or programmatic coverage.

Support for an approach along these lines was provided in a 1985 memorandum from EPA headquarters to the regions that stated the Administrator was

> ". . . interest[ed] in developing a set of 20 or so indicators that would report national environmental status and trends and at least partially measure whether Agency activities have affected environmental quality as intended."

The benefits of such an approach would include (1) providing a rational basis for making resource decisions on the basis of existing evidence, (2) developing a common understanding to guide federal and state efforts in implementing environmental programs and activities, (3) establishing accountability, and (4) building an analytic base for assessing environmental progress in the future.

Thus, best available measures, used in conjunction with a framework similar to that shown in table 4.1, would help overcome the inertia hindering progress in managing for measurable environmental results by

- identifying the levels of measurement necessary for assessing program results;
- avoiding the ad hoc approaches prevailing in the past and today;
- providing a focus for EPA's current efforts, such as those of the Conservation Foundation and Region 10, to develop and implement measures of program effectiveness;
- promoting the use of data already collected within the agency or by other federal and state agencies;
- providing a process that facilitates establishment of accountability and time frames for implementation as well as helping to establish the extent to which program managers can be held responsible for achieving results; and
- helping to determine the monitoring and other data collection activities requiring continued or additional support.

Monitoring and Quality Data Will Be Needed to Encourage the Use of Environmental Measures

Identifying best available measures is an important first step toward managing for measurable environmental results. However, once measures are identified, data must be collected through a monitoring activity and data quality must be ensured.

EPA, recognizing the important role of environmental monitoring in all agency activities, developed and disseminated its first environmental monitoring policy in 1983 and its first order governing quality control procedures for data collection in 1984. The monitoring policy statement defined monitoring as the broad set of activities providing chemical, physical, geological, biological, and other environmental data required by environmental managers. Under this broad definition, "monitoring" included the following: planning the collection of environmental data to meet specific program objectives and environmental information needs; designing monitoring systems and studies; selecting sampling sites; collecting and handling samples; laboratory analysis; reporting and storing the data; ensuring the quality of the data; and analyzing, interpreting, and making the data available for use in decision making and reporting to the public. The quality control order required establishment of data quality objectives for all projects and tasks involving environmentally related measures to ensure that EPA produced data of known quality.

In examining efforts devoted to collecting and analyzing ambient concentrations of pollution and contamination, we found that (1) although monitoring is the key activity in collecting this data, EPA has reduced its monitoring activities, needs to do follow-up studies to develop trend data where information has previously been collected, and could take fuller advantage of the monitoring efforts of others and (2) EPA's numerous data bases, which are managed by the program offices, are difficult to integrate and may contain extensive errors.

Reduction in Monitoring and Other Environmental Data Affects EPA's Ability to Assess Progress

EPA has reduced its collection and analysis of monitoring data. Although reductions in monitoring activities may be justified for cost savings, they are not always made without imposing certain costs of their own. For example, monitoring data, collected over time, as was illustrated in figure 4.1 on stream water quality, document changes in the ambient quality of the environment. Knowledge about these changes in environmental quality are necessary for assessing environmental progress and determining the effectiveness of the programs and approaches being used to combat environmental problems.

Leadership Changes and High Costs Have Affected Monitoring Activities

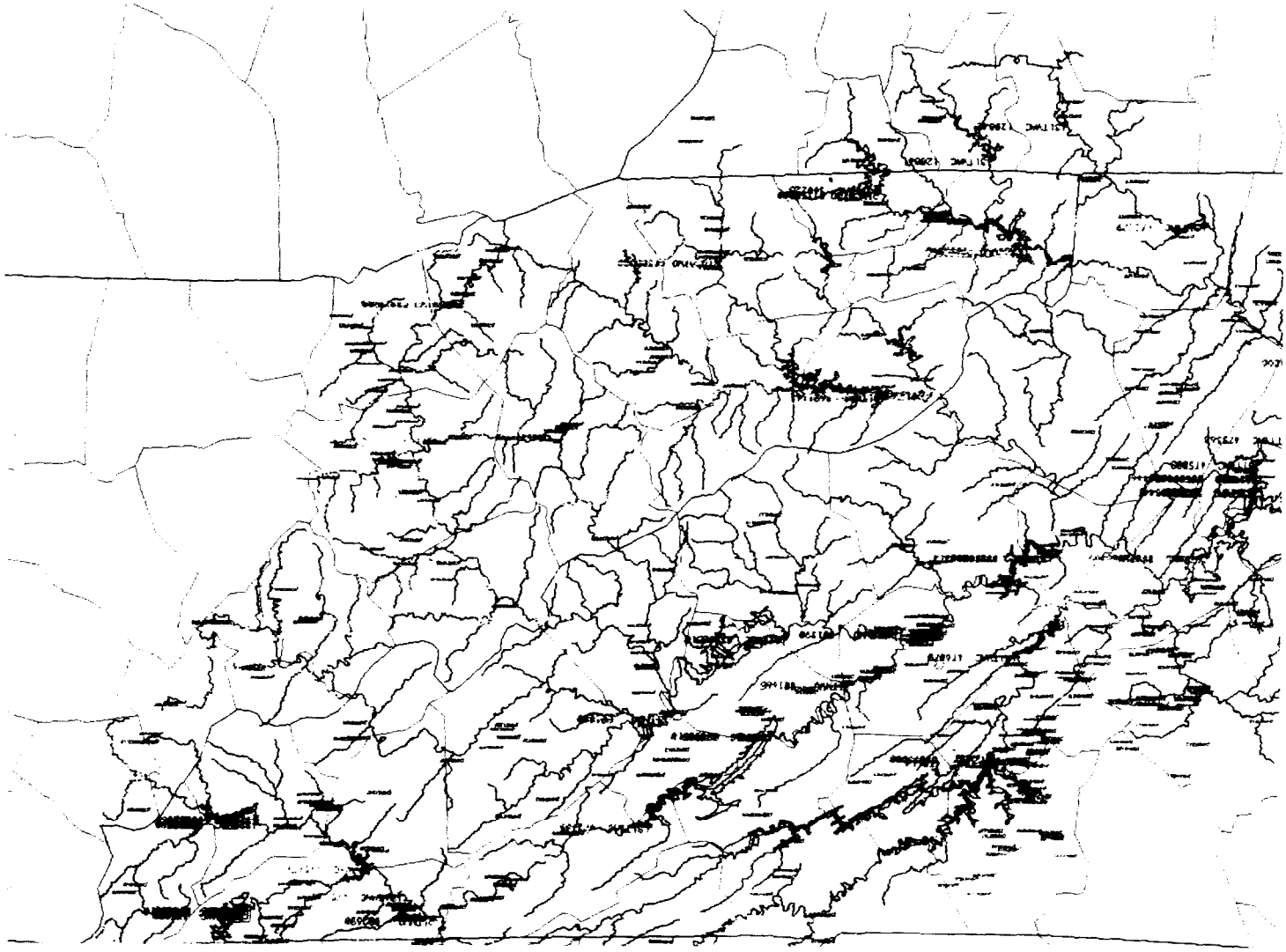
Monitoring strategies are the end result of the process of deciding what measurement data should be collected and how the collecting process will be implemented. Monitoring strategies were prepared, evaluated annually, and updated as needed from 1984 through 1986. The agency decided not to call for monitoring strategies for 1987. When questioned as to why no calls for monitoring strategies had been made in 1987, an EPA official familiar with the history of EPA's monitoring program attributed the change to the departure of the top EPA executive supportive of agency monitoring activities and a shift of resources to other monitoring activities. He contended that with the departure of this key executive, enthusiasm and top level leadership for improving monitoring activities dissipated. This lack of a high level champion may have resulted in making these monitoring activities, which are expensive and already susceptible to budget cuts, even more vulnerable.

Developing national monitoring networks can be expensive undertakings. For example, the Air Program budgeted $71 million for monitoring air quality in fiscal year 1987, out of a budget of $239 million. According to four EPA officials, although considered important, monitoring activities are often the first item to be cut during a budget crunch. An official in the Office of Pesticides and Toxic Substances attributed the reduction in the office's monitoring activities to budget reductions brought about by the relatively low priority of monitoring compared to other activities such as meeting statutory deadlines. Another official, agreeing on the vulnerability of monitoring activities to budget reductions, said a related problem was that in an effort to maintain monitoring activities, cuts were made in the staff who analyzed the data subsequent to collection. He suggested that without a staff to analyze the data, program managers became less supportive of the costs since they could see no end product for the expense. It was his opinion that provisions for analyzing the data were a necessary condition to revitalizing monitoring in EPA.

To a great extent the problem with environmental monitoring can be viewed as the classic question, "Which came first, the chicken or the egg?" The work done by EPA's Region 4 (Atlanta) illustrates both that reductions have taken place in existing monitoring systems and, to the extent these data are used to assess program results, that such reductions can affect the ability to manage for environmental results. A part of Region 4's project entailed preparation of two maps for the same large geographical area, one for 1975 (fig. 4.2) and one for 1985 (fig. 4.3), showing surface water quality reported by existing monitoring stations. The extent to which monitoring for dissolved oxygen has declined

between the two periods can be seen by comparing the decrease in the amount of colored areas in the two figures. (The individual colors and how these data can be used to assess results and target resources are explained later in this chapter in our discussion of the need to link program activities to changes in the environment.)

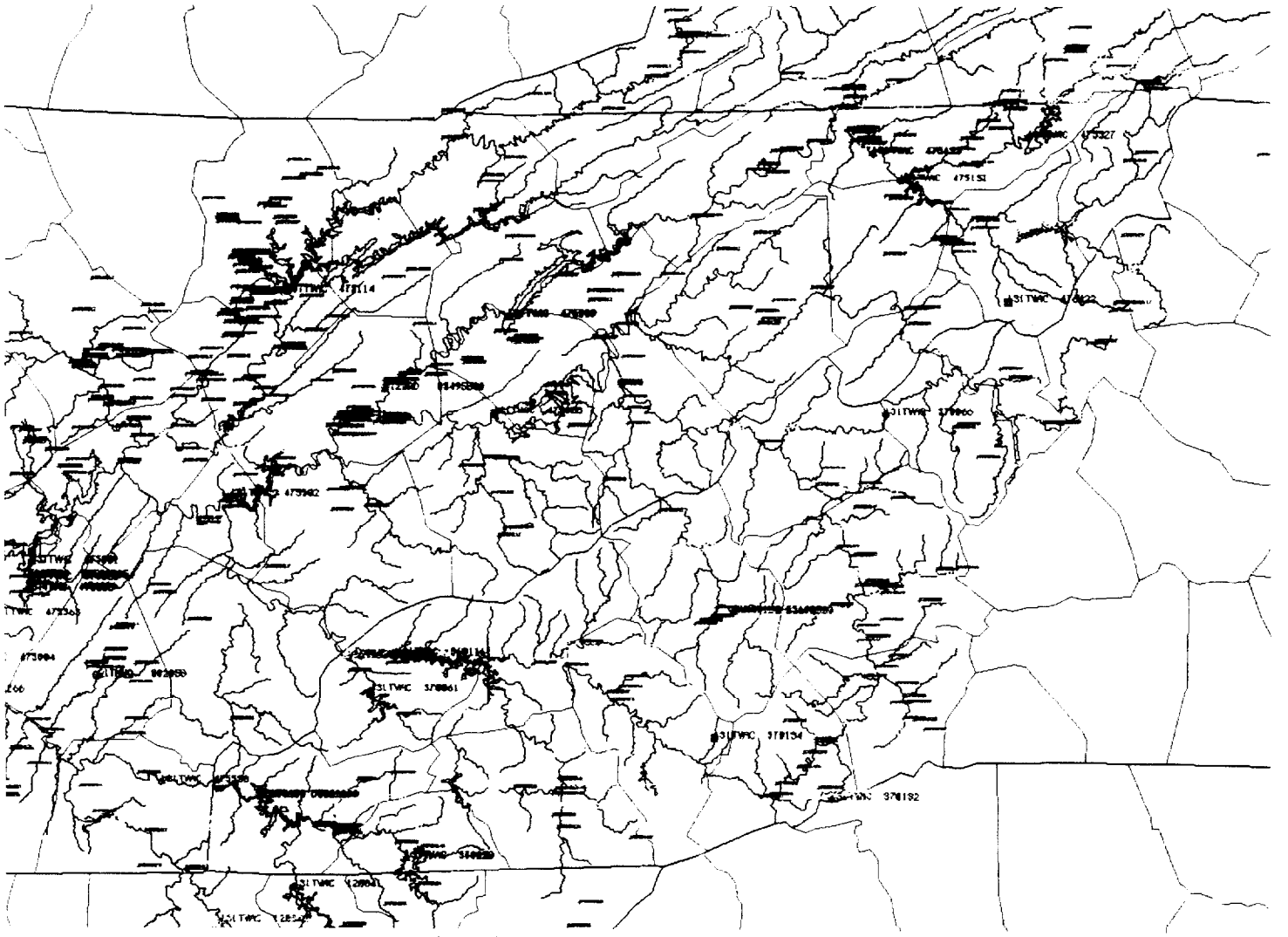
Figure 4.2: Results of Surface Water Monitoring for Dissolved Oxygen for Selected Geographic Areas, 1975



Legend
Blue = Location of municipal/industrial discharge permit
Yellow = Meets standard
Red = Below standard

Source: U.S. Environmental Protection Agency

Figure 4.3: Results of Surface Water Monitoring for Dissolved Oxygen for Selected Geographic Areas, 1985



Legend
Blue = Location of municipal/industrial discharge permit
Yellow = Meets standard
Red = Below standard
Source: U.S. Environmental Protection Agency

Data Valuable in Assessing Regulatory Effectiveness but Budget Pressures Limit Human Measurement Effort

The value of monitoring data in assessing regulatory effectiveness can be seen in the pesticides and toxic substances area. In the 1970s EPA banned the major pesticide uses of dichloro-diphenyl-trichloro-ethane (DDT) and dieldrin and began banning polychlorinated biphenyls (PCBs).

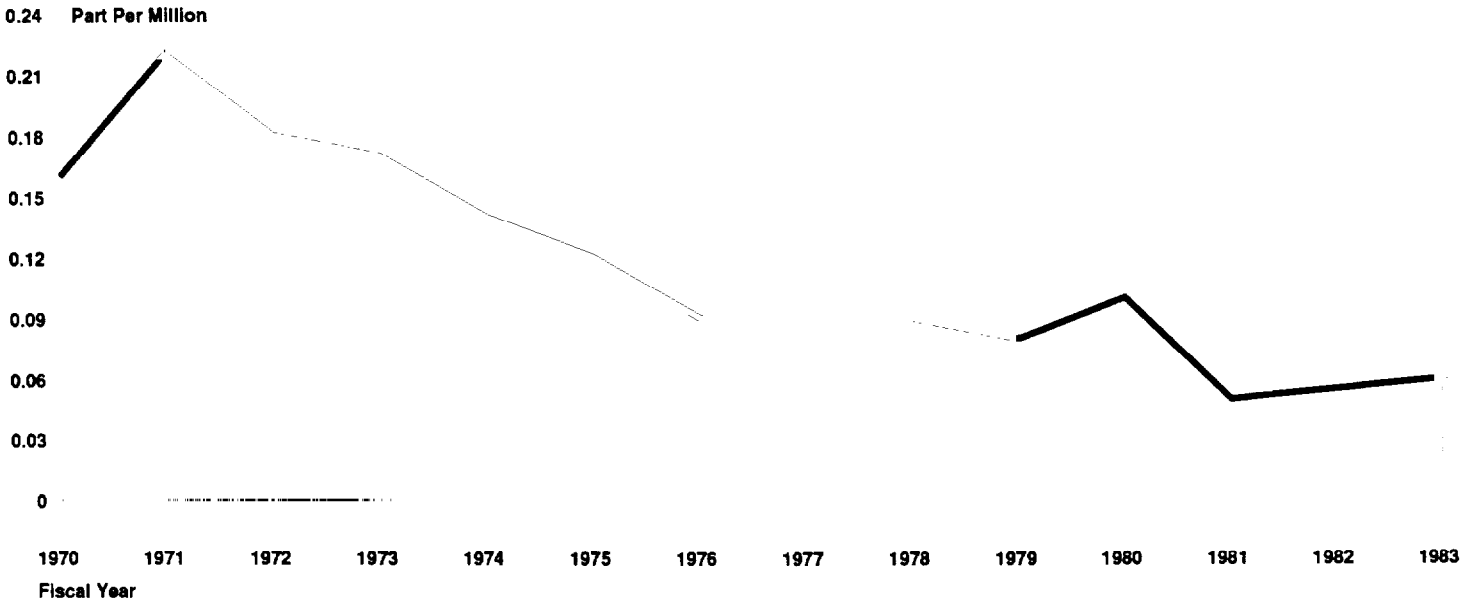
As figure 4.4 shows, the levels of these pesticides and chemicals found in human fatty tissue have significantly declined. The data showing these measurable environmental results is derived from the Office of Pesticides and Toxic Substances' National Human Monitoring Program.

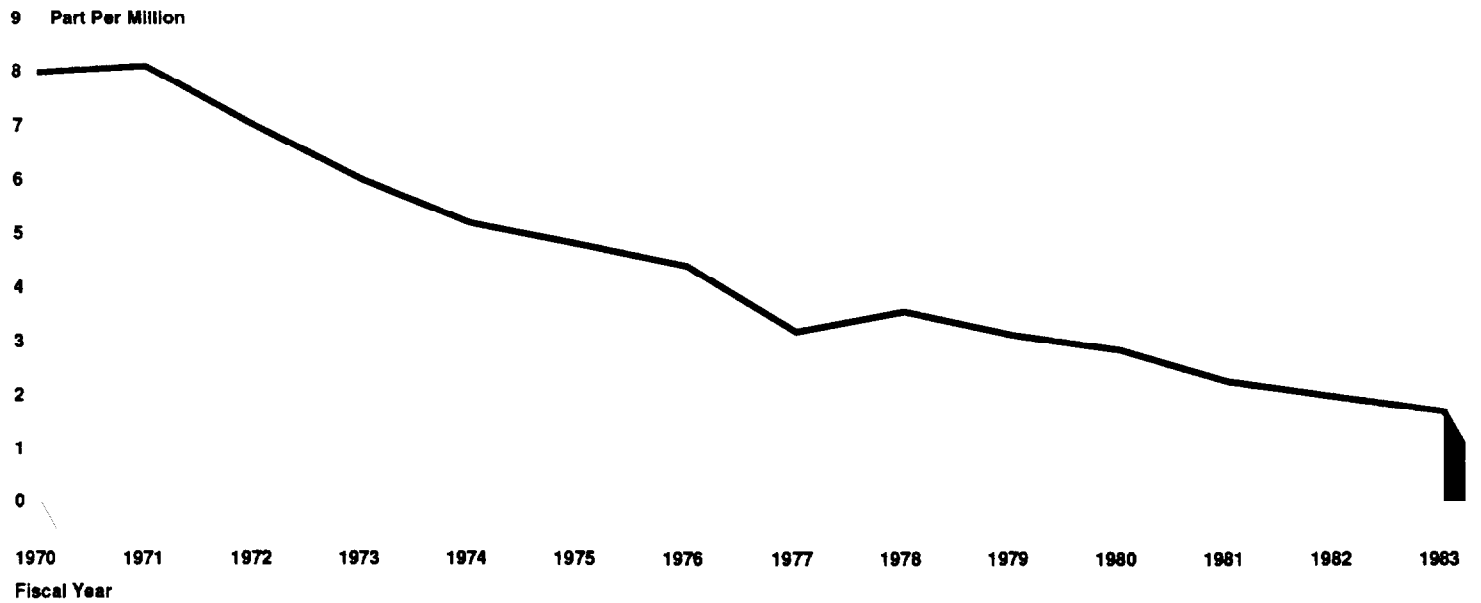
While the monitoring results shown in figure 4.4 provide evidence of the effect of regulatory action on the amount of these selected chemicals in the human body, other similar monitoring activities, as discussed below, have been curtailed because of funding decisions.

In fiscal year 1986 EPA's Office of Toxic Substances increased its emphasis on assessing the extent of chemical problems through the use of increased monitoring of chemical levels in the human body. The National Human Adipose Tissue Survey is currently the main program under the national monitoring program. The primary goal of this survey is to establish the distribution of levels of selected toxic chemicals in a cross section of the U.S. population; the sample is of sufficient size to allow comparisons based on age, sex, and place of residence. Historically, this survey has provided information on pesticides and PCBs in the U.S. population, but more recently it was expanded to monitor additional chemical classes.

However, according to the Director of the Exposure Evaluation Division, the recent history of deferrals and inadequate funding has resulted in deferring certain important and needed activities involving the monitoring of human adipose tissue, blood, and mother's milk for additional toxic substances; conducting research and developing analytical models to improve the usefulness of collected human exposure data; and obtaining a more detailed breakdown of national human exposure data by regions of the country and race. Officials of the national monitoring program attribute the pressure to cut funding to the lack of a specific statutory mandate or deadline, making these efforts less competitive with programs and activities with specific mandates for implementation.

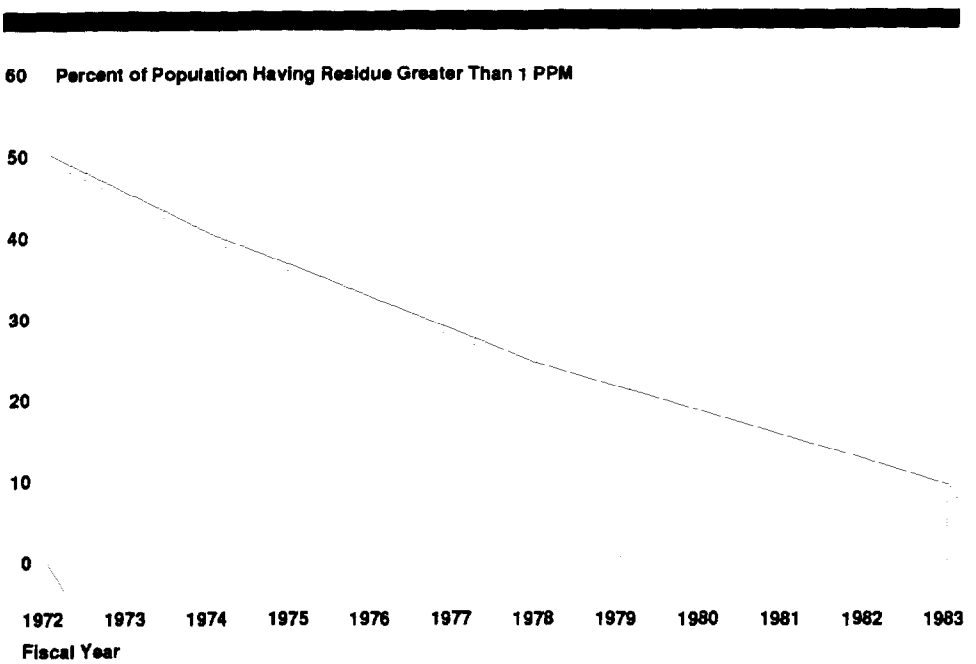
Figure 4.4: Decline of Some Chemicals in People





Source: EPA's National Human Adipose Tissue Survey
Note: Data for 1982 were not available.

Decline of PCBs



The Value of Surveys of Environmental Quality Could Be Increased Through Follow-Up Efforts

One way EPA could increase the amount of monitoring data available is to follow up previous surveys of environmental conditions. In addition to the use of monitoring stations, EPA monitors on a survey basis. Our work shows these are one-time efforts that, if repeated, could provide data for trend purposes. For example, during our review EPA was in the process of conducting a national survey to determine the level of agricultural chemicals and pesticides in well water, both public and private, used for drinking purposes. The data on the level of chemicals in these wells are being collected to determine whether changes are needed in regulatory policies.

Our experience shows EPA could benefit from repeating the surveys to develop trend and other data needed to measure the results of EPA programs over time. EPA has not conducted follow-up efforts on prior surveys, because of a reluctance to justify data collection efforts for other than regulatory purposes. However, repeating previous surveys—for example, every 2 or 3 years—can be a cost-effective way of gathering ambient data, especially where environmental changes can be expected to be slow or in cases where it is expensive to collect the information.

Data Collected by Other Federal Agencies Could Be More Widely Used by EPA

Another way to increase the availability of monitoring data would be for EPA to make better use of data collected by other agencies. One area where such data could be beneficial to EPA is in the use of measures of ambient quality. For example, a senior analyst at the Conservation Foundation believed EPA should consider developing trends in some of the following to measure for environmental results in the surface water area:

- selected pollution concentrations (fecal coliform, suspended particles, dissolved oxygen deficiencies) around certain population centers,
- water quality as reported from continuous monitoring stations nationwide, and
- attainment and nonattainment status of water quality based on data from the Water Body Tracking System, using only objective data.

As discussed in subsequent sections, Region 4 is attempting to use data collected by other agencies, in this case the U.S. Geological Survey and U.S. Army Corps of Engineers, to supplement available monitoring data on water quality. Region 4 was, however, the only region of the four we visited that indicated it was using data from other federal agencies to manage for environmental results. We did find that Region 10's project includes measures similar to those suggested by the Conservation Foundation, but the project has not sufficiently developed to determine the source of the data to be used.

Improvements in Data Accessibility and Quality Needed to Promote Managing for Environmental Results

While the availability of monitoring data is important, another factor impeding EPA's ability to manage for environmental results is the difficulty of accessing agency information systems and the quality of the data being maintained. For example, if good water quality data are not readily accessible to potential users, the likelihood of its use will decline. The likelihood of data's use will also decline if potential users perceive that the data are inaccurate or unreliable. Our work, and that of EPA and others, shows monitoring systems and EPA water quality data continue to require EPA management attention and improvement. As far back as 1981 we reported that EPA's river monitoring network was not adequate for assessing the quality of the nation's rivers and streams. We also noted,

"To meet the ambitious goals set forth in [the Federal Water Pollution Control Act Amendments of 1972 (86 Stat. 904)], it is essential to have data describing existing

water quality conditions, how pollution occurs, and the effect of eliminating sources of pollution."[3]

Criticism by EPA, and others, of environmental data monitoring included

- limited coordination, control, or planning of agency monitoring activities,
- difficulty of accessing information,
- uncertain quality of the data collected,
- the design of networks and studies that result in data of limited use,
- lack of data suitable for trend analyses, and
- incompatibility of data bases.

Work by the State of Georgia and Region 4 Can Be Used to Increase Access to Computerized Data

Our review of a joint effort by the state of Georgia and EPA's Region 4 (Atlanta) showed it encountered data problems similar to those identified in the past. However, it also showed the potential benefit to EPA and the state of integrating the data contained in several EPA data systems. Georgia and EPA's Region 4 determined that, even with massive expenditures for gathering and entering environmental and program management data, program managers often cannot obtain the right data in the right format for their day-to-day decision making.

To deal with the inability to access needed data, they undertook a data-sharing project. However, their project faced extensive difficulties in extracting needed data from the seven data bases maintained by the various EPA program offices. For example, in trying to relate poor surface water quality to issued industrial and municipal permits and display this information as overlays on the same map, they were required to write computer programs that would allow the data to be read in such a way that it could be combined in the same computer file. Working with the state of Georgia, Region 4 developed these programs and used them to integrate the various files.

Subsequent to developing the programs, Region 4 and Georgia, under the authority of the Association of State and Interstate Water Pollution Control Administrators, prepared computer tapes and program documentation that allow other states with similar computer equipment to access

[3]Better Monitoring Techniques Are Needed to Assess the Quality of Rivers and Streams, Volume I (CED-81-30, Apr. 30, 1981). We concluded that because of the inadequacies surrounding the then existing monitoring program—small and infrequent samples, lack of representativeness of the results of either the individual streams sampled or the nation's surface water, and the inability to associate the problem conditions with specific causes—EPA monitoring approaches needed to be significantly changed and much of the water quality data EPA collected was inadequate.

the same EPA data systems. This effort provides EPA an opportunity to make access to its various information systems more readily available, for a wider range of purposes, both among the states and within EPA.

Extent of Data Sharing Is Dependent on Accurate Data Systems

While making data sharing more practical is important, increasing the level of data sharing with the states and within the organization is not without its own problems. If other organizations are to increase their use of data from information systems they do not control, those program offices responsible for the systems will have to ensure the data are accurate and timely. While some costs are involved, as discussed in a later section of this chapter, the alternative can be the more expensive approach of other offices, developing their own information.

According to Region 4 officials their efforts to use other information systems were slowed by data bases that often contained extensive inaccuracies. Further, they believed the program offices responsible for the data files were not responsive to requests to make the needed corrections. For example, when Region 4 decided to plot the location of public water supplies as a way of determining their proximity to potential Superfund locations, Region 4 took the water supply location data from an existing program office data system. However, the data were not always reported or, when reported, were not always accurate. For instance, a printout of a county in one state, when the location data were plotted, showed 30-40 percent of the wells at locations outside the county. In another instance, the location data showed municipalities reporting their wells at points in the Atlantic Ocean or in other states.

When Region 4 requested the program office at EPA headquarters to correct the data, explaining the importance of the data to their project, the region was informed that the program office did not need the data item and no action was taken. The program office reportedly did not take action because it did not want to increase the reporting burden on the states by making them validate the data; however, Region 4 is continuing to work with states to correct the data.

Because of their experience Region 4 officials believed that many data systems needed review and the addition of more environmental results and monitoring data. They also believed EPA needed to bring existing data bases up to some acceptable level of accuracy so that others would be encouraged to use the data to better manage their programs. As part of these changes the officials would like program offices to recognize that others in EPA must use data collected by the program offices, having

no alternative, and to be held responsible for ensuring data base quality. An illustration of long-standing data problems is discussed below.

In 1985 we reported that data problems existed in the Hazardous Waste Data Management System.[4] This system, which collected compliance data on all hazardous waste facilities subject to closure, postclosure, financial responsibility, and/or groundwater monitoring requirements, was found to have extensive data problems. For example,

- compliance data could not be extracted from the system,
- data in the system was of questionable quality,
- the system was poorly documented, and
- many key terms essential to uniform systems operation were poorly defined.

According to agency officials familiar with the system, EPA has initiated, but not yet completed, corrective action because of frequent legislative changes in program requirements.

The quality of information in other data systems was raised during demonstration projects conducted by EPA. These projects, which will be discussed at greater length in chapter 5, provide an excellent source of information on various data systems because they attempt to use existing data for cross-media analysis. Reports issued on two of the projects, Philadelphia and Santa Clara Valley, raised problems with existing data systems. For example, the Philadelphia project report, discussing its work to assess air sources of pollution, stated that the quality of the data on which the area source emission estimates were based had been questioned by many but that the data were the best available on air. The Santa Clara Valley project also reported limitations in the data available to assess risks for air pollution and contaminants, including the lack of monitoring data on metals levels and the limited number of data readings for more recent years.

Managing for environmental results across media/programs is dependent on data, data quality, and ways to make use of existing data bases. Region 4's experience and the experience obtained through EPA's demonstration projects illustrate the potential difficulties as well as benefits that can be achieved.

[4]Assessment of EPA's Hazardous Waste Enforcement Strategy (GAO/RCED-85-166, Sept. 5, 1985).

Linking Measures to Program Activities Is a Necessary Step in Managing for Environmental Results

Identifying measures of environmental quality, collecting monitoring data to determine changes in these values, and ensuring the data are readily accessible are essential steps to progress in managing for measurable results. However, it is equally important to link program activities and the measures so EPA efforts can be assessed. Linking EPA activities to environmental changes would allow EPA to evaluate the effectiveness of its programs and activities. Lack of environmental improvement would suggest the activities may not be adequate, allowing management to reassess them. EPA's Region 4 is piloting what appears to be a useful approach to the linking process. The results of this effort could be monitored and, if successful, instituted in other regions.

Linking Environmental and Program Measures Will Help Determine If EPA Programs Make a Difference

The framework in table 4.1 depicts the concept of how EPA programs improve environmental quality. EPA programs are predicated on the assumption that performance of certain program and regulatory activities, such as inspections, permit granting, enforcement, and construction, will initiate a chain of events resulting in (1) reductions in damages to and/or (2) continued protection of human health and the environment. In simplified form, this process would work as follows:

- EPA takes actions, such as preparing regulations, making inspections, and issuing permits, as way of affecting pollution levels in air, land, and water (level 1—activity measure).
- Pollution sources (e.g., industrial plants, municipalities) take actions to install pollution control equipment or to modify processes or operations to reduce discharges as required by EPA (level 2—activity measures).
- Amounts of pollutants discharged are reduced (level 3—environmental measure).
- Ambient concentrations of pollutants in the environment decline (level 4—environmental measure).
- Uptake of pollutants by humans, animals, and plants declines (level 5—environmental measure).
- Adverse ecological and human health effects are reduced (level 6—environmental measure).

However, without linking the various measures and establishing relationships between them, EPA cannot be ensured that its actions result in environmental improvements. Establishing cause and effect relationships between program activity and environmental measures requires linking EPA and source activity to changes in environmental conditions. The process must also isolate program impact from the influence of

extraneous factors. For example, monitoring and program results data can be greatly affected by weather conditions, economic conditions, and other factors beyond the control of program managers. Illustrations of extraneous factors that might affect assessing results for surface water programs could include increases in stream flows due to heavy rains or increases in pollutant discharges due to increased production.

In spite of these difficulties, as the following case studies from an internal EPA document on managing for environmental results illustrate, EPA must continue trying to link its activities to environmental indicators.

"Puget Sound was a true program success story, or so everyone thought. All [National Pollutant Discharge Elimination System] permits had been issued, all municipal secondary treatment waivers were being processed, etc. Unfortunately, once EPA shifted its focus from program accomplishments to environmental accomplishments, it was apparent that something was wrong. Shellfish beds were being closed at an increasing rate, toxic-contaminated sediments were being found almost wherever researchers looked, and fish tumors and other signs of poor biological health abounded."

"In another example, for 20 years it has been known that young salmon, when they first leave fresh water for the sea, out-migrating through Washington State's polluted Grays Harbor have a much lower survival rate than [young salmon] from less polluted adjacent streams. EPA assumed that the problem would be resolved as soon as the two pulp mills discharging into the harbor installed technology-based treatment equipment. Unfortunately, this action did not solve the problem. With no program having clear-cut responsibility for follow-up action, with no specific grant funds to tackle the problem, and most importantly, with no accountability for resolving the issue, this problem may continue indefinitely."

Linking Monitoring Data to Program Activity Can Help Assess Performance and Allocate Resources

Our review of the work ongoing in EPA's Region 4 provides a good example of how monitoring data, linked to selected program activities, can help assess performance and allocate resources. The project approaches the concept of managing for environmental results in terms of the following four steps:

- identifying and prioritizing problems/risks,
- relating problems/risks to needed regulatory controls,
- tracking environmental trends, improvements, and risk reductions, and
- overlaying trends with regulatory controls to evaluate effectiveness.

As discussed above, an objective of the project is to link program activities to data collected at monitoring stations to determine program effect. The data are obtained from EPA and other federal agencies' files and are

combined in a computer data base. The data are analyzed using a computerized mapping system. At the time of our visit, Region 4 had portions of the system in operation for surface water, ground water, and air.

Using the data in figures 4.2 and 4.3, monitoring readings for 1975 and 1985 were related to water criteria standards for dissolved oxygen: monitoring stations with a reading below the standard (bad quality) are shown in red, monitoring stations without a violation (good quality) are shown in yellow, while industrial and municipal discharge permits are shown in blue. As shown, the connection with agency activities can be made by overlaying the monitoring results with the location of industrial and/or municipal emission permit numbers on the map. Once the water quality and permit data are plotted, it becomes apparent which industrial and municipal facilities are close to the monitoring stations with poor ratings.

Analyzing the data this way allows for assessment of progress between years as well as helping to identify problem areas that can be targeted for future inspections, permit changes, or enforcement actions. The data can also be used to assess the results of corrective action. For example, if a permit is changed or a municipal sewage facility is upgraded, monitoring data can be used to assess changes, if any, in ambient water quality. If no improvement is noted, the monitoring data would indicate that further action is needed. Using this information, management could evaluate whether it is doing the right kind—as well as the right number—of inspection tasks, whether enforcement actions are needed, and whether attention is needed on other point-source or nonpoint-source pollutants.

Another example, in the groundwater area, illustrates a way to target resources to high risk areas. Figure 4.5 shows the location of potential Superfund sites on a map with circles 3 miles in diameter drawn around them (red circles). Locations of municipal underground wells, used for drinking purposes, are then superimposed over the map (green squares). Places where the two overlap indicate potentially threatened wells. Such data would be obtained from both the Office of Drinking Water and a Superfund data base.

As shown in figure 4.5, combining these two pieces of data and presenting the results graphically allows Region 4's program staff to focus their resources on those potential Superfund locations most likely to be high risk. Further, more detailed information on both the sites and the wells

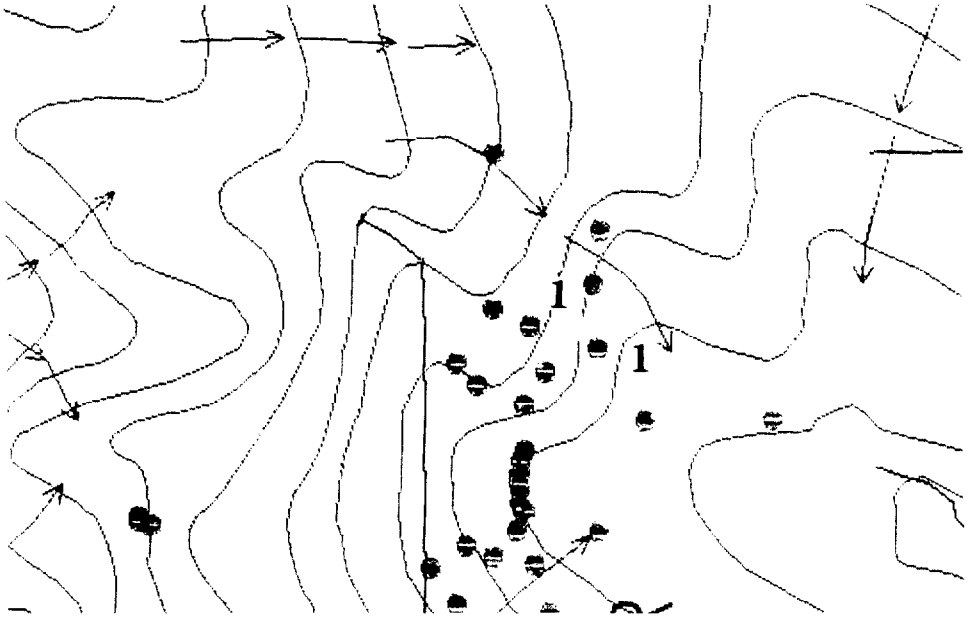
can be obtained from the same computer files for use in making program-related decisions. For example, ownership of the well, the number of people receiving water from the well, known violations, and data relative to the products stored at the potential Superfund site can be obtained. Using existing data in this way suggests that EPA has an opportunity to reduce the overall cost of making required site assessments and provides a way, that does not now exist, to address first those sites posing the greatest potential risk to the public.

Figure 4.5: Hypothetical Example of a Mapping Process Depicting Proximity of Municipal Water Supplies to Possible Superfund Sites

Legend
Green squares = Location of municipal water intakes from underground sources
Red circles = Potential Superfund site located in a circle 3 miles in diameter

The usefulness of this mapping process could be even greater if it were possible to know where aquifers were located, their rates and direction of flow, and their quality. Figure 4.6 shows how such a map looks where this information is available.

Figure 4.6: Hypothetical Example of a Mapping Process Depicting Proximity of Municipal Water Supplies to RCRA Land Disposal Sites and Aquifer Locations and Directions of Flow



Legend
Blue circles = Location of municipal water intakes from underground sources; numbers indicate multiple intakes
Yellow stars = RCRA land disposal sites
Green arrows = Aquifers, locations and direction of flow

In figure 4.6 the blue circles show locations of municipal wells, the yellow stars show the location of operating hazardous waste facilities,[5] and the green arrows show the location and direction of flow of major aquifers. As shown in figure 4.6, having information about groundwater characteristics improves the ability to link program activities to environmental problems. For example, one of the aquifers shown in figure 4.6 is located near the hazardous waste facilities and flows near several

[5]In 1984 the Congress amended RCRA to, among other things, provide EPA with greatly expanded authority to initiate corrective action and cleanup as part of its overall management at leaking hazardous waste facilities that were not abandoned or inactive. These facilities are referred to as RCRA facilities.

municipal wells. Knowing this information on the aquifers would be valuable in determining which facilities to monitor closely and in suggesting the substances for which the cities should monitor their water supplies. The ability to visually portray aquifers in this manner would also be useful for assessing and containing contamination resulting from accidents or newly discovered hazardous waste sites.

The methods employed in preparing these maps are highly flexible and can be used for other purposes as well. For example, areas of intensive pesticide application or activities known to contaminate underground water could be plotted to determine their relationship with problems identified through monitoring activities.

While the Region 4 project appears to be a viable approach to linking ambient measures to agency activities, limitations in the monitoring system, as well as the data quality problems discussed earlier, could serve to reduce its effectiveness. The current monitoring system is limited by the decreasing number of locations in the system and the number of contaminants and pollutants monitored. Region 4's experience provides some guidance on options open to EPA for increasing the amount of monitoring data available. However, to achieve the objective of linking program activities to environmental changes, EPA will have to face the difficult decision of how it can further increase monitoring information both in terms of the number of stations and the number of contaminants measured. Building on the results obtained from the Region 4 project appears to be one way of improving EPA's ability to manage for environmental results.

Conclusions

Identifying and developing measures of environmental quality are necessary parts of managing for environmental results. Such measures, if tied to program and pollution source activities and actions, and assuming that extraneous factors can be controlled, would allow better program management and provide a way for EPA, the Congress, and the public to assess the progress being made toward achieving environmental goals. If environmental measures are not used, EPA, the Congress, and other interested parties can rely only on their best judgment as to what is being achieved.

Our review disclosed that EPA and others have long seen the development and use of measures of environmental quality as a major requirement for improving EPA's ability to manage for measurable environmental results. For example, we found that work has been done,

and is continuing, to identify and collect data on environmental quality measures, including attempts to link these measures to program activities. EPA needs a framework, such as that shown in table 4.1, within which to direct these efforts. With such a framework, we believe EPA could progress in managing for environmental results by developing and using best available measures, rather than waiting many years for the completion of efforts to develop perfect measures. Such an approach would (1) direct and promote the use of data bases and measurement efforts within both EPA and other agencies, by identifying where information is needed and causing resources to be a consideration in how the data are to be obtained, (2) serve as a basis for determining where other requirements and activities could be reduced so monitoring and data improvement actions could be undertaken, and (3) unify and focus efforts such as those of the Conservation Foundation and EPA's regional offices.

Recommendations to the Administrator, EPA

To revitalize and better direct EPA's efforts to identify environmental measures, as a way of achieving its goal of managing for measurable environmental results, we recommend that the Administrator, EPA, adopt a framework similar to that shown in table 4.1 and concentrate agency efforts on identifying and testing best available measures. The process should include

- assigning specific responsibility for the effort and establishing time frames for completion, allocation of resources, and peer review and/or oversight,
- assessing the progress being made in Region 10, on the Conservation Foundation project, and the work at Corvallis Laboratory to determine how they can contribute to measurement identification and implementation,
- revisiting its past surveys and data collected as part of its operating and monitoring activities, as well as similar data collected by states and other federal agencies, to determine if these data might be appropriate for use in assessing program results, and
- recognizing the vulnerability of monitoring and survey activities to budget reductions when making decisions relating to the expansion, termination, and/or reduction of these activities.

A necessary step in evaluating program effectiveness is to link program activities to measures of environmental quality and to decisions on allocation and targeting of resources. Therefore, we also recommend that the Administrator begin taking the steps necessary to link program and

monitoring activities to environmental indicators. Efforts underway in Region 4 appear to provide a good starting point.

A Sound Analytic Base Is Needed for Assessing and Managing Risks

EPA's analytic base includes the complex array of information needed to assess and manage environmental risks and carry out the policy initiative of managing for measurable environmental results. Such information includes data on the potential toxicity of chemicals/substances; their human health effects, such as cancer and birth defects; their environmental effects; the extent of human exposure and environmental contamination; the effectiveness of technologies to reduce human and environmental exposure; and economic effects of regulatory alternatives. Two sources of information for this analytic base, additional to the environmental indicators, measures, and monitoring systems discussed in chapter 4, are research and development and demonstration projects. Research and development provides the underpinnings for environmental science and risk assessments, while demonstration projects test new and innovative approaches for addressing complex problems that involve several environmental media or programs.

EPA has initiated several actions to strengthen its analytic base. However, challenges that face EPA—such as a declining or no-growth research budget at a time of increasing responsibilities, a short-range outlook towards research planning, and limited usefulness of demonstration project results—hamper its effort. These challenges also provide opportunities for EPA to focus or redirect some of its attention and resources to further strengthen its analytic base. Two areas where EPA could make further improvements are the following:

- Research could be better focused on the long-term efforts needed to fill critical information gaps for assessing and monitoring environmental risks; such a decision will require trade-offs between short-term and long-term research needs.
- Demonstration projects aimed at developing new ways to assess and manage risk across several environmental media or programs need to be evaluated so results can be more fully utilized and management of future demonstration projects can be improved.

By improving these two areas, EPA would broaden and strengthen its analytic base, increase the credibility and soundness of its risk-based decisions, and enhance its ability to accomplish its initiative of managing for measurable environmental results.

We believe EPA would benefit by designating a focal point for ensuring that the initiative of managing for measurable environmental results is implemented. The focal point would concentrate EPA's attention on both

research and development and demonstration projects, as well as on other issues and recommendations discussed in chapters 2 through 4.

A Sound Analytic Base and Its Use Are Critical for Assessing and Managing Environmental Risks

A sound and credible scientific base is critical for assessing and managing risks facing the public and the environment. The environmental analytic base, which EPA is continually attempting to broaden and strengthen, includes the complex array of information needed (1) to identify new and emerging environmental problems, (2) to determine and set policy priorities and appropriate regulatory and nonregulatory actions aimed at maximizing risk-reduction, (3) to assess the implications of its actions across all environmental media, (4) to develop measures of environmental quality, and (5) to measure whether its activities help solve environmental problems. EPA's task is difficult because many actions must be taken on the basis of incomplete scientific information especially when the public's health may be imminently involved and because of external pressures from the public and the Congress. In addition, EPA must maintain public trust by ensuring that its decisionmakers objectively interpret and work with the best available scientific data.

Risk Assessment and Risk Management: Elements of an Approach to Managing for Environmental Results

A major component of EPA's efforts to better manage for measurable environmental results is the use of risk assessment and risk management tools, both of which are largely dependent on sound, credible information. Risk-based decision making, or risk analysis, encompasses both risk assessment and risk management, the two distinct elements upon which many regulatory actions for public health and environmental protection are based. According to the National Academy of Sciences,

> "Risk assessment is the use of the factual base to define the health effects of exposure of individuals or populations to hazardous materials and situations. Risk management is the process of weighing policy alternatives and the determination and examination of policy alternatives and selecting the most appropriate regulatory action, integrating the results of risk assessment with engineering data and with social, economic, and political concerns to reach a decision."[1]

EPA has adopted the risk assessment strategy and terminology set out in the Academy's report on risk assessment activities in the federal government. The Academy characterized a risk assessment as containing some or all of the following steps:

[1]National Academy of Sciences, National Research Council, Risk Assessment in the Federal Government: Managing the Process (Washington, D.C.: National Academy Press, 1983), p. 3.

- Hazard identification: the determination of whether a particular chemical is or is not causally linked to adverse health effects,
- Dose-response assessment: the relation between the magnitude of exposure and the probability of occurrence of adverse health effects,
- Exposure assessment: the extent of human exposure before or after application of regulatory controls, and
- Risk characterization: a description of the nature and often the magnitude of human risk, including attendant uncertainty.

Although no specific steps exist for the process of risk management, EPA has several analytic tools that it uses, including (1) cost-benefit analysis, where the costs of pollution or hazard control are explicitly compared with the monetized benefits, (2) risk-benefit analysis, which balances the economic benefits of a polluting activity against the associated risks to health and the environment, and (3) cost-effectiveness analysis, which seeks to identify the path of least cost to achieve a goal, given a control action is deemed desirable. Carrying out all of the above analyses is resource- and data-intensive.

As discussed below, these risk assessment and risk management tools have important advantages but are also heavily dependent on extensive data.

Advantages and Limitations of Risk Assessment and Management

As recognized by EPA, the use of the risk assessment and risk management tools can help protect the environment and human health more efficiently. EPA has neither the budget nor the time to extensively test each of the thousands of chemicals marketed in the United States. Risk assessment and risk management can help provide the analytic approach to setting its agenda and priorities, recognizing that some of the priorities will be set by the Congress.

Risk assessment and risk management can produce more efficient and consistent risk reduction policies. Although some important differences exist in the ways the laws require the management of risk, EPA's adoption of a risk management approach permits it to use its remaining administrative flexibility to make more efficient use of its resources to reduce risk and to make its actions more consistent. In discussing how risk assessment relates to the different environmental statutes, the Administrator stated that while EPA may make different decisions under different environmental statutes using the same risk assessment, it will at least have a clearly articulated rationale for doing so to ensure public understanding of agency actions.

Use of risk assessment and risk management depends heavily on data and is limited by the existence and the quality of the data. A lack of information results in uncertainty when determining health risks. The uncertainty is particularly great for noncancer health effects. To compensate for missing data, assumptions have to be made that may limit the usefulness and credibility of the risk assessment. The application of risk management works best when the environmental risks EPA program offices are seeking to reduce can be easily quantified or expressed in a numerical form. Unfortunately, few risks can be quantified accurately, resulting in risk management decisions based more upon judgment than upon specific data.

EPA Efforts to Strengthen Its Analytic Base and Its Use in Assessing Risks

EPA recognizes the importance of broadening and strengthening its analytic base to support its initiative of managing for measurable environmental results and has taken several actions aimed at achieving this. These actions include (1) supporting research to reduce the uncertainty that exists with much of the existing data, (2) formally establishing a quality assurance program to ensure that all future environmentally related measurements supported by EPA produce data of known quality, and (3) requesting the Science Advisory Board to peer review its existing and planned research programs (the Board conducted 65 scientific reviews of EPA research programs in fiscal year 1986).

Other EPA activities apply to the use of this analytic base. Beginning in 1983, following the recommendations of its Toxics Integration Task Force, EPA initiated a number of actions to institutionalize a risk-based approach in its decision making and to improve consistency and quality in the conduct and use of risk assessments. These activities include development and communication of a risk assessment/management framework for agency decision making; the development of several agency-wide guidelines to help ensure consistent scientific assessments of risks across all EPA programs; the creation of the Risk Assessment Forum, the Risk Assessment Council, and the Risk Management Council, again to ensure uniform, consistent, or comprehensive risk assessment and management approaches and decisions; the training of EPA personnel and outsiders to better understand and use risk assessment/management concepts and tools; the development and implementation of the Integrated Risk Information System to provide a common and consistent information source on completed chemical risk analyses to EPA users and others; and the initiation of several demonstration and other special projects to test new or innovative ways to address environmental problems that cut across several environmental media or agency programs.

EPA Needs to Fill Research Gaps in the Analytic Base Used for Assessing Risk

The quality of risk assessments is largely dependent on sound information. Risk assessments, as now performed, have some weaknesses and information gaps, generally recognized by EPA and the scientific community, that could be strengthened or filled through research. However, EPA's research agenda does not now emphasize the filling of information gaps because such action generally requires long-term projects. EPA's current focus is on short-term activities of the program offices, particularly in developing regulations. This focus on research for developing regulations rather than on completing the environmental analytic base underlying risk assessment occurs, in part, because of tighter research budgets and the current system of research planning and allocation of research resources.

What Are the Data Gaps and Why Is Filling Them Important?

On the basis of our interviews with environmental experts at EPA; special interest organizations; and congressional committees with oversight of environmental issues and a review of EPA, Science Advisory Board, and CEQ documents, we conclude that large and extensive gaps exist in information needed to perform risk assessments. The nature of the information gaps identified by these experts included poor or nonexistent exposure and other data, a lack of methodologies for assessing ecological or noncancer risks, and a lack of understanding of basic global environmental processes.

Given the limited resources available to EPA, a knowledge of environmental risks is necessary to attack those first that are most likely to cause the greatest damage. However, EPA is faced with gaps in the information it needs to make risk decisions (i.e., identifying hazards, determining a dose-response relationship, assessing exposure, and characterizing a risk). For example, noncancer health effects data—such as developmental, immunological, kidney, liver, neurotoxic, and reproductive effects—are poor or nonexistent. In addition, no generally accepted methods exist on how to count and assess noncancer health or ecological effects. Much of EPA's past efforts focused on cancer-related health concerns. According to a former EPA Deputy Assistant Administrator for Research and Development, because of these data gaps—noncancer health and ecological effects data—he did not believe EPA was ready to use a risk-based approach.

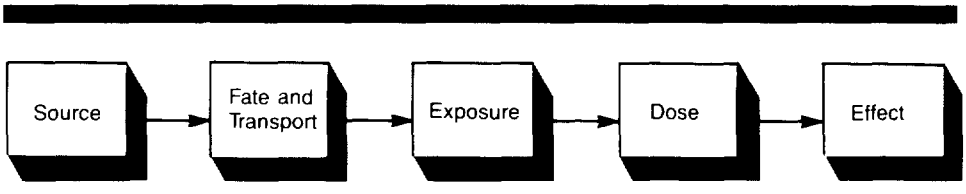
Lack of Human Exposure Data

An illustration of a critical gap in environmental decision making is the lack of accurate information on human exposures to environmental pollution. Without adequate data on these exposures and their sources, EPA

cannot make the best possible decisions to set priorities for environmental regulatory programs using risk reduction as a criteria. One of the greatest single sources of uncertainty in the risk-reduction approach is the scarcity of relevant human exposure data. According to EPA, a major reason for this has been the lack of methods for determining the exposures of the population to environmental pollutants with reasonable accuracy and affordable cost.

Determining the risk of environmental pollution to public health requires a knowledge of the components in figure 5.1.

Figure 5.1: Components for Determining Public Health Risk From Environmental Pollution



Source: EPA

Each of the five components for determining the public health risk associated with environmental pollution in the above figure is important. However, information and knowledge about each component are not available to the same degree. Usually, environmental pollution comes to the attention of the public through the sources—smoke stacks or leaking toxic waste drums. The manner in which the pollutant moves through the environment—its fate and transport—is another component often investigated. Likewise, the fifth component—the effects of pollutants on humans—has also received considerable attention. However, the knowledge of two important components of the risk model—exposure and dose—is limited for most pollutants of concern in the environment. Until the 1980s few accurate data on the actual exposures of the population to important environmental pollutants existed. Information on adverse health effects of a pollutant alone is not sufficient to do a valid risk assessment; exposure data are also a key component to a risk assessment. According to EPA's Assistant Administrator for Research and Development, exposure assessment is the weakest component of risk assessments because of the lack of exposure information.

In its February 1987 Comparative Risk Project report, which compared and ranked the human and ecological risks associated with major environmental problems, EPA acknowledged its awareness of the nature and extent of the information gaps—the general lack of health, welfare, and ecological effects and exposure data. The report was heavily based on the experience and judgments of senior EPA managers because, according to the report, it was impossible to perform the project in a quantitatively rigorous fashion because of the many data gaps.

A 1984 National Academy of Sciences study on toxicity testing needs of chemicals found that the toxicity data base was inadequate for toxicity evaluation for 50 percent of pesticides and over 80 percent of chemicals in commerce.[2] The Academy recommended that priorities for further testing should be guided by the potential for human exposure, for which the data base was even more inadequate than for toxicity. The science of exposure assessment is less well developed than for toxicity testing, especially for general population exposures.

In an April 26, 1985, Science Advisory Board review panel report on EPA's total human exposure research program, the Board said EPA's ability to perform credible quantitative risk assessments is severely constrained by the limitations in current capabilities in exposure assessment.

The Board credits EPA for much of the progress in exposure assessment technology in recent years; however, it believes the level of support has been limited and the level of effort too meager to permit advances commensurate with the needs for increased numbers of ever more sophisticated risk assessments.

Other Information Gaps

Other information gaps presented in the March 1985 Council on Environmental Quality report on long-term environmental research illustrate the scope and size of the gaps:[3]

- One or more elements of needed environmental-related data are missing because of the lack of understanding or tools to measure how the environment works or because the cost of measurement is prohibitive.

[2]National Academy of Sciences, National Research Council, Toxicity Testing: Strategies to Determine Needs and Priorities (Washington, D.C.: National Academy Press, 1984), p. 117.

[3]Council on Environmental Quality, Report on Long-Term Environmental Research and Development (Washington, D.C.: Mar. 1985), pp. 6 - 11.

- No adequate long-term (e.g., 10 or more years for slow environmental changes to be noticed) observation data exist for distinguishing natural changes from those attributable to human activities.
- Measurement of the rate of transfer of pollutants across several environmental media is rudimentary.
- An understanding of the cause/effect relationships between global pollutants and ecological process is lacking.
- Current quantitative risk assessment techniques are crude and lack the precision needed for the important decisions made on their basis.

Impact of Information Gaps

These information gaps—particularly in noncancer health and ecological effects, human exposure, transfer of pollutants across media, and global environmental processes—extend to most, if not all, environmental media and exist in the risk assessment sciences. As a result of these gaps, the agency's risk assessments, which serve as a basis for risk-based decisions, may reflect scientific uncertainty and may be less credible than desired. We do not suggest that EPA risk assessments are improperly conducted or less than state of the art. We simply point out that the risk assessments may be incomplete and characterized by a degree of uncertainty, thus having an impact on EPA's credibility.

Assessing the risks of most environmental chemicals/substances is a highly uncertain exercise because it requires using a variety of untested assumptions to compensate for the absence of data or fundamental scientific knowledge. Given the extensiveness of existing information gaps, analysts may need to use many assumptions, thus the uncertainty associated with some EPA analyses, including some risk assessments, can be very large. For example, EPA has been criticized by the regulated community about making layers of assumptions in a given analysis that were all biased in a conservative direction and thereby overstating a risk estimate when compared to one resulting from unbiased assumptions.

Other criticisms include the opposite, that EPA's efforts to assess risk are so rudimentary that they likely understate true risks. EPA has also been criticized for using faulty data or inappropriate models as a basis for action. Such criticisms are the direct result of the need to use assumptions to accommodate information gaps, and they constitute evidence of the lack of credibility in those studies because of EPA's inadequate analytic base.

Although EPA has taken steps to improve the quality of data and can remove bias in its risk estimates, the prevalence of data uncertainties continues to be a limitation in making risk decisions. The National Academy of Sciences noted in its 1983 report that

"... the basic problem in risk assessment is the sparseness and uncertainty of the scientific knowledge ... and this problem has no ready solution ... [T]he greatest improvements in risk assessment will result from the acquisition of more and better data, which decreases the need to rely on inference and informed judgment to bridge gaps in knowledge."

In its 16th annual report (1985), the CEQ stated that "[s]cientific uncertainty is pervasive in environmental decisionmaking."

EPA's Focus on Legislative Mandates, Deadlines, and Current Program Needs Limits Resources to Fill Data Gaps

EPA's research activities are focused primarily on short-term research needs. As a result long-term research with its capability to fill data gaps is delayed, postponed, or not initiated. Several reasons exist for this, including the different legislative mandates for considering and regulating risks and the numerous statutory deadlines, the declining or limited research resources, and the research planning structure/process for identifying and funding research needs.

Different Legislative Mandates Contribute to Fragmentation in Approaches to Risk Reduction

As discussed in chapter 2, EPA is responsible for implementing nine major environmental laws, each with its own requirements for regulating specific substances, standards to be considered, values to be used in analyzing the hazards, and other factors to be considered in implementing its programs. The type of risk management approach used is usually controlled by the type of hazard being evaluated and by the particular legislative authority. The risk management approaches most generally used are risk only, risk balancing, and technological control. Different statutes require the use of different approaches in developing and evaluating regulatory options. This condition of different legislative mandates contributes to fragmentary and potentially uneven or contradictory approaches to reducing environmental risks.

Another characteristic of some of the environmental statutes is that each statute tends to be focused on a single environmental medium. As a result, according to the Director, Science Advisory Board, EPA frequently directs scientific and other issues with a medium-specific mind-set.

Another impact of the different legislative requirements is that different EPA program offices sometimes issue their own risk assessments for the same substance (e.g., dioxin and asbestos). Issuing multiple risk assessment documents for a single substance, as well as seeking separate scientific reviews by the Science Advisory Board for each document, is not an efficient use of EPA or Board resources, according to the Board.

Another aspect of the environmental laws that poses a challenge to EPA is the numerous and specific deadlines imposed on EPA, the states, and the regulated communities. Such deadlines, some agency officials argue, create a resource allocation bias toward conducting short-term research to support these deadlines. This bias causes EPA to do less long-term research that is more likely to be focused on reducing information gaps that have broader application to EPA's programs.

Declining or Limited Research Resources to Fill Information Gaps

EPA's efforts to conduct the research needed to fill information gaps are limited by its declining research budget during the early 1980s and only partially restored research budget in the latter 1980s. Many of the criticisms leveled at EPA in the past by the scientific community and the Congress can be explained by the upheaval in funding of EPA's research program during the early 1980s. EPA recognized these criticisms and in fiscal year 1984 began working to attain a more stable funding base for its research program. Some of the research budget was restored; however, each of EPA's research budgets for fiscal years 1987 and 1988 is still about 25 percent less (in constant dollars) than its fiscal year 1980 research budget. Since 1980 EPA's research work force has shrunk by about 500 staff years to 1,831 staff years in 1988 compared with 2,344 in 1980. Table 5.1 shows EPA's research budget and staff years for fiscal years 1980 through 1988 (1987 estimate and 1988 proposal).

Given the current federal budgetary climate, the outlook for additional research dollars at EPA is not optimistic. Opportunities for additional research resources are probably limited to reassessing other EPA priorities and shifting resources to the research area.

EPA's Research Planning Process Could Be Better Focused on Long-Term Research Needs

EPA's research planning process focuses on short-term projects aimed at supporting ongoing activities rather than long-term needs. This planning process is carried out through the Research Committee System composed of six research committees, each co-chaired by a senior manager from the Office of Research and Development and a senior manager from the program office. According to agency documents, the committees communicate research needs, describe research programs aimed at meeting those needs, and advise the Assistant Administrator for Research and Development on research priorities. These committees—Air and Radiation, Water, Hazardous Waste/Superfund, Pesticides/Toxics, Multi-Media Energy, and Interdisciplinary—are specifically oriented to users of the research information (the program offices) and are aligned with the major regulatory programs.

We were not able to obtain EPA data on the breakdown of short- and long-term research because the agency does not categorize research in that way. However, EPA officials and others told us of their perceptions and concerns about the imbalance between short- and long-term research.

Although agency research planning documents state that the process attempts to balance the research program and anticipate problems not on EPA's regulatory agenda, we were told by several EPA officials and others that short- and long-term research are not balanced. According to several agency officials as discussed below, in practice, research resources tend to be allocated to short-term projects in support of ongoing regulatory activity rather than long-term projects designed to reduce information gaps. Further, although the benefits of long-term research are likely to be realized in the long run, agency officials are under pressure to produce results and comply with the environmental legislation in the short run. According to the Assistant Administrator for Research and Development, although EPA's research committee process for developing research agendas has resulted in research responsive to the program offices, it has undermined the agency's long-term research capability. A constant pressure, according to a former Deputy Assistant Administrator for Research and Development, exists to reprogram research resources to respond to the immediate needs of the program

offices. As a result, he said, this frustrates any long-term research because of limited and unstable funding.

One of the issues discussed at the February 1987 EPA Senior Management Forum was the narrow scope of the Research Committee process and how the process is oriented toward specific issues and provides almost no opportunity for investigating environmental science. According to EPA's Director, Office of Environmental Processes and Effects Research, the limited resources for support of research and the increasing urgency of emerging environmental problems, such as acid rain and toxic substances, has forced EPA to commit a major share of its resources to conducting research in direct support of decision making and away from basic environmental science research. The Science Advisory Board also noted that EPA must conduct more long-term research to help the agency foresee future scientific and regulatory issues.

The Congress too has been concerned about EPA's long-term research needs. Over the years, one of the Congress' consistent concerns about the overall management of the environmental research and development program has been the need for better planning and more long-range research. For example, the House's authorization bill for EPA's fiscal year 1988 research budget stipulates that EPA's mandate include a responsibility to conduct basic, long-term environmental research.

In its review of EPA's research program, the Science Advisory Board said that EPA's ability to achieve its goal of building risk-based decision making depends upon its ability to maintain and enhance the technical skills of its personnel, particularly in the research area where the older or retiring work force is not being replaced by new staff as quickly as are personnel in other EPA areas. The Board believes EPA needs to define for the Office of Management and Budget and the Congress its scientific staffing needs in the context of its maturing work force, work load, current mix of scientific skills, and goal of establishing a risk-based decision-making apparatus.

EPA Has Started to Address Long-Term Research Needs

In 1987 EPA added emphasis to addressing the gaps in ecological effects data by initiating efforts to establish and focus a long-term research program on the problem. In May 1987 EPA Administrator Lee Thomas addressed the EPA Science Advisory Board's Environmental Effects, Transport, and Fate Committee and expressed concerns about the following:

- the lack of quantitative ecological effects data to make decisions;
- the need to standardize ecological effects information within EPA; and
- the need for more agency-wide and federal-wide coordination and monitoring effort in ecological trends.

He asked the Board to assist EPA in developing a long-term research program to address these gaps. In May 1987 the Board established a new subcommittee under the Environmental Effects, Transport, and Fate Committee to address his concerns and to formulate a long-term ecological research plan. As a first step in developing this plan, the subcommittee is holding public meetings to find out what EPA, other federal agencies, international organizations, and private groups, and industry are doing in the area of long-term ecological research. The subcommittee efforts will take approximately 1 year.

In addition, in June 1987 a special committee of the Science Advisory Board began exploring ways of improving strategic research planning in EPA, including identifying ways to better support its risk assessment and risk reduction goals. Administrator Thomas asked former Deputy Administrator Alvin Alm to chair the committee. This committee plans to issue its report to the Administrator in the summer 1988.

The Congress, in addition, directed EPA to reallocate $10 million of its fiscal year 1988 budget from other research projects to research directed at reducing the uncertainty of risk assessments. This shift has a potential limitation in that the $10 million shift represents less than 3 percent of EPA's 1987 research budget, which may not be sufficient to address the agency's many unmet long-term research needs and, at present, the shift may only be a one-time event. To address this congressional directive, EPA is currently identifying the needed research priority areas and the other research areas where resources will have to be reduced.

Another initiative, begun in fiscal year 1987, is the development of a comprehensive risk assessment research program. EPA did not have a comprehensive program; instead, it had several risk assessment research projects supported by several offices. According to a January 1987 memorandum from the Assistant Administrator for Research and Development, there has been no process to define overall goals and a comprehensive risk assessment research program, nor has there been a mechanism that would allow such a program to be implemented. Because of this, EPA is currently developing a comprehensive research

plan for risk assessment and exploring ways and options for ensuring that needed risk assessment research gets supported.

All of these initiatives can serve to reduce information gaps, which will broaden and strengthen the agency's analytic base and improve the credibility of its risk assessments. This would help EPA in its efforts to implement its initiative of managing for measurable environmental results.

Opportunities to Fill Information Gaps

EPA has the opportunity for a comprehensive look at its ongoing research activities and its present research committee process for developing its research agenda. In taking such a look, EPA could determine (1) how well the activities and the process contribute to the initiative of managing for measurable environmental results and (2) whether the activities and the process result in the best balance between short- and long-term research efforts to meet the needs of the agency in carrying out its initiative now and in the future.

By developing a long-term research agenda clearly focused on furthering the agency's capabilities in assessing and comparing environmental risks and in making risk-management decisions, EPA can begin to more rapidly fill the identified information gaps.

Listed below are several factors or considerations we believe are relevant to EPA's assessment of its research program needs and development of a long-term research agenda focused on the initiative of managing for measurable environmental results.

Factors or Considerations for Developing a Long-Term Research Planning Process and Agenda

- Coordinating efforts to identify research gaps in risk assessment data and methodology, risk comparisons, and other analyses used in risk management decisions.
- Evaluating the advantages of establishing an ongoing effort to improve, expand, and update the agency's recent Comparative Risk Project and using its results to identify additional key information gaps and recommendations on agency risk reduction priorities.
- Developing a long-term research agenda based on identified data and methodological gaps along with the estimated resource requirements. This would be done in conjunction with the present research committees which would be responsible for developing the agency's short-term research agenda.

- Soliciting and selecting research proposals from the program offices and the Office of Research and Development in line with the proposed agenda.
- Committing funding to short- and long-term research on a balanced basis and safeguarding either research agenda from disproportionate shares of increases or decreases in the total research budget.
- Finding ways of providing stability of funding support to ongoing research projects.

Responsibility for assessing its research program and developing a long-range research agenda could be assigned to an agency unit or group, such as the Risk Management Council or a subcommittee of the council, that is in a high-level and central position within the agency and has the immediate backing and oversight of the Administrator. In addition, emphasizing and highlighting at least that portion of research directed at expanding credibility to a prominent and central position in the agency would be justified because achieving credible risk assessments and other scientific analysis is a principal concern and challenge of the agency. Further, the Risk Management Council already encompasses both cross-program and agency-wide representation and has a broad scope of interests and areas of concern that include and extend beyond the risk assessment and research areas.

The existing Research Committee process could be continued in a supportive role to the new research planning organization. The new organization would give long-term research attention and resources commensurate with its importance in establishing a credible analytic base.

Finally, a long-term research agenda focused on filling information gaps and improving risk assessments would result in improved precision of these risk assessment estimates and lead to both improved analytical credibility and better decisions.

Opportunities to Improve the Management and Use of Demonstration Projects

Important parts of the analytic base are the methodologies and knowledge needed to apply research results, environmental monitoring data, and other analytic data, techniques, and processes to daily operations at all levels of government. This knowledge is especially essential to successful implementation of new concepts or approaches that can substantially change the way programs or activities are carried out.

A major way that EPA obtains this knowledge and develops and/or tests new methodologies is by conducting demonstration projects. These projects generally involve selecting specific geographic locations or aspects of agency activities and attempting to implement a new concept or approach with the purpose of first determining whether the concept will work and second developing generic methodologies that could be used in other areas of the country or more broadly for the activity studied. EPA's recent experience with one set of these projects—the Integrated Environmental Management Program (IEMP) geographic studies—illustrates the difficulty and the promise of using demonstration projects for these purposes. These studies have provided valuable experience to EPA staff and a means for developing closer working relationships with state and local officials and the general public. However, additional efforts are needed if they are to fully meet their goal of developing methodologies that can be applied elsewhere and making them a part of normal operations.

The IEMP Geographic Projects: Their Purpose and Importance

The IEMP geographic studies were established because of concerns by EPA managers and technical staff, as well as other environmental professionals outside the agency, that the traditional approach to environmental protection insufficiently recognizes that pollutants cross and recross medium boundaries, undergo chemical changes, and produce adverse effects in media other than the ones in which they were initially discharged. EPA staff have identified five negative consequences resulting from this traditional framework of pollution control:

- The solution to a single-pollutant, single-medium problem might simply transfer the problem to another medium, perhaps incurring greater risks and costs of control.
- Problems involving several environmental media may not be addressed sufficiently by an environmental agency that generally examines each medium independently.

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1987 review by the Science Advisory Board, a review of one of the projects by EPA's Program Evaluation Division, and our work, which included discussions with EPA headquarters, regional, and local officials associated with the projects.

The Findings of the Science Advisory Board

In July 1987 the Science Advisory Board issued a report to the EPA Administrator on its review of the IEMP program, which was largely focused on the geographic studies. The review had been requested by the EPA Deputy Administrator and the Assistant Administrator for Policy, Planning, and Evaluation. In its report the Board concluded that the conceptual approaches employed in the geographic studies represent an important component of EPA's overall effort to develop and/or apply methodologies to establish environmental priorities. According to the Board the projects, in particular, provide a valuable means for developing closer working relationships with state and local governments and the general public in evaluating area- or site-specific risks and in devising effective strategies to communicate risks. The Board further concluded, however, that the absence of consistently documented scientific assumptions and objectives and the ad hoc approach to peer review had created difficulties in assessing whether the program as a whole or specific studies have achieved their overall goals.

Some of the specific concerns or problems identified by the Board were as follows:

- Although not a research or risk assessment program per se, the IEMP greatly depends upon technical data as a basis for priority setting. Thus, clear statements regarding scientific assumptions and objectives toward which data are applied constitute a necessary program aspect. The frequent lack of indicators or criteria for judging program or project success or failure has made it difficult to systematically identify and institute corrective steps at earlier stages of project or program development. This latter characteristic also resulted from staff turnover.
- The IEMP is not a model or even a method, but more of a process that uses several highly variable methods, with health risk estimates providing the underlying metric of the process. This characteristic emphasizes the program's need to adequately document its use of scientific data and models. The Board also believes that IEMP decision tools should never become the sole basis for either identifying or managing environmental problems by any level of governmental decisionmakers.
- The program suffers from some inadequate use of scientific information and models. Moreover, no clearly stated criteria for maintaining quality

- Policymakers have no systematic way of setting priorities across sources, pollutants, and exposure pathways in different media. Consequently, environmental policies and regulations may not be cost-efficient, spending too little on some problems and too much on others.
- One-dimensional studies of pollutants and individual media may not consider total or cumulative environmental exposure either within a medium or across all media.
- Laws and regulations may use different and sometimes inconsistent objectives, methods, and standards.

The general goal of IEMPs is to develop a model for local environmental management that (1) is integrated, to the extent that it has an analytically defensible basis for establishing pollution risk reduction priorities across media, (2) takes into account both cost-effectiveness and potential for pollution transfer from one medium to another in selecting pollution control remedies, (3) can be practically used by local officials, and (4) contains an implementation process that maximizes the potential for broad public understanding and acceptance of management decisions. The projects were to translate general concepts—use of quantitative risk assessment applied across media to establish priorities, minimization of pollution transfer, and use of cost-effectiveness to help select pollution control technologies—into a workable, practical environmental planning and management process at the local level.

IEMP geographic studies have been or are being conducted in Philadelphia, Pa.; Baltimore, Md.; Santa Clara Valley, Calif.; and Denver, Colo. At the time of our review, the Philadelphia project, which began in 1982, had been completed and a final report had been issued. The Baltimore and Santa Clara Valley projects, both of which began in 1983, had advanced to completion of phase I reports. Denver was in its initial stage of preparation. During phase I, the project scope is defined, available data on environmental problems are analyzed, and the environmental priorities are set.

Design, Implementation, and Funding Problems Limit Project Success

The IEMP geographic projects have contributed to a better understanding on the part of EPA, state, and local officials of the need to assess environmental issues from a multimedia perspective and how they can work together to evaluate health and environmental risks and devise effective strategies to communicate them. However, design and implementation problems have to date thwarted the IEMP goal of a generic model for integrated environmental programs at the local level and have limited the projects' usefulness. This assessment of the IEMPs is based on a July

control were adopted for the program as a whole or for the guidance of individual project managers. Similarly, no consistently designed or implemented process of peer review existed at the program or project levels.

- The IEMP projects have not always made effective use of other scientific talents within EPA and the scientific community concerning multimedia analysis.
- The IEMP has not employed a conceptually unified framework for addressing risk and has not consistently presented a clear identification of the major uncertainties in its efforts to screen, rank, and assess risk. This is needed to reduce the possibility that the multimedia assessments will be misinterpreted.

The Science Advisory Board made several recommendations to the EPA Administrator to address these problems for future projects. The IEMP program should

- adopt clearly articulated, measurable objectives for the program as a whole and for individual projects at the time of their initiation,
- more clearly document the scientific assumptions it uses and communicate the limitations and uncertainties associated with the results of its various studies,
- identify the range of scientific disciplines needed and develop a plan to develop cooperative working relationships with other EPA groups having expertise,
- more aggressively seek technical input from experts in the environmental and scientific community, and
- develop explicit quality control criteria and adopt rigorous peer review for both study design and implementation.

EPA's Program Evaluation Division Review of the Baltimore Project

An EPA review of the Baltimore IEMP project by the Program Evaluation Division in the Office of Policy, Planning, and Evaluation found problems similar to those identified by the Science Advisory Board. Its major conclusion was that the integrated environmental management concept is basically a rational approach to environmental protection, which deserves a fair trial and possible application in some form; but in practice, many technical, institutional, and managerial issues raise questions about the workability of the IEMP approach. According to the Evaluation Division, the limited availability of data and limitations in the scientific underpinnings make it difficult to establish reasonable estimates of risks

for exposure resulting from multiple chemicals by multiple routes arising through multiple media. The Division cited institutional and managerial problems, such as jurisdictional disputes and public debates concerning politically unappealing issues in election years. According to the Division, the management of the project, in the face of conflicting interests and insecure sources of funding for the investigation of environmental problems, is an extremely difficult proposition. In general, the Program Evaluation Division concluded that the IEMP process is still in an evolutionary stage, the basic concepts of the IEMP approach are sound, but the scientific and technical basis for executing the program is weak.

Our Discussions With EPA, State, and Local Project Officials Identified Additional Concerns

We held discussions with EPA, state, and local officials involved in the Philadelphia, Baltimore, and Santa Clara Valley IEMP geographic projects. These officials expressed the following additional concerns about the projects:

- A Philadelphia city official said that the major flaw with the Philadelphia project was that it looked only at limited problem areas in the environment. He attributed this narrow approach to limited project funding. Another city official stated that no tools came out of the study that he expected to use. He said that the overall IEMP approach and concept are sound, but the Philadelphia project approach must be refined and funding made available to do follow-on efforts.
- According to some participants of a March 1987 seminar on the progress of the Baltimore project, the environmental issues identified by the project for further work reflect existing state/local government programs and the interest, background, or responsibilities of the agencies involved in the project rather than a true cross-media assessment. The participants were also concerned about the project's future funding as the project's phase II is completed.
- According to a Santa Clara Valley project official, the EPA regional office could have been more supportive by better meshing its activities with the project, providing some data systems funding, and providing technical assistance. He also said that it was a mistake that the state of California had not been involved in the project.

The Next Steps

The four IEMP geographic projects have been completed or are near completion, at which time a report is to be issued on each. These reports are to discuss the activities, findings, and conclusions reached by the study

teams. As such, the reports should be beneficial in terms of disseminating information on the individual projects and lessons learned that can be applied to future IEMP projects. An analysis of these reports to identify common achievements, limitations, problems, and lessons learned could further ensure that the results are most effectively used and help improve future projects. The Science Advisory Board review should be especially beneficial in this regard.

An analysis of the experience with these projects could also provide EPA opportunities to better use demonstration projects, in general, as a tool for adding to the analytic base. From our examination of the projects and review of other evaluations of them, we developed some basic requirements (see table 5.2) that we believe would apply to these and other demonstration projects and could help EPA in this analysis. (For example, the Science Advisory Board noted the need for clearly defined IEMP project objectives.) The projects could be assessed to determine the extent to which they met the criteria and whether EPA needs to make changes to ensure that other ongoing and future demonstration projects are well managed.

Table 5.2: Basic Requirements for Managing EPA Demonstration Projects

Project proposals should contain	adequately specified objectives and sufficient funding to accomplish them, evidence of support and input from appropriate program and regional offices and participating local agencies, evidence of support and input from research and planning offices, and how the individual project contributes to the overall plan or goal established for the set of projects and agency objectives.
Project plans should	incorporate results of previous studies and have peer review of project methodology.
Project implementation should have	clear assignment of accountability, representation of affected program and regional offices and local agencies on the project, and mechanisms to monitor project funding, schedule compliance, and progress toward objectives.
Project evaluations should	have peer review of methodological and other substantive findings and conclusions, identify lessons learned that are applicable to future projects and current program operations, and contain a strategy for use that includes (1) dissemination of results and (2) plans for appropriately integrating the results into agency activities.

Agency Action on IEMPs

Subsequent to reviewing a draft of this report, EPA officials informed us of actions they were taking to respond to both the Science Advisory Board's and our recommendations for improving the IEMP process. For example, they have enlisted the scientific community to help develop measurable objectives for the Denver IEMP and to better document and explain the assumptions, limitations, and uncertainties in the Baltimore project's air toxics monitoring study. They also established a science review panel to participate in the development and review of study methods and findings for the Denver IEMP.

Further, they have undertaken efforts to expand the use of EPA's Office of Research and Development and other internal experts to improve efforts in monitoring air toxics and developing better approaches for noncancer risk assessment. Steps have also been undertaken to more widely disseminate the lessons learned from the projects. We believe

these are positive steps, which can enhance the usefulness of these projects to EPA and the environmental community.

Leadership and Organizational Focus Could Help Achieve the Goal of Managing for Measurable Environmental Results

EPA's goal and efforts to implement the initiative of managing for measurable environmental results represent a movement in the right direction. However, the agency must consider whether the initiative and the accountability for achieving it are provided through its current single-media-oriented organizational structure.

The agency lacks a clear understanding of the policy goal and the initiative, has weak or missing links between its planning and budgeting systems to accomplish the initiative, needs to develop or improve ways to monitor and measure environmental progress, and needs to strengthen the analytic base used in assessing and managing environmental risk. Thus, EPA's successful accomplishment of the initiative may be slowed and not effectively implemented.

In our opinion, a better organizational focus may be an effective way for providing the leadership needed to implement and achieve the initiative. One way of establishing such an organizational focus could be to designate a focal point (an individual, group, or office) to be responsible for ensuring that the initiative is carried out. Options for this focal point could be the Assistant Administrator for Policy, Planning, and Evaluation; the current Risk Management Council; a new office of environmental results; or a new group made up of the Deputy Administrator, the Assistant Administrator for Research and Development, and the Assistant Administrator for Policy, Planning, and Evaluation. A designated focal point, in our opinion, would be another step in institutionalizing a risk-based decision-making process and providing a broad perspective for identifying ways to successfully implement the initiative and improve the agency's analytic base beyond its immediate single-media and short-term needs. This focal point could also begin undertaking the actions we recommend in chapters 2 through 5 of this report.

We recognize that arguments can be made in favor of the current organizational arrangement and that an individual, group, or organizational unit in and of itself does not ensure a coordinated, integrated, and comprehensive approach to environmental management. Likewise, although there are good reasons for continuing to assign responsibility for managing the initiative of managing for environmental results to the program

offices—their intimate knowledge of their respective media, their control over program and field resources, and the reinforcement of traditional agency decision-making processes—we question the efficacy of this approach for the following reasons.

First, this approach may not be effective in all cases because of the single-medium focus of its program offices, especially as their actions are driven by single-medium-oriented legislative mandates. A focal point would be beneficial because the goal of managing for measurable environmental results cuts across the agency, thus requiring an agency-wide focus, crossing intra-agency boundaries, and the ability to sustain a long-term effort. Incentives are not in place under the present system for such a broad focus. EPA experience using the program offices to pursue the actions needed to obtain measurable environmental results across media has not been very successful because competing requirements generally take precedence over longer-range efforts. The focal point, in contrast to the program offices, would have the incentive to pursue the actions needed to obtain measurable environmental results across media.

Second, interpreting and using the various pieces of legislation to manage for measurable environmental results requires a broad agency-wide perspective. A focal point, in our opinion, would facilitate the task of implementing environmental statutes, which focus on specific environmental media or substances, differ in the required standards for regulating a risk, and differ in emphasis placed on risk-benefit considerations in developing environmental regulations. The House Committee on Appropriations has recognized this potential problem of fragmented and inconsistent risk-related analyses. The Committee staff have discussed with EPA the need to establish a focal point for ensuring consistency in the conduct of risk assessments and to use risk-related analyses to guide regulatory policy decisions and resource allocations.

Third, placing the responsibility for managing for environmental results at the media/program office level leaves, in our view, the eventual resolution and decisions of many of the details with the Administrator and Deputy Administrator, the only management level with a perspective that encompasses the entire agency. On the other hand, we believe assigning responsibility for implementing the initiative to a focal point could free the Administrator from personal involvement in the details of such a large and complex undertaking.

A focal point for managing for measurable environmental results could be given overall responsibility for policy development and management of EPA's efforts to better achieve its goal of managing for measurable environmental results. To better institutionalize efforts to develop an integrated approach to managing risk, the focal point could also help ensure consistency in the conduct of risk assessments and the use of risk-based analyses to guide regulatory and other policy decisions, including resource allocations. A focal point for risk-based decision making would also address remaining barriers to the use of risk analysis, such as statutory limitations. Establishing such a focal point would provide an institutional or organizational focus for current management efforts to incorporate risk-benefit considerations into agency planning, budgeting, and operations. This, we believe, is an essential step in the evolution toward an "integrated environmental program focused on measurable environmental results."

To ensure permanency and continuity from one EPA administration to the next, such a focal point could be formally designated and established within the agency so that EPA's current efforts of making greater use of risk-based decisions are perceived as a permanent part of the agency's operating procedures. Succeeding administrations would not have to "reinvent the wheel," in the sense of having to construct from scratch a system for managing policy and program decision making toward achieving the goal of managing for measurable environmental results.

Conclusions

EPA is dependent, in part, on a sound scientific, analytic data base to make decisions about environmental risk and when and how to manage, reduce, or prevent that risk to protect the public and the environment. This data base, in turn, is dependent on research, human and environmental monitoring systems to gauge status and progress, and demonstration projects to experiment with innovative ways to address complex, multimedia environmental problems. Information gaps on the nature and extent of human exposure to pollutants and environmental effects abound, and many uncertainties exist regarding available data.

The EPA research budget over the years has declined or been only partially restored to the peak levels of the early 1980s. Long-term research needs are postponed in favor of short-term research to support regulations and other current program activities. Given the current federal budgetary climate, the outlook for additional research dollars at EPA is not optimistic. Opportunities for additional research resources are probably limited to reassessing other EPA priorities and shifting resources to

the research area. We believe an appropriate mix of both short-and long-term research is needed to ensure that research to fill gaps gets started or is not delayed.

We also believe EPA's present research committee process for setting the agency's research agenda needs to be evaluated to determine whether and how it can be improved or supplemented to meet the agency's long-term research needs. In reviewing this process, EPA may need to consider ways to ensure a better balance between the competing research needs. One way could be to develop a long-range research agenda and corresponding resource allocations and assign that effort a visible and prominent organizational place within EPA. By doing so, this authority may be able to champion full or adequate coverage and a more stable funding of long-term research efforts, providing greater incentives for their initiation and completion.

One of the conditions EPA is faced with is the fragmented, single-media, and varying standards for regulating risks of the several environmental statutes and their individual mandates and deadlines. This condition affects EPA's research program in that, during periods of limited resources, long-term research needs are postponed in favor of short-term needs to support the various statutes and deadlines. Chapter 10 identifies as a future management challenge the question of whether a need exists for a single, organic environmental statute.

EPA uses demonstration projects as a way to develop and/or test new methodologies for broader application to agency operations. These efforts are especially important when implementing new concepts such as risk assessment and cross-media priority-setting. Our review of one set of these projects—the Integrated Environmental Management Program geographic studies—found that the projects have provided valuable experience to EPA staff and a means to develop closer working relationships with state and local governments and the public in evaluating and communicating area- or site-specific environmental risks. Design and implementation problems, however, have reduced the projects' effectiveness in achieving their basic goal of developing a generic model for integrated management at the local level. Realistic funding has also been a concern of project participants.

In addition to completing the remaining projects and responding to the Science Advisory Board findings, EPA needs to take two additional steps to more fully utilize the results of these studies. First would be to assess

the study results to identify common achievements, limitations, problems, and lessons learned to help ensure that the results are most effectively disseminated and used to improve future geographic projects; where efforts have been started they need to be continued. Second, the experience with the projects needs to be analyzed for changes that EPA could make to improve its management of demonstration projects in general.

Building on EPA's ongoing efforts to implement its initiative of managing for measurable environmental results, we identified several areas that could be improved to ensure the successful achievement of the initiative. Chapters 2 through 5 list several actions we believe need to be taken if EPA is to more effectively achieve its initiative. These recommendations address a range of agency processes and activities, including the need to

- clarify the policy goal of managing for measurable environmental results,
- establish or strengthen links between the agency's planning and budgeting systems,
- develop a process to monitor and measure progress, and
- strengthen and broaden the analytic base and its use.

We believe all of these actions are either contained in, or can influence the outcome of, EPA's initiative of managing for measurable environmental results. We also believe a focal point would be one possible way to help ensure institutional visibility and to signal top management's commitment by translating the policy goal into operating reality.

Recommendations to the Administrator, EPA

To ensure the continued strengthening of a sound analytic base needed for assessing and managing environmental risks, we recommend that the Administrator, EPA,

- identify the critical research needs for implementing the initiative of managing for measurable environmental results and establish a process and/or structure to ensure that these needs are met,
- as part of this, assess the status of methods and activities for determining exposure, particularly human exposure, to pollutants to provide a basis for deciding the additional research needed to develop and use effective methods, and
- establish a long-range research planning process for addressing the above research needs. As part of this effort, we recommend that the Administrator evaluate the present Research Committee process of

developing the agency's research agenda with a view toward determining how it can be revised to ensure a proper balance between the agency's short- and long-term research needs. The factors or considerations presented earlier in the chapter could help in devising the appropriate long-range research planning process and agenda.

To more effectively accomplish the objectives of the demonstration projects, we recommend that the Administrator, EPA, review the results of the Integrated Environmental Management Program geographic studies to identify

- achievements, limitations, problems, and lessons learned that are common to the projects so that the results are effectively disseminated and used to improve future geographic studies and
- changes that need to be made in the management of demonstration projects in general. The requirements set out in table 5.2 could help identify needed changes.

To ensure that the goal and initiatives of managing for measurable environmental results are being implemented, monitored, and accomplished and to implement the recommendations in chapters 2 through 5, we recommend that the Administrator, EPA, establish an organizational focus as a way for providing the leadership to ensure the successful implementation and achievement of the initiative. A focal point could be an individual, a group, or an office designated as responsible for seeing that the necessary policies, procedures, processes, and systems are developed, implemented, monitored, and revised to ensure that progress is being made in effectively achieving the initiative.

Establish an Effective Partnership With the States

The day-to-day operation of national environmental programs has become largely a state responsibility. As their roles have grown, states seek to operate more as EPA's partners, with greater flexibility and decision-making discretion. Concurrently, EPA has been working to develop a federal/state relationship that does not unduly impinge on the states' increased role but meets the agency's need for accountability for the programs. This balance has been difficult to achieve.

- Chapter 6 shows how EPA's attempts to establish a partnership with the states have not been fully successful. We identify continuing EPA and state concerns, EPA initiatives to overcome them, and major obstacles to a partnership. Our recommendations to advance current efforts include that EPA both determine where it can eliminate or replace detailed review of state program transactions with other oversight techniques and improve its state program performance evaluations by giving greater emphasis to measuring the environmental results achieved.
- Chapter 7 points out that current EPA efforts to improve its partnership arrangement with the states have achieved limited success in balancing EPA and state needs and concerns. Thus, EPA may need a new approach to achieve more of what it and the states desire in a partnership. We present an alternative for consideration by EPA, the Congress, and states. This alternative, which we refer to as "recertification," calls for EPA to periodically recertify the states to continue operating programs under delegation. EPA guidance, technical assistance, and oversight would be linked to comprehensive evaluations of state performance for recertification purposes. Recertification is presented as a general concept, recognizing that further details would need to be worked out and that EPA, the Congress, and the states would need to give additional thought to the extent and nature of the concept's application for national environmental programs.

Building an EPA/State Relationship for the Changing Management of Environmental Programs

EPA's achievement of national environmental goals is increasingly dependent on the states. States have been delegated operational or day-to-day responsibility for carrying out most EPA programs and will likely have an even larger role in the nation's future efforts to improve the environment. Along with their greater program role and responsibility, states have been seeking a more equal partnership with EPA. At the same time, EPA management has been working to establish a federal/state relationship that appropriately reflects changing roles in environmental programs.

Recognizing that states are a major factor in how well it meets its goals and objectives, EPA devotes much effort to ensuring that states satisfactorily carry out their delegated responsibilities and comply with legislative and other federal requirements. It issues regulations and standards, provides detailed guidance and financial/technical assistance, and monitors state performance.

The states, for their part, have generally taken on more responsibility and provided additional resources, expertise, and experience in carrying out the programs. In return, they want flexibility to tailor the programs to meet local conditions and needs, input into decisions affecting implementation, and EPA's trust in them to make the choices involved in day-to-day program operations. States believe that these conditions are essential to effective programs.

EPA and the states can point to substantial accomplishments in delegated programs. However, internal and external EPA studies continue to show that EPA guidance and oversight can be improved and that state performance is sometimes inconsistent.

Against this backdrop, EPA has been working to put in place a relationship that acknowledges the states' increasing role as key partners and yet provides EPA with assurances that delegated programs are carried out effectively. Such a relationship involves (1) a clear and appropriate division of authority and responsibilities, (2) state involvement/participation in goal-setting, policy formulation, and planning, and (3) reporting and other oversight mechanisms that provide the control and evaluative information that EPA needs. In this regard, one of the agency's major stated management priorities is "environmental federalism." The principle behind this priority is that EPA recognizes that each level of government has a proper role in public health and environmental protection and that the concerted and coordinated efforts of federal, state, and local agencies will best serve the public interest.

Given that fully addressing the nation's environmental problems will require the concerted and intent effort of both state and federal governments, we believe that EPA's initiative to better balance EPA and state perspectives is one of its most important endeavors. EPA has made improvements, but additional actions are needed to accomplish its objective of establishing an effective partnership with the states.

EPA Increasingly Relies on the States for Program Implementation

Major environmental laws enacted during the 1970s assigned to EPA most of the key functions involved in the delivery of environmental programs but provided for states to assume program implementation responsibilities. As their capabilities grew, states gradually applied for and received more tasks until, today, operational responsibilities for most EPA programs have been delegated to the states. These responsibilities vary by individual program but usually include

- establishing conditions, through issuance of permits, under which pollution-emitting sources will be allowed to operate,
- inspecting facilities to verify compliance with permits, and
- pursuing enforcement actions against those who violate the conditions of their permits.

Even in situations where environmental programs are not formally delegated, states often play a major role in assisting EPA to carry out day-to-day program activities. For example, Texas, which does not have delegation for the National Pollutant Discharge Elimination System (NPDES) program, not only prepares state permits but also drafts federal permits for final approval by the EPA regional office.

Major Impetus for Program Delegation

EPA has increasingly delegated its programs because it believes that delegation offers an opportunity to

- deliver more effective environmental protection by placing decision-making authority at a level of government closer to the people most affected by the decisions,
- broaden available resources and support by taking advantage of state advances in staffing and expertise (the states combined have many more environmental agency personnel than EPA does), and
- reduce duplication of effort (for example, under delegation, a pollution-emitting source no longer has to obtain both a federal and state permit).

In addition, many states have urged EPA to delegate because they believe that environmental protection within their boundaries is their responsibility and that they have a better understanding of their environmental problems and regulated community. The Congress has also encouraged EPA to delegate many of its programs in recognition of the states' large interest in and responsibility for environmental protection.

Delegation Is Widespread and Growing

Most of EPA's major programs are already delegated, as illustrated by table 6.1.

Table 6.1: Status of Delegation for Major EPA Programs Based on EPA-Provided Data

Program	Delegated states[a]	Nondelegated states[a]	Percent delegated
National Pollutant Discharge Elimination System (NPDES)	39	18	68
Construction Grants			
Agreements in force	51	6	89
All key activities delegated	37	20	65
Resource Conservation and Recovery Act (RCRA)			
Pre-Hazardous and Solid Waste Amendments (HSWA) program	43	14	75
Post-HSWA program	1[b]	56	2
Drinking Water			
Public Water System Supervision	54	3	95
Underground Injection Control	39[c]	18	68
New Source Performance Standards (air)			100[d]
All applicable	29		
Most applicable	23		
Some applicable	1		
None applicable		0	
National Emission Standards for Hazardous Air Pollutants			92[d]
All applicable	38		
Most applicable	10		
Some applicable	1		
None applicable		4	

(continued)

Program	Delegated states[a]	Nondelegated states[a]	Percent delegated
Prevention of Significant Deterioration (air)			96
Full delegation	43		
Partial delegation	6		
No transfer of authority		2	

[a]The term "states" as used here and elsewhere in this chapter refers to the states, the District of Columbia, and U.S. commonwealths or territories, such as Puerto Rico and the Virgin Islands.

[b]Only Georgia has received delegation, and that for only a part of the program.

[c]Includes six states that have delegation for only part of the program.

[d]Includes all the states for which at least some of the standards have been delegated.

The trend toward greater delegation is expected to continue. EPA program and regional officials and the states anticipate further delegation in programs where it is allowed, particularly in relatively new ones such as the Hazardous and Solid Waste Amendments (HSWA) program. Alabama and Ohio, for example, were seeking HSWA delegation at the time of our visits, with Alabama later receiving it in December 1987. In practical terms, EPA officials pointed out that EPA has neither the staff nor other resources to operate the programs without major state assistance. According to the officials, the amount of resources now budgeted for EPA is based on the states' substantially carrying out many program activities. In addition, they believe that agency responsibilities have increased considerably during the past few years.

The Congress Is Also Expanding the States' Roles

Some recent environmental legislation has directly assigned the states major responsibilities, rather than requiring EPA to establish the program and then allowing it to be delegated. The Water Quality Act of 1987, for example, requires the states to establish nonpoint source water pollution management programs and control strategies for toxic pollutants in navigable waters. Another example is the Safe Drinking Water Act Amendments of 1986, which require the states to establish programs to protect areas around wellfields from contaminants. EPA, however, maintains overall responsibility for implementation of the acts.

EPA Actions to Ensure State Program Success Range From Assessments to Monitoring and Assistance

EPA recognizes that effective state performance is a major factor in the extent to which national environmental goals and objectives are achieved. EPA also knows that it is ultimately accountable to the President, the Congress, and the public for meeting legislative requirements and program objectives, efficiently using funds provided for program implementation, and ensuring compliance with various federal administrative requirements that apply to the use of federal funds. This creates an inherent tension within EPA between trying to delegate programs and give states flexibility, while trying to monitor and control state performance. In any event, EPA has a major stake in improving state performance. Three major ways it attempts to ensure state program success and compliance with requirements are to (1) assess state capability to carry out program responsibilities before deciding to delegate, (2) provide program guidance and oversight after delegation, and (3) provide financial and technical assistance to the states.

Nevertheless, EPA actions to ensure state program success have not been universally effective. First, state capability can change after the delegation assessment is made, and EPA is reluctant to withdraw delegated authority. Second, problems in EPA oversight and monitoring have been reported. Third, EPA assistance has not kept pace with increasing state responsibilities.

EPA's Assessments Are Comprehensive but State Capability May Change After Delegation

EPA performs comprehensive state capability assessments in deciding whether to delegate a program to a state. This one-time assessment gives EPA a detailed look at a state's potential capability to operate a delegated program. However, state capability can change after delegation because of factors such as staff turnover, changes in state legislative or financial support, and new environmental responsibilities. EPA can take back delegated authority if it finds the state is not satisfactorily carrying out its responsibilities, but it is reluctant to do so. EPA believes that it must rely on the states to implement environmental programs and would withdraw delegation only under the most extreme circumstances.

How the Delegation Process Works

EPA bases its delegation decisions on several key factors that are indicators of a state's ability and desire to operate environmental programs. These factors include the appropriateness of state laws, adequacy of funding and staff resources, and the effectiveness of any similar state program operated before delegation.

Generally, when a state requests delegation of a particular environmental program from EPA, it must submit an application to the EPA Administrator. The application must include a written request for delegation from the governor to the appropriate EPA Regional Administrator, copies of applicable state statutes and regulations, a statement from the state attorney general affirming that the laws of the state provide adequate authority to carry out all aspects of the program, a memorandum of agreement describing the roles EPA and the state will play under the delegated program arrangement, documentation of public participation activities, and a complete program description. The program description is of particular importance because it details the contents of the program the state wants to administer in place of the federal program. It includes information on the scope, structure, process, and procedures of the state program; state staff who will carry out the program; operating costs; and sources and amounts of funding available.

A team of knowledgeable EPA officials evaluates the state application. This capability assessment varies by program but in general focuses on measuring state ability to effectively manage the inspecting, permit granting, compliance, and enforcement activities of the program.

EPA's hazardous waste program has its own specific criteria for assessing state performance. These criteria can be used to assess state programs for delegation, as well as for midyear or other evaluations of those already delegated. This guidance, entitled "National Criteria for a Quality Hazardous Waste Management Program under RCRA," was developed jointly by EPA and the states and issued in 1984, with revisions in 1985 and 1986. The criteria are intended to provide a systematic approach for EPA to use in assessing state capability and reaching agreement on the steps necessary to build and sustain a quality program. In 1987 EPA issued a new State Consolidated RCRA Authorization Manual, which further describes the requirements for RCRA delegation and includes several checklists that EPA can use to evaluate a state's ability to operate an effective hazardous waste program.

In EPA's water programs we found that capability assessments are performed but not with program-specific criteria documents similar to RCRA. EPA regional officials told us that assessments of state capabilities for water programs are incorporated into EPA's review of state applications for program delegation. Like the RCRA program these assessments include reviews of state laws, quality of personnel, and sources of funding for the state program.

Capability Assessments Have Been Used to Withhold Delegation

EPA, in some cases, has decided not to grant a request for delegation because it did not believe that the state had sufficiently demonstrated the capability to administer the program. For example, one state that we visited, Alabama, had received interim RCRA delegation in 1981 and was seeking final delegation in 1984 when the new requirement for a capability assessment became effective.[1] EPA's assessment of the state program identified a shortage of state personnel and inconsistencies between state regulations and federal RCRA requirements. The capability assessment acknowledged that the state staff were competent and willing to operate a quality program; however, there simply were not enough trained personnel in the state program to meet the needs of RCRA permit granting and compliance/enforcement activities. EPA did not approve final delegation to Alabama. The state withdrew its application in 1984 but reapplied in November 1985. A subsequent capability assessment of the state program showed that the state had greatly improved its capability and the quality of the program. At the time of our visit, EPA regional officials anticipated the final delegation, which occurred in December 1987. In the meantime, the EPA regional office had been administering the program, with the state assisting EPA in conducting program activities, such as permit granting and inspections.

Another state we visited, Ohio, had also been denied RCRA delegation. It received interim delegation in July 1983 and applied for final delegation in January 1985. EPA initially delayed delegation because it did not believe that the state's enforcement efforts were satisfactory. After Ohio improved that area, EPA identified the state's staffing level as a problem. The state acknowledged that it had trouble retaining and hiring personnel and took measures to increase the number and quality of its personnel. However, EPA still did not believe that Ohio should receive delegation and asked it to withdraw its application. The state refused, challenging EPA to detail in writing its rationale for not granting the delegation.

EPA Is Using More Stringent Capability Assessment Criteria

EPA is taking a tougher stand on approving new delegation requests, as shown by the new capability assessment requirement for RCRA delegation. States, such as Ohio, currently applying for delegation believe they

[1] RCRA originally allowed a state to apply for either interim or final delegation. Interim delegation allowed a state to develop and implement a program that is not exactly the same as the federal program—a status referred to as "substantially equivalent." To receive final delegation, the state program must be equivalent to, no less stringent than, and consistent with the federal program. Interim delegation expired on Jan. 31, 1986.

must meet tougher standards than states that received delegation in earlier years. Ohio officials maintain that the performance of their RCRA program is equal to or even greater than that of already delegated states. (We did not review Ohio's program performance or EPA's decision not to grant RCRA delegation.)

In addition, officials in some states that currently have delegation told us that they might not be able to qualify for delegation if they were applying today. EPA regional officials agreed and added that some states, which currently have delegation, need significant improvements in their programs. Florida, which has a delegated RCRA program, was considering whether to apply for additional delegated responsibilities under the Hazardous and Solid Waste Amendments of 1984. The state inquired about application procedures to EPA's Regional Office in Atlanta and, according to a state official, was informed not to apply at that time. An EPA official confirmed this and indicated that the Florida RCRA program was not yet ready to assume more responsibilities.[2] Florida did not submit an application.

EPA Reluctant to Withdraw Delegation After Decision Is Made

State capabilities can fluctuate after the delegation decision, but according to many EPA officials, the agency is reluctant to withdraw delegated authority even if performance problems occur. After the program is delegated, EPA performs various types of program oversight but does not routinely reconsider the delegation decision. Regardless of the program deficiencies found during oversight, EPA must decide on whether the program would be better administered under the direct control of its regional office or under control of state personnel. Because EPA does not have sufficient staff or resources to administer the programs from its regional offices, it faces the dilemma of having to rely on the states for day-to-day program operations.

EPA's Region 4 was faced with such a decision regarding one state's Public Water System Supervision program. Inconsistencies in data reported by the state prompted EPA to formally study the program in May 1984. In general, the study concluded that statewide resources were adequate but too many different offices were involved in program direction and day-to-day operations, promoting inefficiencies and lowering state performance. Although the state had a history of poor compliance, EPA continued to rely on the state for daily operations and opted to make

[2]To make decisions on state applications for the HSWA program, EPA plans to perform capability assessments of the states' entire hazardous waste program, including the base RCRA programs.

recommendations for improvement, rather than rescind delegation authority. After further deterioration in program performance, EPA placed the state on a quarterly release of federal grant funding until the state demonstrated improved performance. EPA regional officials believed that the state has now shown some progress toward addressing EPA's concerns.

EPA's Oversight of State Implementation Is Extensive but Sometimes Ineffective

EPA's policy is to provide program guidance for all states granted delegated authority. EPA provides detailed requirements and guidance through federal regulations, policy documents, and various other means. EPA expects the states to carry out their environmental commitments in accordance with this guidance. To ensure that states live up to their agreements, EPA oversees state performance using an assortment of monitoring techniques.

EPA's guidance and monitoring of the states is extensive. Nonetheless, major environmental problems remain, and various internal and external EPA studies have identified needed improvements in EPA guidance and monitoring and state performance.

EPA Provides Guidance and Performs Monitoring

EPA oversees delegated programs primarily by issuing guidance and then monitoring state compliance with the guidance. Because of differences in the specificity of authorizing legislation, program maturity, program type, and regional management systems, this guidance and monitoring varies somewhat by program and regional office.

The major vehicles EPA uses to provide guidance to delegated state programs are as follows:

- Regulations specifying pollutant criteria and standards and program requirements for permit granting, compliance monitoring, and enforcement.
- Annual operating guidance setting out EPA program priorities for the upcoming year.
- Strategic Planning and Management System (SPMS) and other internal EPA accountability systems that set out annual program commitments for regional offices. These work commitments include such measures as number of issued permits, enforcement actions, and inspections. For delegated programs, these commitments become state commitments.
- Review and approval of state work plans. Each year states must develop, and submit for EPA approval, detailed plans for achieving

agreed-upon program objectives. EPA grants are tied closely to approval of these plans.
- Numerous policy statements and accompanying guidance on regional and state strategies to carry them out. These policies often identify planning and program management activities that EPA considers essential and establish the basic principles and criteria to govern development of state strategies to carry out the policy.
- Manuals and technical documents providing guidance on such program activities as inspection, compliance monitoring, and enforcement.
- Various meetings and telephone discussions with state officials on aspects of the programs.

EPA's regional offices monitor delegated state programs primarily through the following methods:

- Review of state reports on their progress in meeting their work commitments. These reviews are usually conducted on a monthly or quarterly basis.
- Review of state-submitted quarterly permit noncompliance reports. EPA requires that states report each quarter on the number of facilities not complying with applicable laws and regulations. EPA examines these reports to ascertain relative program progress.
- Periodic on-site inspections. EPA regional staff may conduct their own or accompany state inspectors on routine inspections to assess facilities' compliance with their permits.
- Review of state program transactions. States, even those with delegated authority, submit large portions of their work, such as permits, to EPA for review.
- Informal contacts with state officials. According to state managers, the frequency of these contacts varies by EPA state project officers and program.
- Annual midyear and/or end-of-year program evaluations or audits of how well states are fulfilling their negotiated work plans and/or grant agreements. During these evaluations, EPA regional staff interview state managers and review case files and procedures.

In addition, EPA headquarters monitors regional and state performance using SPMS, other accountability systems, annual evaluations of regional offices, and its monitoring of permit compliance and environmental quality.

We found that EPA provides considerable guidance, with the level of detail varying by program and regional office. In addition, EPA's monitoring of state compliance with the guidance can, in effect, establish the guidance as "requirements" for the states. As discussed later in this chapter, the perception of many state officials is that EPA exerts too much control and does not allow enough flexibility for the states to most effectively administer delegated programs.

Problems in EPA Guidance and Monitoring Have Been Reported

A variety of sources within and outside EPA have identified shortcomings in EPA guidance and monitoring. In turn, many of these studies also identify cases of inadequate or inconsistent performance by the states that EPA is responsible for overseeing. Although EPA overall provides much guidance, studies have identified instances where it is not sufficient. For example,

- A 1986 EPA hazardous waste groundwater task force found shortcomings in guidance available to both facility operators and enforcement personnel.
- In a December 1986 report, Hazardous Waste: EPA Has Made Limited Progress in Determining the Wastes to Be Regulated (GAO/RCED-87-27, Dec. 23, 1986), we concluded that EPA has made only limited progress identifying the hazardous wastes that need to be controlled.
- A 1986 report by EPA's Program Evaluation Division on the Underground Injection Control Program stated that a need exists for definitive program policy and guidance on how EPA would like fundamental program activities conducted.
- The 1987 water quality management plan of the Puget Sound Water Quality Authority identified several weaknesses in the NPDES program, including that EPA had not issued point source effluent standards covering all industries.

Various studies have also found problems with EPA monitoring. The EPA Inspector General, for example, told us that the agency needs to substantially improve its monitoring. This conclusion was based on a variety of Office of the Inspector General reviews. For instance, a 1986 report found that the EPA regional office and two states that were

reviewed had failed to manage and control the RCRA permit granting program to ensure that hazardous waste facilities would be granted a permit or closed[3] within congressionally mandated time frames. A 1987 Inspector General report concluded that the EPA regional office's monitoring and enforcement of its orders against hazardous waste law violators are ineffective. Another example of monitoring weaknesses follows:

- In an August 1987 report, Hazardous Waste: Controls Over Injection Well Disposal Operations (GAO/RCED-87-170, Aug. 28, 1987), we reported that for the 21 wells in 2 states for which it had direct oversight responsibility, EPA had not performed the required periodic inspections during fiscal years 1985 and 1986. In addition, EPA headquarters did not perform oversight evaluations of the regional office program that ensured that well inspections were performed in the two states.

These studies also cited instances of states not adequately carrying out their program responsibilities. For example, the Puget Sound Water Quality Authority's management plan identified the lack of a systematic program to detect unpermitted discharges, expired major and minor permits, weak enforcement, and insufficient state resources for effective implementation as weaknesses in the NPDES program. Further, recent EPA regional office evaluations of states and EPA headquarters evaluations of regional offices show that state performance is inconsistent. The evaluations identified such problems as insufficient state staffing, inadequate state response to permit violations, a backlog of permits to be reissued, and not enough state inspections.

EPA's Assistance Has Not Kept Pace With Increasing State Responsibilities

EPA supports states via financial grants and technical assistance. This support is important to the success of delegated state programs, and EPA and state officials are concerned that assistance has not kept up with increases in state responsibilities.

Financial Assistance Is Limited While Responsibilities Increase

The concern that federal financial assistance has not kept pace with increasing responsibilities is illustrated by the following three tables. The first, table 6.2, shows the amount of grant funds provided to the states during the past 5 fiscal years.

[3]Proper closure of hazardous waste facilities is important, but closed facilities may continue to represent an environmental threat. Closure does not necessarily mean that any resultant contaminant conditions in the soil or groundwater surrounding or below a waste unit have been corrected.

Table 6.2: State Grant Budget Authority for Fiscal Years 1983-87

Dollars in millions

Program area	1983	1984	1985	1986	1987
Air	$85.05	$87.68	$90.94	$95.66	$94.57
Water quality	57.20	59.26	66.30	66.89	75.86
Drinking water	36.42	36.85	39.05	39.17	45.75
Hazardous waste	44.07	46.85	57.14	66.75	71.03
Pesticides	10.72	10.86	12.32	11.80	11.11
Toxic substances	a	.50	1.50	2.26	2.24
Total	**$233.46**	**$242.00**	**$267.25**	**$282.53**	**300.56**

[a]Program started in fiscal year 1984.

Although table 6.2 shows an increase in funding for all programs for fiscal years 1983 to 1987, table 6.3 shows that the increase is much less and even decreases for the air and pesticides programs, if the grant dollars are converted to constant dollars to take inflation into account.

Table 6.3: State Grant Budget Authority for Fiscal Years 1983-87 Expressed in Constant (1982) Dollars

Dollars in millions

Program area	1983	1984	1985	1986	1987
Air	$81.86	$81.26	$81.56	$83.54	$80.49
Water quality	55.05	54.92	59.46	58.42	64.57
Drinking water	35.06	34.15	35.02	34.21	38.93
Hazardous waste	42.41	43.42	51.25	58.30	60.45
Pesticides	10.32	10.07	11.05	10.31	9.45
Toxic substances	a	.46	1.35	1.97	1.91
Total	**$224.70**	**$224.28**	**$239.69**	**$246.75**	**$255.80**

[a]Program started in fiscal year 1984.

The issue of state program funding has become more severe as a result of recent legislative amendments that substantially increase state responsibilities. For example, recent amendments to the Safe Drinking Water Act and the Clean Water Act have established several new mandates as indicated in table 6.4.

Table 6.4: Recent Legislative Mandates for EPA and the States

Safe Drinking Water Act Amendments of 1986	Water Quality Act of 1987
15 major requirements for new regulations	25 requirements for new regulations
25 policy and guidance documents	40 policy and guidance documents
5 studies and/or reports to the Congress	31 studies and/or reports to the Congress
10 new implementation activities	50 new implementation activities
38 explicit deadlines (by 1991)	80 explicit deadlines (by 1993)

According to EPA officials, the states will have to shoulder the lion's share of these new responsibilities—either because of delegation or at the specific direction of the legislation. With limited gains in the amounts of federal grants and increasing responsibilities, state and EPA program officials are concerned that states will have to increasingly rely on their own funding sources.[4]

Delayed and uncertain financial assistance is another cause of concern for state officials. Because EPA budgets are usually not approved until late in the federal budget process, EPA's grant agreements with the states cannot be finalized until well into the fiscal year for which the funds are provided. That many states' fiscal year begins in July rather than October compounds this problem. Several state officials noted that this timing makes it difficult for them to plan long-range program activities and staffing.

EPA Wants to Improve Its Technical Assistance

Technical assistance becomes more and more important as new responsibilities are assigned to the states, especially as environmental problems and programs become more technically complex. Realizing its growing importance the EPA Administrator has expressed dissatisfaction with the agency's current technical support to the states and formed a technology transfer task force. According to EPA, past attempts to generate better approaches to technical assistance to states and the regulated community have not been fruitful.

[4]In the states we visited, federal grants often represented less than half of total funding for state environmental agencies.

An Effective EPA/State Partnership Has Been Difficult to Achieve

EPA and the states have agreed on the key elements or principles of an effective partnership for carrying out delegated programs. EPA has been working to establish such relationships, but fully implementing these principles has proven difficult. Although EPA efforts are helping, many of the long-standing concerns about the relationship continue.

Key Elements of an Effective Working Relationship

EPA and state officials have identified four major elements as the keys to a strong EPA/state working relationship. These are

- a clear definition of roles and responsibilities that organize work so that each element of government makes its unique contribution and efforts are coordinated and not duplicative,
- clear, negotiated performance expectations so that each party knows what is expected of it,
- an opportunity for each party to appropriately influence decisions affecting its role and capability to carry them out, and
- a sense of mutual trust and support.

These objectives, from EPA's perspective, are reflected in two major agency policies, which were issued in 1984 to (1) clarify EPA's general approach and expectations for delegated programs and (2) articulate the agency's continuing role after delegation. The first policy—EPA Policy Concerning Delegation to State and Local Governments—was designed to promote the swift, responsible transfer of program authority to states that want it and to work with states to dismantle unnecessary barriers to delegation. The second policy—EPA Policy on Oversight of Delegated Environmental Programs—declares that it is EPA policy to conduct oversight of delegated state programs in order to

- enhance the success of state programs through a combination of support and accountability activities and
- ensure adequate environmental protection through national standards for state programs and use of direct enforcement action as a backup to state action.

Former EPA Administrator Ruckelshaus, in issuing these policies as part of a new effort by EPA to "foster a viable and mutually beneficial partnership with the states," set out the following principles:

- EPA and the states each have essential, but different, roles to play. The states are to interpret and apply national standards through day-to-day

program actions. EPA is to lead and support the nation's network for environmental protection.

- EPA policies and regulations must reflect national needs and the latitude states might require to do the work to carry them out.
- EPA must revise its concept of program oversight to emphasize constructive support of delegated states.

The Administrator also stated that EPA must modify its way of doing business with states by (1) providing states with a clear understanding of agency expectations as to what constitutes a quality program after delegation, (2) phasing out day-to-day involvement in discrete decisions made by delegated state programs, (3) increasing its technical, administrative, and legal support for state programs after delegation, and (4) increasing its capacity to monitor the progress of state programs, especially with regard to changing environmental conditions.

From the states' perspective, the essential elements of a viable relationship involve flexibility and trust. They want the flexibility to adapt or adjust national standards, policies, and programs to reflect local conditions and needs. They want EPA's trust to let them make these decisions without second-guessing and excessive justification.

Administrator Thomas has continued EPA top management's support for a partnership with the states. For example, in a 1985 speech outlining his environmental management plan, he stated that EPA

"... will continue the strong movement envisioned in our statutes to decentralize our programs and delegate additional responsibility to Regions and States. Environmental protection is too large a dog to be wagged by a tail clutched in Washington. We intend to do everything we can to increase the flexibility with which states and localities may implement Federal standards. We will also strengthen our technical support and oversight role. We must continue to change policies and long-standing practices that impede this movement."

Concerns About the EPA/State Relationship Have Been Long-Standing

The EPA/state relationship has been a concern almost from the beginning of delegated programs. For example, in December 1975 a Decentralization Task Force formed by an EPA assistant administrator reported:

"Of even more concern to State officials is the deeply felt belief that the joint State-EPA partnership, which is often cited in EPA program documents, is little more than a slogan. The use of the term, partnership, by EPA is seen by many States to be somewhat self-serving since EPA defines the terms of the 'partnership' and appears to reserve to itself the role of 'senior partner.' Several State officials referred to

program delegation as a system in which, "the States do all the work and EPA retains the authority and takes the credit."

In our 1980 report, entitled Federal-State Environmental Programs—The State Perspective (CED-80-106, Aug. 22, 1980), we concluded that the partnership envisioned by the Congress between EPA and the states for administering federal environmental programs had not materialized. At that time, state environmental officials identified delayed and inflexible federal regulations and excessive EPA control as major obstacles to their effective program management. State perceptions were that the EPA/state partnership was nonexistent and that EPA's desire to control state programs stemmed from mistrust.

Several later studies found similar problems with the EPA/state relationship. A February 1982 Congressional Research Service report, entitled Federal-State Relations in Transition: Implications for Environmental Policy, attributed a strain in federal-state environmental relations largely to the perception that EPA exerts excessive and detailed control over states. The specific problems cited were

- national standards and regulations that fail to account for differences among states and frustrate efforts to design implementation plans that are sensitive to local needs and
- excessive federal oversight and day-to-day control, with EPA having a tendency to exercise detailed involvement in state programs, even when delegation has occurred.

In June 1983 EPA top management established a task force of senior EPA managers and top state officials to develop a set of options on what state and federal roles might be appropriate in implementing environmental programs. The State/Federal Roles Task Force issued its report, Options for Improving the State-EPA Partnership, in September 1983. The major report conclusion was that federal/state relations must change in response to program delegation. According to the report, direct program administration and enforcement should be primarily state functions and the key to EPA's future is successful state programs. EPA, as stated in the report, needs an oversight approach aimed at improving state program performance and the quality of national programs, but too many EPA officials view oversight as evaluation and correction of individual state decisions. The report also concluded that improving EPA/state relationships requires more trust and a better mechanism for involving states in major decisions.

EPA Has Been Working to Build an Effective Relationship

To deal with the above concerns, EPA has moved to improve its relationship with the states. Recent actions have been efforts to (1) further define roles and expectations, (2) improve communication, and (3) better support state programs. Many of these actions grew out of the State/Federal Roles Task Force findings.

Defining Roles and Expectations

Two major examples of EPA actions to better define roles and expectations are EPA/state enforcement agreements and the performance-based assistance policy. EPA issued a policy framework for EPA/state enforcement agreements in June 1984. The policy, which was updated in August 1986, is intended to implement the federal/state enforcement relationship envisioned in the previously mentioned oversight and delegation policies by providing for EPA to enter into enforcement agreements with each state. These agreements are to ensure clear oversight criteria, specified in advance, for EPA to assess good state—or regional—compliance and enforcement program performance; clear criteria for direct federal enforcement in delegated states; and adequate state reporting to ensure effective oversight.

EPA's May 1985 "Policy on Performance-Based Assistance" is aimed at establishing an agency-wide approach to tying financial assistance to state performance. It establishes overall policy for negotiating financial assistance agreements with the states, conducting oversight of the agreements, and responding to key oversight findings. The policy lays out a framework for managing assistance programs through negotiating work outputs, overseeing states' performance against agreed upon commitments and time frames, solving problems through corrective action strategies, and imposing sanctions when corrective actions have failed or EPA and a state cannot agree on a corrective action strategy.

Although both policies are relatively new in their implementation, many EPA and state officials believe the policies have helped define their relationship and expectations. They have also helped to improve communication. Implementation of the performance-based assistance policy, however, has created some problems in that it provides EPA managers with another vehicle to exert control over the states. Some state officials have expressed concern that EPA is inflexible in negotiating work outputs and does not provide the needed technical assistance.

Improving Communication

A major initiative to improve communication with the states was EPA's formation of the State/EPA Committee. The Administrator relies heavily on this committee and its regular meetings to ensure effective communication between state and EPA officials on issues and developments in carrying out programs. The committee is comprised of 10 state environmental commissioners—each representing one of EPA's 10 regions—and 5 governors' representatives. The committee meets quarterly with the Administrator and other EPA officials. Under the committee's auspices, state environmental agencies have recently been involved with EPA regional offices in commenting on EPA's operating guidance for fiscal year 1988 and in the EPA priority-setting process for fiscal year 1989. Several state officials told us that the State/EPA Committee meetings have been beneficial.

Supporting State Programs Better

In addition to the financial and technical assistance discussed earlier, EPA sponsors formal programs of technology transfer to states, conducts seminars and courses in a wide variety of areas, and issues technical manuals. As previously pointed out, the Administrator established a task force to examine ways EPA can improve technical support to the states. The task force issued its report in December 1987, calling for changes in EPA's institutional climate and organizational structure for technology transfer and a clearer vision of the agency's role with respect to delegation and program oversight.

EPA has various other initiatives underway to assist the states. Included are a project to develop a common automated system and data base for environmental information (discussed in ch. 8) and five state pilot projects to develop state capability to assess environmental problems, conduct analysis of cross-media issues, and establish priorities.

Current Perceptions About the EPA/State Relationship

On the basis of discussions with state officials, relations between EPA and state environmental agencies have improved during the past few years. Several state officials cite recent EPA efforts such as the State/EPA Committee as having improved communication, the exchange of ideas, and the understanding of each other's needs and priorities in carrying out environmental programs. Many state officials, however, still have concerns about limited flexibility, too much EPA control, and EPA oversight that is too detailed.

Central to current state concerns is that EPA has remained heavily involved in day-to-day program operations. Many state officials attributed this to EPA's reluctance to change its role from implementer to overseer after programs are delegated. State RCRA program officials in Florida, for example, told us that they saw no change in EPA's role after the state received delegation of the program.

Many state officials believe that their flexibility to decide how to implement the programs is limited by the specificity of federal environmental statutes, EPA grant agreements, and other guidance. They deem programs as most effective in achieving environmental results when they take into account differences in local or regional conditions, priorities, and problems. Their major concern about EPA oversight is the level of detail and the amount of review of individual program transactions and state operational decisions. They also believe that relying heavily on SPMS and other similar accountability systems may not provide a good measure of the success or failure of programs to accomplish their major objective of protecting the environment.

Three recent studies provide further insight into concerns about the EPA/state partnership. They dealt with the issues of trust and accountability, the amount of close EPA monitoring of the states, and the potential adverse impacts if current trends in the relationship continue.

A February 1987 internal EPA paper prepared for a senior management forum discusses the management theme of environmental federalism and the EPA/state partnership. According to the paper, if the partnership is to succeed, EPA must trust states to perform competently and responsibly, merging states' specific environmental interests with theirs, and the Congress must trust both parties to work more productively as partners than as supervisor/subordinates. The paper concluded that such trust has not yet been reached.

The Council on Environmental Quality in its 16th annual report to the Congress, dated May 1987, concluded that the relation between the federal environmental effort and those of the various states must be redefined. The report stated:

"... The EPA media programs spend an inordinate amount of time checking up on what state programs have done, and approving changes in those programs. ... Elaborate second-guessing of states uses resources that might better be spent doing

things that the states cannot do at all—controlling interstate movement of pollution, for example. . . [I]n general, EPA could increase its ability to supply state governments with the informational basis for effective and efficient control of particular local pollution problems."

An October 1987 internal EPA study found that examples of partnership exist in some programs and some regional offices, but in general the current problems with EPA/state relations are the same ones identified by the 1983 State/Federal Roles Task Force. According to the study, if the identified trends continue, national priorities may drive out environmentally significant state priorities, and EPA/state relations may be seriously undermined by the mismatch between EPA's rhetoric and actions.

Obstacles to a Relationship More Reflective of State Role

During our review, we identified several obstacles to current efforts to establish a relationship that better reflects the states' increased management role. These include

- Inconsistent state capability and performance. As pointed out earlier in this chapter, state performance can vary by state, program, activity, and period of time. Thus, EPA staff are reluctant to reduce their involvement and control, even in delegated programs.
- Some uncertainty as to the objectives of the Administrator's management priority of environmental federalism. The EPA Administrator has established environmental federalism as a high agency management priority, but some confusion continues among agency staff as to what the specific objectives are with regard to their programs. EPA is working to better define this management priority.
- The absence of a consensus among EPA staff that a more equal partnership is the most effective working arrangement. Our discussions with EPA managers and feedback from EPA management conferences indicate that agency staff remain largely uncertain that a more equal partnership with the states is the most effective approach to achieve EPA objectives and national environmental goals and meet the accountability demands of the Congress and the public. EPA staff are concerned that increased state flexibility and reduced EPA control will make it more difficult to ensure that states take the necessary action to achieve EPA objectives and national goals, especially in a consistent manner.
- Legislation that is very detailed in the requirements that it sets out. Federal environmental legislation, such as the 1984 Hazardous and Solid Waste Amendments to RCRA, often contains specific requirements and dates for their accomplishments. Such requirements tend to encourage

EPA, as the agency with overall responsibility for meeting them, to exercise greater control to ensure that all parties involved carry out their responsibilities on time.

- Certain regulations and internal EPA management processes and accountability systems that can discourage increased flexibility and trust. For example, current regulations for the NPDES program require that delegated states submit each major permit to EPA for review. In addition, SPMS and other internal EPA accountability systems, with their detailed task objectives, encourage EPA regional personnel to require states to accomplish the specified types and amounts of activities that EPA decides are the most important to be conducted within the states.

Actions That Could Improve EPA/State Relations

From our discussions with state and EPA officials and review of studies on the EPA/state partnership, we identified opportunities for EPA to further improve its relations with the states and enhance the feeling of partnership. These opportunities are as follows.

Reduce Individual Transaction Review

As pointed out earlier, EPA still requires that states submit various program transactions for its review. Thus, EPA is involved in individual, day-to-day state decisions. Although EPA believes that its involvement in these cases is needed, individual transaction review is usually not in keeping with the general program delegation principle that states are responsible for day-to-day operations. EPA may be able to substitute oversight for transactional review by reviewing a sample of these transactions as part of its evaluations of state program performance. EPA would lose some program control because the decisions would have been made before its review. But the concept of delegation is that the states make the operational decisions subject to EPA oversight and subsequent correction of problem areas. If oversight shows that state performance in making these decisions needs to improve, EPA would work with the states to take corrective action.

Provide Multiyear Guidance and Funding

Providing financial assistance and major program guidance documents to the states every 2 or 3 years rather than annually could help alleviate state concerns about the lateness and uncertainty of the guidance and funding and the resulting adverse impact on planning. Multiyear guidance and funding may also enhance the states' feeling of EPA trust in them and give them a greater opportunity to demonstrate that they can effectively carry out the guidance and use the funds provided them.

- improve its process for deciding when to delegate program responsibility to the states,
- strengthen its guidance, support, and oversight of the states,
- better involve them in policy formulation and decision making, and
- establish the most appropriate and effective division of program roles and responsibilities with the states.

EPA has not yet fully accomplished these objectives. Its decision making about delegation has limitations, state performance and EPA oversight can be strengthened, agency and state officials are not satisfied with EPA's support to state programs, and long-standing concerns about the EPA/state relationship and the appropriate division of roles and responsibilities still exist. EPA has made improvements, but fully establishing an effective partnership with the states will continue to be difficult to achieve.

Recommendations to the Administrator, EPA

To help sustain and advance current EPA efforts to establish a more effective federal/state relationship in carrying out national environmental programs, we recommend that the Administrator, EPA, take the following actions:

- Identify cases of individual state transaction review by EPA and reassess whether such procedures are essential. If the procedures are not essential or can be substituted for with other monitoring techniques, we recommend that they be eliminated.
- To the extent feasible, provide multiyear, instead of the current annual, guidance to the states and work with the Congress to consider providing multiyear financial assistance.
- Improve evaluations of state program performance, especially with regard to incorporating the measurement of environmental results as discussed in chapter 4. In communicating and addressing performance problems, stress the type and amount of improvement needed and options available to the states to take corrective action.
- Establish specific guidelines as to when and under what circumstances EPA will begin action to take back delegated program authority. These guidelines should be communicated to both agency staff and the states for use in cases where evaluations find that state performance is poor.

EPA May Need a New Approach to Achieve a Partnership With the States

Although EPA has been working to establish a partnership with the states, we are concerned that its efforts may be piecemeal adjustments to the current relationship that, as has been the case with prior efforts, will not fully meet EPA and state expectations. EPA's competing or conflicting objectives for its working relationship with the states may have to be addressed in a more comprehensive way if substantial and sustained changes are to occur. In this regard, we have outlined an alternative approach that we believe may foster a better balancing of state concerns and EPA objectives.

Under this approach, which we call "recertification," EPA would periodically recertify the states to continue exercising delegated program authority. EPA guidance and oversight would center around comprehensive evaluations of state performance conducted to determine whether the states should be recertified. Recertification would emphasize results more than process, giving the states greater day-to-day operating flexibility while assuring EPA that the states are effectively carrying out the program. If state performance is found inadequate, EPA could take action ranging from putting the state on "probation" for a period of time and/or subjecting program decisions to more detailed review to not recertifying the state and operating the program with EPA personnel.

We see an opportunity for EPA, the Congress, and the states to use the recertification concept to examine whether EPA's current approach is best suited to achieve program results. A key aspect of this examination is for the Congress and EPA to clarify and agree on how the states are to share accountability for delegated programs.

How EPA Objectives in Working With States Compete or Conflict

As detailed in chapter 6, EPA has three major objectives in working with the states: (1) to achieve national environmental goals, (2) to maintain accountability, and (3) to enhance the EPA/state partnership. A basic conflict exists among these objectives.

Responsibilities and activities may be delegated to the states, but the Congress holds EPA responsible for achieving the goals and objectives set out in environmental statutes. It also looks to EPA to make sure that funds appropriated for the programs are used efficiently and effectively and in accordance with a wide range of federal requirements. EPA seeks to ensure that the goals and objectives are met, protection against environmental hazards is achieved in a consistent manner nationwide, and the various federal requirements are met. Because of the states' large

use of federal grant funds. For example, legislative changes could be made to allow the states to transfer some program funds to programs they consider higher risk priority. The evaluation of program performance leading to recertification would be a check on the results achieved and thus, in effect, on how well the states made these funding decisions.

Although EPA has no explicit authority to implement recertification, the agency, according to an EPA official, may already have the legal authority to implement much of the recertification concept. In any event, we believe that implementation of the concept is a large enough change in the management of national environmental programs and EPA/state relationships that congressional approval and recognition of the change through legislation should be obtained. In addition, increased flexibility in state use of federal grant funds may require legislative change. State support would also be needed to successfully implement recertification.

What Recertification Could Be

In the narrow sense, recertification would simply mean that once states obtained delegation, EPA would periodically recertify them to continue exercising delegated authority for a program. Recertification would be an additional requirement without any substantial changes in how EPA directs, oversees, or assists the states in carrying out delegated programs. This limited approach to recertification would allow EPA to reconsider delegation decisions, taking into account changes in state capability and program needs, and to base delegation decisions on observation of the states' carrying out delegated responsibilities. However, as an added process, it would require additional EPA and state resources or diversion of attention from other program aspects and may be objected to by the states as another indication of EPA's lack of trust.

Viewed more broadly, recertification offers opportunities to more fully realize current EPA policies and initiatives to address the long-standing concerns about not enough flexibility for the states, too much EPA intervention, and a lack of trust between EPA and the states. For example, refocusing EPA's monitoring/ oversight around recertification—from an emphasis on the amount of activity and control/review of individual state transactions to evaluating results—could alleviate much of the state concern. States could also have more funding flexibility within programs because of EPA's emphasis on overall results rather than controlling state use of grant funds. Authority to transfer some grant funds between programs would further increase state flexibility.

Recertification could also provide the opportunity to make changes in how EPA provides technical assistance by focusing its efforts on specific technical needs identified during the comprehensive evaluations of the states. In addition, during the periods between recertification, EPA regional staffs could visit the states and state projects to learn more about what is being done and how its technical assistance is helping. This first-hand knowledge of state activities would also aid EPA in making recertification decisions.

How Recertification Could Work

The following is a discussion of how recertification could work in terms of its time frame, what would be evaluated to determine whether to recertify a state, and options as to how recertification evaluations could be made and what EPA could do if poor state performance were found.

The Recertification Time Frame

EPA could establish a target recertification time frame, such as 3 years, for its programs as a whole, unless program or state circumstances justified a different time frame. A 3-year time frame would appear to be long enough to (1) allow state programs to show results, (2) allow EPA to comprehensively assess state performance, and (3) reduce the workload burden that a shorter time frame would have on EPA and the states. At the same time, it would appear to be short enough to permit EPA to take early action if state performance proved to be poor or the program substantially changed.

The actual time frame could vary somewhat from the target time frame. For example, recertification of relatively new or substantially revised programs may need to occur more often than for mature, stable programs because the states would have had limited experience with new programs and EPA would have limited knowledge of the resources and capabilities necessary to carry out the programs.

The recertification time frame could also vary by state. As a state gained experience or improved its performance, the time frame could be lengthened. On the other hand, slippage in state performance could result in a decision to continue or shorten the time frame.

How the Individual State Recertification Decisions Could Be Made

Recertification would involve EPA's deciding whether a state should continue to exercise delegated authority for a program. The decision to recertify would be based on EPA's determination that state performance/effectiveness during the period had been adequate and the state

remained committed to continued effective implementation of the program.

EPA could evaluate state performance/effectiveness in achieving measurable environmental results and the major program functions: permit granting, compliance monitoring, and enforcement. EPA would also need to evaluate state compliance with federal administrative requirements. State program performance would be evaluated against agreed-upon standards or objectives, with achieving measurable environmental results as the major determinant of success to the extent that valid environmental measures are available.

The evaluation leading to a recertification decision could take several forms, as illustrated by the following examples:

- State reporting of program activities and achievements (with EPA verification of the data).
- Comprehensive reviews of major program components.
- An overall assessment of state performance, probably conducted in stages during the recertification period.
- State reporting plus reviews of program aspects.

The specific recertification format selected would depend on such factors as the completeness, accuracy, and timeliness of EPA/state information and reporting systems; available evaluation resources; and the type of program. At least initially, EPA would likely need a formal assessment of overall state performance or comprehensive reviews of a substantial part of the program (rather than largely relying on state-reported data) to provide the agency, the Congress, and the public with assurances that the program was being operated efficiently and effectively.

A range of options also exists for who would conduct the evaluations. They could be conducted by EPA regional program officials; a combination of EPA headquarters and regional officials; nonprogram EPA officials to provide greater independence and credibility for the effort; a combination of EPA, state, and public interest group representatives; or representatives of other states as a peer review under EPA guidance.

Taking Action Based on Evaluation Findings

If the evaluation determines state performance to be satisfactory and the state commits to continued operation of the program, the state would be recertified to exercise delegation for the next period. On the other hand, a less than satisfactory evaluation would not necessarily

mean that the state would no longer operate under delegation. Several options would be available to EPA. For example,

- The state could continue with delegation for a probationary period.
- Certain functions or aspects of the program could be made subject to more detailed EPA monitoring or review.
- The state could accept more intensive EPA technical assistance tailored to its needs and/or a loan of EPA staff, if available.
- The state could be subject to more detailed reporting requirements, or EPA evaluations could be conducted more often.

Very poor performance or poor performance with no real indication that it would improve would mean that the state would no longer have delegated authority. EPA would then operate the program, a potential problem because of EPA's limited staffing. However, EPA's current policy is to handle poor state performance in the same way.

The Potential Benefits of Implementing Recertification

Recertification could benefit both EPA and the states—EPA, by assisting it in its three major objectives concerning state delegation, and the states, in their major objectives concerning program flexibility, use of state skills, and decision-making authority. It could also benefit the Congress by assuring it of proper and efficient program operation.

What It Could Do for EPA

As previously pointed out, EPA's three major objectives in its efforts regarding the states are to

- ensure that states adequately carry out their program responsibilities in order to achieve national environmental goals,
- maintain an adequate level of accountability, and
- enhance the EPA/state partnership.

Recertification could be structured to help with each of these objectives and, more importantly, to help balance them where they conflict.

Recertification could help EPA ensure state program success in achieving national environmental goals. First, it could help overcome limitations in EPA's current delegation decision-making process. After initial delegation, decisions to recertify states would be based on the states' actual experience in carrying out program responsibilities. EPA also could consider program changes and changes affecting state capability.

Recertification could also strengthen and broaden EPA sanctions against the states for nonperformance of delegated responsibilities. Delegation would no longer be awarded permanently, with the onus on EPA to withdraw it for state failure to perform. Rather, delegated authority would end as of a certain date and the state would be recertified for the next period if it had performed satisfactorily. A decision not to recertify the state would be based on a comprehensive evaluation of state performance against agreed-upon standards.

Recertification could better focus state and EPA efforts on program results and effectiveness. EPA's emphasis on more comprehensive evaluations of program results, rather than on reviewing state process or program activity levels, could encourage the states and EPA staff to concentrate on achieving results.

Recertification would encourage EPA and the states to establish more meaningful performance standards. First, the standards would be more important because state performance would be assessed against them. Second, results or effectiveness-oriented standards could be used to the extent that they are available or could be developed.

Recertification could help EPA to maintain accountability. It would better establish that states, to continue with delegation, are accountable for program success and meeting federal requirements, as well as being responsible for operating the delegated programs while EPA sets the standards and oversees state performance.

Recertification could help EPA enhance its partnership with the states. It could

- help reduce EPA review of individual state decisions and detailed control over day-to-day state program activities by substituting broader, more comprehensive evaluations of program results,
- help emphasize achieving environmental results rather than monthly or quarterly counting of activities, thus better emphasizing quality over quantity in programs,
- better emphasize the importance of states in accomplishing EPA's mission and the importance of state program success to objectives of both EPA and state staffs,
- focus EPA's oversight more on program results and less on process/transaction review and activity levels, thus giving the states greater flexibility in how they achieve results, including how they utilize federal grant funds,

- better clarify EPA/state roles for day-to-day program management by emphasizing the states' achievement of program results, and
- provide a mechanism for EPA and state agreement on program implementation and an exchange of ideas and information.

What It Could Do for the States

In seeking delegation, many states want to

- tailor national programs to best meet local environmental needs and existing institutional and state agency situations,
- make the most use of state agency maturity, skills, and knowledge of local environmental problems, and
- respond to state government, public, and industry desires for the state agency to exercise more decision-making authority within the state.

Recertification could help the states achieve the above objectives. For example, it could

- allow states to tailor programs by focusing EPA's oversight efforts on evaluation of program results rather than on control and review of day-to-day program activities,
- help clarify that the state agencies operate the programs and EPA evaluates them, and
- challenge the state agencies to use their skills and knowledge to manage the programs effectively, to exercise greater decision-making authority, and demonstrate results to EPA and others.

This greater state flexibility and less day-to-day EPA involvement would reduce state concerns that EPA is intervening in day-to-day operations and lacks trust in them. It would also allow the state agency to have more decision-making authority, within the bounds set by federal legislation, EPA/state agreements, and achievement of positive results.

What It Could Do for the Congress

The Congress, in its major oversight and policy roles, wants assurances that environmental programs effectively carry out national policy and legislative requirements and that federal funds are used effectively and efficiently. The Congress generally looks to EPA for these assurances whether the programs are delegated or not.

Recertification could help provide these assurances by

- EPA's recertifying states to continue delegated authority only if they are effective,
- providing more useful program performance data by focusing EPA evaluation on program effectiveness and environmental results, and
- better clarifying EPA and state roles and responsibilities under the delegation concept.

How the Applicability of Recertification to EPA Programs Could Be Determined

Various options for determining to what extent and how EPA should implement recertification are available.

- Use the combined judgment of EPA, congressional, and state representatives obtained through a task force, hearings, etc.
- Test the concept through voluntary agreement with one or two states.
- Implement it for one of EPA's programs on a test basis.

To test recertification by implementing it in a program, EPA could select a

- new or relatively new program to avoid changing long-established procedures to test the concept,
- program for which compliance with national standards or achievement of environmental results is viewed as low (possibly a good test of whether greater state flexibility can make a difference),
- program that is currently the closest to recertification in how it is implemented and overseen, or
- program for which EPA has developed or is closest to developing sound environmental results indicators that could be used to assess delegated state program performance.

When Recertification Could Be Implemented

The timing for implementing recertification would be important. A major decision would be whether implementation should be

- begun immediately, utilizing available evaluative data and techniques,
- tied to the development of a set of valid environmental measures or indicators that could be used to evaluate state program performance in achieving environmental results (see ch. 4 for a discussion on EPA efforts to develop environmental measures), or
- postponed until EPA and state data systems are deemed adequate to provide EPA sufficient program and management information.

Another major decision on the timing of recertification would be whether it should be introduced EPA-wide or program-by-program, on the basis of analyses of such factors as legislative requirements for the program, program maturity, and overall state capability or readiness to operate the program under recertification. If done program-by-program, recertification could be viewed as an additional stage in the evolution of EPA program management.

Historically program management has usually evolved through the following stages: (1) EPA primarily implementing the program, (2) EPA implementing the program with major state assistance in carrying out such functions as inspections and compliance monitoring, (3) EPA delegating the program to the states but remaining heavily involved, and (4) EPA reducing its day-to-day involvement under delegation and giving states some flexibility. Recertification could be treated as a fifth stage, characterized as EPA further reducing its day-to-day involvement and allowing delegated states additional operational flexibility while retaining overall assurances that the states are effectively implementing the program.

Initial Reactions to Recertification

We have had some preliminary discussions with EPA officials and state associations about recertification. Their responses have been mixed. The comments ranged from highly supportive of EPA's implementing the concept to various concerns about it. They were in general agreement that it is beneficial to consider recertification in the context of the changing management of environmental programs and EPA efforts to establish an appropriate federal/state relationship.

Preliminary Views of EPA Officials

The EPA officials expressing support for recertification said that it could address many of the problems and concerns associated with the current EPA/state relationship. They especially cited the potential benefits of EPA's periodically performing comprehensive evaluations of state performance. They believed that the evaluations would be more meaningful to EPA and state staffs because they would be tied to recertification decisions and would emphasize overall program results rather than day-to-day activities. They further believed that such evaluations could provide the accountability EPA needs and reduce its staff's inclination or need to become heavily involved in the daily operations of delegated programs.

The concerns about recertification included the following:

- Recertification appears to be an administrative fix to a nonadministrative problem and would absorb additional resources but not resolve the inherent EPA/state tensions that we describe.
- The concept does not fully recognize the legislative pressures for agency accountability and consistency within state programs.
- It is unclear that the benefits of recertification would justify asking Congress to retool the basic programs.
- It may not be feasible to get the legislative changes needed to implement recertification.

Some officials liked part of the concept but had concerns about other aspects. According to the EPA Inspector General, the concept has merit, but he was concerned that it would result in less EPA monitoring of the states. Another official said that the major problem with recertification is that EPA is not in a position to take back delegated authority and thus has no real "stick" against poor state performance. He attributed this situation to the political unpopularity of programs being taken back and EPA's not having the resources to operate programs on its own.

The official liked the comprehensive evaluations of state performance that we describe as a major part of recertification. He thought that EPA should probably evaluate the states' actions periodically against clear expectations and inform them of how the agency expects them to improve over time. EPA, according to the official, has not laid out these expectations for the states.

GAO Response to Concerns of EPA Officials

Recertification, as we are presenting it, is a general concept or outline of a possible EPA/state working arrangement that we are offering for discussion and consideration. As such, we anticipated that reactions to it would somewhat depend on how one envisions it would work in detail.

With regard to the specific concerns that thus far have been expressed, we do not believe that the tensions inherent in the EPA/state relationship can be fully eliminated. EPA and the states have different perspectives and to some extent different objectives for the relationship. It is more a question of how these objectives can and should be balanced to reduce tensions and draw on the expertise and perspectives of the different levels of government. Recertification, in a sense, is an administrative fix, but it is aimed at providing a better opportunity for broader changes in how EPA and state officials view and operate within the relationship.

We do not anticipate that recertification would require additional resources. EPA's current staff would be involved in evaluating state performance for recertification and providing technical assistance and monitoring in between the evaluations. Additional resources, or a shift from other areas of responsibility, would be needed only if many of the states were not recertified and EPA had to operate the programs without substantial state assistance, because EPA's budget is based on many of its programs being substantially delegated. However, EPA's current policy is to monitor state performance and be prepared to take back delegated authority if the states are not performing satisfactorily.

Recertification may help address EPA's reluctance to take back delegated programs because of limited resources. The evaluations of state performance would better highlight or surface those cases where EPA needs to take back the program or become more heavily involved. In response, the Congress would have the choice of giving EPA the needed resources or accepting that in some cases the programs will not be operated most effectively. Furthermore, the assistance that the states now provide EPA in carrying out nondelegated programs suggests that states may also assist EPA in programs for which they are not recertified.

Under recertification EPA would not have the same level of day-to-day control and the programs would not be as prescriptive. Thus, EPA would have more difficulty ensuring the consistency of state programs and maintaining the level of accountability that it believes the Congress demands. As a result, we believe that recertification should be implemented only with congressional approval and through legislative changes. Also, EPA currently has no explicit authority to implement the concept. Both EPA's and the Congress' goal for the programs is to efficiently and effectively address environmental problems and needs. Recertification's increased emphasis on comprehensively evaluating program results would appear to better apprise them of how well the goal is being met. We also think that recertification would help to focus EPA's accountability to the Congress and others on the overall success of the national programs and the states' accountability on how they manage their individual programs and comply with federal standards and requirements.

Recertification has not been implemented or tested in any of EPA's programs. Thus, it is difficult to demonstrate that it would provide greater benefits or better achieve national environmental goals than the current or another possible arrangement. However, EPA's own assessment is that

"strong forces shaping EPA-state relations are working against a partnership and threaten to undermine the relationship." The strong forces cited are the perceived need for accountability; the hands-on orientation of EPA technical staff; the experience and training of seasoned managers (many of whom ran state programs before delegation); and the need for new, inexperienced staff to develop detailed program knowledge. According to the EPA assessment, these forces combine to encourage intrusive oversight. We believe that recertification can address these needs and concerns. Nonetheless, we cannot conclude with certainty that the concept in actual practice will achieve the delicate balance of EPA and state objectives. The proposal is offered for debate between EPA, the states, and the Congress with the anticipation that the collective judgment that emerges from the debate will identify the merits of recertification and whether and how it should be tested in actual practice.

We recognize that getting the legislative changes made to implement recertification and obtaining state support would be difficult. Such a change affects many parties, including EPA program and regional offices, the states, and various congressional committees. In addition, EPA programs and relationships with the states are governed by several major statutes and accompanying regulations. However, EPA and state interest in an improved partnership and congressional interest in more effective programs should provide the impetus for making the changes if recertification is judged to be a better way of operating.

Preliminary Views of State Associations

We obtained the initial reactions to recertification from three state associations. These were the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA), the Association of State and Territorial Solid Waste Management Officials (ASTSWMO), and State and Territorial Air Pollution Program Administrators (STAPPA).

ASIWPCA told us that it agrees that the federal/state relationship is in need of reconstruction but is concerned that recertification would be implemented as just another bureaucratic exercise, yielding little or no substantial improvement. According to association officials, as an added-on process, the states will view recertification as extra work without any benefit and EPA will use it as an opportunity to further involve themselves in state programs. ASIWPCA further said that periodic recertification gives EPA too much control and it may allow external groups to have undue influence and perhaps intervene in the recertification process. The concept of this being an additional requirement is particularly troublesome, according to the officials. They believed that, if

anything, the concept should reduce other requirements, such as detailed grant applications. According to ASIWPCA, grants should be automatic for the recertification period, thereby eliminating a major work effort that may compensate for the additional work required for recertification.

Some opportunities, according to ASIWPCA officials, do exist within the context of existing programs and structures to creatively address the current problems between the states and the federal government. They stated that, for example, EPA should emphasize the big picture (e.g., environmental results) rather than count "beans" as it now does. ASIWPCA also suggested that the goal of the recertification proposal could be achieved under existing programs because recertification, in a sense, takes place now on an annual basis through grant application—EPA mid-year and end-of-the-year evaluations.

ASTSWMO representatives did not believe that the recertification concept could be expected to work on a practical basis in the fashion intended. They said that it is not possible to wipe the RCRA slate clean and start again or to expect that the Congress will make the sweeping changes in a number of related statutes that would provide the concept's structure. According to the representatives, the concept would

- add continuous approval layers from organizations with a proven track record of not reaching decisions in a timely and consistent fashion,
- continue the practice of assessing states against abstract standards of capability that cannot be met now by any alternative federal program, and
- make state requirements for reporting and responding to EPA open-ended.

ASTSWMO representatives suggested that a better way may be for the Congress to define more clearly the state and federal roles and responsibilities that it expects in delegated programs and then insist that those are met during the oversight process. States should be given more direct access to approval for program authorization and then held directly accountable for their results in carrying out the program.

One ASTSWMO representative said that the association's members would not want to give EPA more leverage that could be used against them. According to the representative, the states would always be in a defensive position under recertification.

A STAPPA representative told us that recertification as we describe it is a good concept. It would be beneficial, according to him, to take a fresh look at the EPA/state partnership in terms of who does what best. EPA's role should not be limited strictly to oversight because much of the states' success in showing environmental improvement depends on EPA's providing them with effective regulatory tools and control technique guidelines. He cited EPA's looking at overall results in evaluating state performance as a major benefit of recertification. He did not believe that association members would be concerned about being recertified. He added, however, that recertification may not apply to all programs because more federal prescription may be needed in some of them.

GAO Response to the State Associations' Concerns

Although we consider strong, effective oversight of national environmental programs to be a major EPA responsibility, we recognize the states' concern that this oversight not be unduly burdensome in terms of reporting, recordkeeping, and other demands on their time and resources. Federal control also should not eliminate the flexibility needed to make the programs most effective. For these reasons, we do not envision recertification as merely an added process. As pointed out earlier, the concept offers the opportunity to focus EPA guidance and oversight around periodic recertification in a way that would result in greater emphasis on broader, more results-oriented evaluations of state performance. Thus, some of the detailed monitoring of state activities and specific requirements could be eliminated. EPA review of individual permits and detailed grant applications are possible examples. The specific requirements or processes that would no longer be needed would be determined on a program basis by EPA and the states, subject, as appropriate, to congressional approval. We agree that recertification, if it is simply an added process, offers few benefits for the states and would require additional resources.

Concerns about recertification giving EPA too much control or leverage against the states and providing the opportunity for external groups to have undue influence could be alleviated by establishing specific standards against which state performance would be evaluated and guidelines for EPA action in response to certain levels of state performance. EPA and the states would need to work together to develop performance standards that are not abstract and are practical to achieve.

The cited need for EPA to emphasize the big picture rather than counting beans is a major part of the recertification concept that we envision. As discussed in chapter 6, EPA has been working for some time to make this

and other changes in the context of existing structures but has not been able to do so to the extent that EPA top management and the states want. We believe that the recertification concept balances EPA's need for accountability and the states' desire for flexibility and less detailed oversight and offers a better chance for improvements in the EPA/state relationship. We do not believe that the grant application process could be expanded to accomplish the goal of recertification. Many EPA officials are already concerned that federal grant funds as a percentage of state environmental agencies' budgets are often too small to give the agency sufficient leverage with the states.

We do not envision that recertification would follow the same process that is now used for initial delegation. The decision to recertify would be based on periodic state reporting of information that they essentially would need anyway to manage their programs and EPA evaluations as described earlier. It should not involve months of processing paperwork or open-ended requirements for state reporting or responding to EPA.

Implementing recertification would not require that the RCRA slate be wiped clean. Major program objectives, requirements, control strategies, and activities could remain the same. The primary changes under recertification would be in how EPA provides guidance and oversees the states in carrying these out.

Conclusions

EPA may need a new approach in its efforts to establish a partnership with the states. Current EPA and state concerns about how the relationship is working are essentially the same as those identified by the 1983 State/Federal Roles Task Force and earlier studies. EPA efforts underway have the potential to make improvements, but we are concerned that the current approach of adjustments to the existing relationship may, as past efforts, be less than successful.

Fully achieving an effective partnership may require an approach that better recognizes and more comprehensively deals with the conflict or competition among the agency's major objectives in working with the states. Each of these objectives —to achieve national environmental goals, maintain accountability, and enhance the partnership with states—is important to EPA, as demonstrated by its past and current efforts. These objectives will become even more important as EPA faces future environmental challenges and increasingly relies on state support for program implementation. At the same time, the conflict or competition posed by these objectives is likely to increase. An approach such as

recertification may offer a better opportunity to achieve a partnership with the states because it attempts to balance these objectives rather than individually pursue them. We are offering this approach for consideration by EPA and the Congress, not as a vastly different way of carrying out programs, but as a way to more fully achieve current EPA policies and initiatives regarding its working partnership with delegated states. We recognize that additional thought and examination of the concept by the Congress, EPA, and the states would be needed before implementing it.

Recommendation to the Administrator, EPA

We recommend that the Administrator, EPA, take the lead in working with the Congress and the states to reassess the current federal/state relationship and to determine whether a more comprehensive approach is needed to accomplish EPA, state, and congressional objectives/expectations for the partnership. Consideration of the recertification approach described in this chapter could serve as a starting point for this reassessment.

Matters for Consideration by the Congress

The Congress could substantially contribute to EPA's efforts to establish an effective partnership by helping to better define EPA/state roles and responsibilities. A key action in this regard would be to clarify accountability and congressional expectations for the management of delegated environmental programs. The Congress would need to clarify how EPA and the states are to share accountability for (1) meeting national goals and objectives, (2) achievement of environmental results, efficient use of federal funds, and compliance with federal regulations within the individual delegated state programs, and (3) the consistency of programs and activities nationwide. To clarify accountability, the Congress could conduct oversight hearings on delegation or on the individual programs that are substantially delegated. A concept such as recertification could serve as a vehicle for examining EPA/state roles, responsibilities, and accountability. As a result of its deliberations, the Congress may need to make adjustments in the environmental statutes and/or the resources provided EPA and the states to carry out their respective roles and meet congressional expectations as to program accountability.

Improve the Integrity of EPA's Information Resources Management and Financial Management Systems

Accurate and timely information is of vital importance to EPA senior officials in their efforts to effectively and efficiently manage the agency. EPA's ability to reach its goals of managing for environmental results and striving toward a true partnership with states hinges on the reliability of its environmental monitoring and compliance data. In addition, the extent to which it can stay abreast of such multibillion-dollar programs as Superfund and water pollution control construction grants largely depends on valid financial information.

- Chapter 8 shows how EPA's single-media focus and headquarters-oriented management systems have adversely affected the integration of data across program lines and do not effectively support the day-to-day needs of the regions and states. Various EPA efforts, such as the State/EPA Data Management Project, have potential cross-program or cross-media benefits, but EPA's planning and budgeting processes do not generally support these initiatives. The agency could facilitate these and other initiatives by developing an information resources management infrastructure that would be linked more closely to EPA's long-range goals through more effective planning and budgeting.
- Chapter 9 identifies how EPA, in moving to correct recognized weaknesses within its planned integrated financial management system, can sustain progress and avoid system development problems and delays. In addition, building upon congressionally mandated audits of EPA's major programs, we have undertaken the first comprehensive audit of EPA's financial statements and recommend that EPA annually conduct such an audit. These actions will help increase financial discipline and help make EPA a leader in financial management reform efforts.

Managing EPA's Information Resources to Support Policy Initiatives and Achieve Program Goals

Efficient use of information resources[1] is increasingly important to EPA's managers, who need access to accurate, relevant, timely information to move the agency toward its goals. In fact, EPA continues to increase its expenditures on information resources as it becomes more dependent on information technology. Over one quarter of the annual amount budgeted for fiscal year 1988 for basic programs, or over $400 million a year, is for collecting, managing, analyzing, and disseminating environmental information. Hence, effective information resources management (IRM)—the application of traditional management processes and resource management principles to an organization's information resource assets—is vital for the agency.

EPA's information systems have traditionally suffered from incomplete and untimely data. EPA recognizes that its information systems must be improved and, accordingly, has several projects underway to upgrade the quality of the information it needs and uses. However, EPA can build on these IRM initiatives with a view toward more long-term changes. This requires two sets of actions. The first focuses on developing an IRM organizational framework that will establish high-level management authority for directing and implementing IRM activities. The second follows from the first and involves linking IRM more closely with the agency's long-range goals through more effective mission-based planning and budgeting.

Our findings, together with those of earlier studies and reports, suggest that taking these actions would increase EPA's ability to overcome data barriers between media that constrained previous systems development efforts, as well as advancing the long-range aims of managing for environmental results and fostering a more positive and workable federal/state partnership.

[1] Information resources include automated and manual information systems; information sources maintained by the organization, such as reports, case files, and document centers; and information services, such as telecommunication services, computer services, and dissemination services.

Reliable Information Is a Vital Asset for Effective Management of Environmental Programs

The Administrator has, on many occasions, spoken of the importance of quality information to effective policy and program management. For example, in an April 3, 1985, speech before the National Press Club, he said the agency needs the best environmental and health data possible to "make informed, intelligent decisions about risks we're willing to take and which ones are not acceptable." According to the Administrator, EPA must have a better understanding of all the factors that need to be considered in making decisions; that is, decisions must be confidently based on high quality data and information because pollution is interrelated in that it can be transferred from one medium to another.

As illustrated in the preceding chapters, the process of converting raw and analytical data into information for decision making (e.g., setting cleanup priorities, planning cleanup strategies, and estimating cleanup costs) is key to environmental management. Most of the laws that EPA administers require identifying, measuring, and assessing the health risks of contaminant concentrations in all media. EPA fulfills these mandates through the many applications of information technology that support its programs. As shown in table 8.1, at least seven major national monitoring, enforcement, and administrative tracking information systems support EPA programs.

Table 8.1: Seven Major EPA Information Systems

Medium/program	System and purpose
Air	Compliance Data System—containing data on sources having permits, including facility description, pollutant identification, and compliance status. National Emissions Data System—for pollution point sources, containing data on actual and allowable point-source emissions. Storage and Retrieval of Aerometric Data System—the national ambient air quality data system, containing complete historical information from national air monitoring stations.
Water	Water Quality Data Storage and Retrieval System—the national ambient water quality system, containing monitoring data by site or station for more than 590,000 sampling sites throughout the United States. Permit Compliance System—the primary national water quality system for tracking and managing the compliance of facilities having permits.
Hazardous waste	Hazardous Waste Data Management System—EPA's primary information system for tracking the status of waste disposal facilities subject to RCRA storage and disposal requirements, including permit-granting and compliance data.
Construction grants	Grants Information and Control System—the national system for managing and tracking the status of EPA construction grants, as well as research and development, air, fellowship, training, and Superfund grants.

These and other automated systems throughout EPA are indicative of the data-intensive and technologically dependent nature of EPA's operations. The building and management of information assets based on accurate, timely, and reliable data are of critical strategic importance to EPA's success and effectiveness.

IRM Problems and Issues Have Long Affected Programs and Operations

Since EPA's beginning, its information systems have been challenged to keep pace with changing legislative requirements, increasing demands for information, rapidly changing technology, growing involvement of end users, and emerging environmental problems. Like most government agencies, EPA experienced growing pains in the evolution of managing information as a resource.

In a June 18, 1986, speech, Administrator Thomas said that EPA's national program systems have traditionally suffered from incomplete and untimely data for a number of reasons: imprecise definitions of reporting requirements, a lack of management attention in that there were no real consequences when reporting requirements were not met, and computer systems that have been relatively inaccessible for either

data entry or retrieval. Similar concerns have been voiced by others. For example,

- In the 1985 RCRA hearings, the Subcommittee on Oversight and Investigations, House Committee on Energy and Commerce, found EPA's Hazardous Waste Data Management System listings to be inaccurate, incomplete, and unreliable.
- In an April 1985 report (GAO/RCED-85-73), GAO noted that two of three EPA regions it reviewed had not updated their compliance data systems, which were designed to assist them in their oversight of air pollution activities. As a result, the status of these activities in those regions was not current.
- An April 21, 1986, American Management Systems, Inc., study, Improving Information Support for EPA Compliance Monitoring and Enforcement, concluded that information systems generally have not been fully effective in helping EPA to maintain hazardous waste inventories, detect violators, select enforcement responses, maintain records for tracking compliance and enforcement events, analyze performance, use resources efficiently, and develop strategies and policies. For example, five of the eight[2] major national systems addressed by the consultant study had unreliable data; four did not have user-friendly software; three had poor documentation and training; seven were not responsive to region and state needs; seven contained data that were not useful for managerial control or strategic decision making; three imposed costly data entry burdens on the regions and states; and four systems did not have timely data.

EPA's Steps to Improve Systems

We believe, as EPA does, that problems with data systems still exist that could impair EPA's program effectiveness. We also found that EPA is taking steps to improve its program information systems. For example,

- To overcome reported data weaknesses in existing systems and to improve program compliance monitoring and enforcement activities, EPA is upgrading certain support systems—the Comprehensive Environmental Response Compensation, and Liability Information System (CERCLIS), the Resource Conservation and Recovery Information System (RCRIS)—and is developing the Aerometric Information Reporting System (AIRS).

[2]Three of the eight enforcement systems are mentioned in table 8.1 (the Compliance Data, Permit Compliance, Hazardous Waste Data Management systems). The remaining five enforcement systems discussed in the consultant study support drinking water, pesticide, and Superfund program activities.

the initial stages of information system design through the operational stages of system start-up and maintenance.

Mission-based plans are to be submitted to the Director, Office of Information Resources Management, who is responsible for reporting the contents of the plans to the Administrator and other senior EPA management officials. Mission-based IRM plans are to be specifically tied to the budget process and to support investment decisions made during the budget preparation process.

EPA's Current Organization for IRM

The Paperwork Reduction Act also requires federal agencies to integrate and establish accountability for their IRM activities. Each agency is to designate a senior official, who reports directly to the head of the agency, to carry out responsibilities specified in the act. The designation of a senior official is intended to establish an identifiable line of accountability for information resources activities, to provide greater coordination among the agency's information activities, and to ensure greater visibility of those activities within the agency. The head of the agency is required to keep the Director, OMB, advised as to the name, title, authority, responsibilities and organizational resources of the senior official. By design, the act allows agencies considerable freedom in organizing their IRM functions. However, the structure within which IRM functions will be managed must be defined and, where delegations are issued, clear lines of authority and responsibility for each function and designee established.

At EPA the Assistant Administrator for Policy, Planning, and Evaluation is the agency's designated senior official; however, his office has chosen to retain IRM responsibility only for matters relating to assessments of the regulatory burden placed on the private sector. This Assistant Administrator has delegated all remaining IRM activities under the act to the Office of Information Resources Management (OIRM), which is under the direct control of the Assistant Administrator for Administration and Resources Management.

The Director, OIRM, is assisted in carrying out these responsibilities by EPA's IRM Steering Committee and the Senior Information Resources Management Officials. The IRM Steering Committee, which is chaired by the Director, OIRM, has members representing EPA national and regional programs, the EPA research community, and the states. The committee is

responsible for advising OIRM concerning IRM policies, resources, and priorities and assisting OIRM in communicating and implementing these policies and priorities within EPA. The committee assists OIRM in conducting periodic reviews of the agency's information resources and of the policies and programs for managing these resources and in designing improvements where needed. The Senior Information Resources Management Officials are responsible for providing guidance on office-wide information resources planning and budgeting and for ensuring that the information systems and information technology acquisitions within their organizations comply with federal and EPA policies and regulations.

Ongoing IRM Project Signals the Need for New IRM Management Techniques

For a variety of reasons, including that the laws governing EPA address specific environmental media, EPA managers have traditionally approached environmental problems on a medium-by-medium basis. As a result, EPA's national information systems were developed with medium-specific focus, that is, focusing on specific program applications within individual program offices. Responsible assistant administrators are challenged to solve the many complex problems unique to particular media. Because EPA's overall infrastructure for IRM support is generally governed by the single-medium focus, opportunities for developing cross-media systems to support the effective sharing and reuse of all environmental data are rarely taken up. Indeed, the benefit and feasibility of such efforts may not be readily apparent to program officials focusing on medium-specific problems.

Administrator Thomas, in his April 3, 1985, speech, called for cross-media, or integrated, efforts. He said that EPA

> ". . .must begin to pursue a neglected facet of EPA's original charter [, that is,] the integration of all environmental programs into a managed system, capable of focusing Federal authority on the reduction of environmental impacts wherever they are found, in the most effective and efficient way. . . . EPA is not so much a coherent national program to manage pollution as it is a reflection of the success that many independent interests have had in getting their positions established in the law."

State/EPA Data Sharing Project Illustrates Opportunities to Strengthen IRM Activities

We evaluated two ongoing IRM efforts that show how EPA is trying to improve its data resources management. The first effort is Phase I of the State/EPA Data Sharing Project to improve the reliability of data through intergovernmental sharing of environmental data. The second is Phase II of the same project, experimenting with the use of automated geographic information system mapping tools to aid in risk assessment. As

discussed earlier in chapter 4, these are attempts to demonstrate how better and more productive use can be made of data resources in the agency and in the states; however, we believe they also illustrate that EPA will continue to be faced with obstacles if its underlying organization for IRM is not improved.

We found that the data sharing project, as demonstrated in EPA's Region 4 (Atlanta) and the state of Georgia, illustrated opportunities to strengthen IRM activities. To begin with, EPA crossed organizational barriers of headquarters, its Region 4, and the state of Georgia and obtained total senior management support, cooperation, and commitment from individuals willing to experiment. With resourceful personnel from both organizations, EPA and Georgia entered into a partnership arrangement and shared a single vision—to manage for environmental results. They also cooperated in developing new and better ways to perform tasks. For example, Georgia's decision to completely alter its data management sharing philosophy provided the spark for development of this new strategy. Mutual trust was built, EPA/state roles were identified, scope was defined, milestones were established, and resources were committed in terms of grant incentives, technical support, training, equipment, and communications technology needed to support state/EPA data processing needs. Working from the same data bases, environmental officials focused on how to enhance program strategies, rather than debate numbers.

A June 1986 EPA report, Georgia/EPA Region IV Information Sharing Pilot Program "A Technical Information Manual," concluded that the combined efforts of Georgia and the region demonstrated that the project could be useful in the preferred cross-media approach and resulted in (1) more timely and accurate state program oversight data, (2) on-time reporting, (3) resource savings of more than 4 workyears for data entry and validation, and (4) achievement of a closer state/EPA working relationship. However, when the project was expanded to other regions and states, certain challenges and constraints were encountered.

Constrained by Compartmentalization

Both phases of the project illustrate how EPA's infrastructure is shaped by the compartmentalized approaches of individual EPA programs, each carrying out a particular statutory mandate. Because EPA has organized itself along media lines, it is difficult for OIRM to persuade program managers to invest in cross-media projects to achieve better environmental results for the agency. This in turn makes it difficult for the IRM official

to exercise long-range direction for the deployment and use of integrative systems to integrate data. In addition, this constraint on IRM leadership results because EPA has not yet fully developed data standards, thus causing data requirements to differ from program to program. For instance, no common definition exists across media lines of what constitutes an "enforcement action." Consequently, each program reports an enforcement action differently. As a result, EPA's OIRM managers have not agreed on an appropriate data architecture[3] to determine the data needed for risk management and the strategies necessary to get the data from all environmental media.

In his April 3, 1985, speech, Administrator Thomas further acknowledged EPA's need for a data architecture. He said, "It is understandable that someone under the gun for instituting water cleanup may not have paid the closest attention to the effect on the air resulting from that cleanup. But someone should have." The Administrator added that EPA needs to establish an infrastructure that would enable the development and sharing of reusable program data assets to make the best informed decisions for achieving important environmental results.

Systems Not Designed to Support Cross-Media Issues

EPA collects data in response to a specific office or piece of legislation and has collected extensive programmatic and monitoring data on the state-delegated environmental programs. These data reside, for the most part, in the seven national monitoring, enforcement, and administrative tracking information systems listed in table 8.1. However, each system's data bases reflect a different focus on how operational and management decisions are made and, therefore, on information characteristics required to support decision-making at local versus national levels of program operations. As a consequence of the systems' single-medium application focus, their data cannot be easily integrated across program lines.

Usage of Data Systems Varies

The unique needs of states also create barriers to cross-media integration because most states' broad environmental authority involves various organizational entities with different oversight and reporting requirements. Therefore, the states' data needs are often different and greater than EPA's. Further, not all states use EPA national program systems, but all states must provide data to EPA national systems.

[3]A map of the information requirements of the agency, showing how major information categories relate to agency processes and how they must be interconnected to support the agency.

As a result of these organizational and reporting differences, regional and state officials said that much of the data were not being used or were being used only for limited decision support, depending on the region, state, or program. For example, for each of the regions, for each of the states involved in the project, and for each of the seven systems mentioned earlier, we obtained and analyzed documentation on how managers use data collected in the seven systems for decision making. We found 60 percent of all the states participating in the project do not use data in three of the national systems mentioned in table 8.1, and state officials use data in only the Water Quality Data Storage and Retrieval System for monitoring.

Usage varied at the regional levels as well. In 1 region, all 7 systems were used for reporting while 2 of the 10 regions use only 1 system for monitoring activities. Usage varied for a number of reasons. For example, systems developed for headquarters decision making often ignored state needs, and state and regional officials developed local systems to meet local needs. In addition, regions need more detailed information than EPA headquarters to meet their day-to-day operational mandates, and states need again more detailed information to accommodate their often broader environmental mission. The American Management Systems study, discussed earlier, indicates EPA's approach to systems development was to invest primarily in large headquarters-oriented systems and that with few exceptions, these headquarters-oriented systems do not support effectively the day-to-day operational needs of regional and state compliance staffs. As such, we believe that the different reporting uses for which these systems were designed make data sharing and integration extremely difficult.

EPA Is Faced With Telecommunications Challenges

EPA anticipates that increased amounts of information will flow within EPA itself and between EPA and the states. As mentioned earlier, the agency is in the process of improving and expanding its telecommunications networks.

A major hurdle in meeting this challenge is to make users aware of the benefits telecommunications can offer. As indicated in the study by the Architecture Technology Corporation, entitled A Strategy for the Use of Local Area Network Technology Within the Environmental Protection Agency (Mar. 19, 1987), EPA officials appear to have limited experience with communications networks and vary widely in their understanding of communications technology. We also found this to be an issue in the

states we visited. For instance, according to a Washington state environmental official, the state does not have the technological capacity to enter a partnership with EPA. Thus, the state is not ready to access EPA systems or to use integrative tools, such as geographical information systems.

The 1987 study also points out that some users are hampered in their ability to communicate their needs and that others are misinformed in that they believe that any data base can be connected to all others. Effective control mechanisms will be needed to determine when a particular application/data base should be put on a centralized computer, personal computer, or a network. Related to this issue is a need to determine the level of expertise of the various users of the system—novice, beginner, intermediate, advanced, and developer. Privileges to access network services would then be assigned commensurate with the user's level of competence.

More Attention Needs to Be Given to IRM Resources During EPA's Planning and Budgeting Processes

Guidance contained in the Paperwork Reduction Act and OMB Circular A-130 require, among other things, that IRM plans be based on general agency mission-based plans; be tied to the agency mission, goals and objectives, and their respective priorities; be developed hierarchically; include planning assumptions and constraints; and contain current and projected information on resources. We found, however, that changes are needed in the way EPA plans and budgets for its IRM resources if it is to meet these requirements.

First, our review of the two phases of the state/EPA data management project indicates that if the project phases were conducted within the framework of a long-range plan for managing agency information resources and supported with funding independent of that of the program offices, the project might be strengthened and its results more effectively used. Further, EPA's planning and budgeting processes generally do not accommodate new systems development or improvement initiatives, thereby inhibiting EPA's ability to exploit new technologies, such as the various geographical information system efforts, which have potential cross-program or cross-media benefits. For instance, as mentioned in chapter 4, EPA did not call for monitoring strategies in 1987.

Secondly, after reviewing (1) EPA's FY 1987 - 1989 Information Resources Management Review Plan, (2) EPA's 1988 Budget in Brief, and (3) EPA's justification of the 1987 Budget Appropriation Estimates for the House Committee on Appropriations, we found IRM is not clearly tied

to program plans or EPA's mission-based approach. For instance, we found EPA's 3-year IRM plan discusses the State/EPA Data-Sharing Project and its milestones; however, it does not document current or projected information on needed resources. As a result, EPA officials in headquarters and regional offices, as well as state environmental officials, expressed concern that the State/EPA Data-Sharing Project did not have adequate resources. According to the officials, EPA had provided little assurance of any significant ongoing commitment to the project, as well as too few grant incentives, people, and dollars to make an important impact on stimulating state participation. When the State/EPA Data-Sharing Project was expanded to 11 states, no resources, other than those previously provided to the prototype project in Region 4/Georgia, were allocated. Consequently, we found that funding for the project had to come out of OIRM and regional office funds already committed to other activities with each office having to reallocate its own resources to market the project and prove that it could work.

In addition, some EPA officials believe that the agency's planning techniques can be improved. For instance, rather than confine information systems planning to EPA's IRM office, these officials stated that the planning process should also include planning officials and program managers. The General Services Administration fiscal year 1985 Procurement Management Review of EPA recommended that EPA institute "bottom-up" IRM planning at the program level, under OIRM guidance and oversight. Following guidance provided by OIRM, program managers would be expected to develop program plans identifying user requirements (both within their own media and cross-media) for information systems and submit them to the senior IRM officials for approval. Upon approval, plans would then be submitted to a person who could translate program requirements into technological requirements. Since system requirements would have been developed by the various program managers using common planning guidance, the requirements would appear less difficult to integrate.

Building an Effective IRM Infrastructure: What Must Be Considered

Adjustments are needed in EPA's management agenda to enable the agency to further develop three essential IRM components, which, together, should contribute to a modern IRM infrastructure. As suggested by the following agenda for change, the components include (1) an effective organization for IRM to advance the intent of the Paperwork Reduction Act, e.g., planning, budgeting, organizing, directing, training, promoting, controlling, and other managerial activities involved with the creation, collection, use and dissemination of information, (2) an EPA

information-flow architecture or model to facilitate managing to achieve mission priorities, including identifying data assets used, created, and reused by each significant operational process, and (3) an effective telecommunications network to tie the whole infrastructure together efficiently. This infrastructure would be accomplished within an agency-wide, long-range plan for managing information resources and with funding independent of that of the program offices.

The following is not intended to diminish the progress EPA has made as discussed earlier in this chapter. Rather, it is intended as a framework on which EPA can continue to build; it should not be viewed as an exhaustive or prescriptive list of changes needed.

Table 8.3: Agenda for Change

Component	Actions to be considered
Organization	The senior-level information resource management official needs to have leadership authority to distribute IRM resources among competing top managers. Such authority would include negotiating with users and those affected by information system developments, spearheading the positioning of information systems within EPA, and building the information architecture described below. As a first step, EPA could review the roles, responsibilities, relationships, and authorities between its IRM organization, top management, and the end users of information support technology in the program offices. EPA could consider ways to bolster the leadership authority of the official to advocate and market the IRM function and exercise strategic direction among his/her peers and key decisionmakers in the agency.
Data architecture and telecommunications	Develop an EPA information architecture to guide future development of data assets and information systems, show how major information categories relate to EPA's mission process and how these categories must be interconnected to achieve the Administrator's goals, and facilitate cross-media integration and sharing of data among program offices. As a first step, EPA could develop an inventory of its existing data resources and assets. At a minimum the inventory would identify duplication, inconsistencies, discrepancies, data no longer of value to the agency, and whether the data resources and assets satisfy the agency's requirements for cross-media integration, managing for environmental results, and environmental federalism. Concurrently, with respect to data communications, EPA needs to foster the understanding and awareness that much of EPA's business is—and more can be—conducted electronically through telecommunications (e.g., the State/EPA Data Sharing Project). Therefore, EPA needs to continue to improve networks for voice and data communications, including providing better education and training programs to attain improved understanding of computer and telecommunications technology within EPA.
Planning	Make IRM planning a prominent element of EPA's agency-wide planning process. As a first step, the Administrator could begin identifying what will be required in the way of resources, staffing, and functional organization to support EPA's long-range planning and management system discussed in chapter 3. Further, EPA could work to involve all key levels of management—policymakers, program managers, information providers, and users—affected by the IRM plan involved in planning, establish a balance between centralized and decentralized IRM structures that allows "bottom-up" planning at the program and field operations level with "top-down" direction and oversight at the OIRM level, involve the senior IRM official not only in identifying the concrete information resource system capabilities and functions to support and achieve the mission/goals, but also in participating in defining agency goals, ensure that EPA policies, procedures, and guidelines provide an explicit methodology for planning, goal setting, and projecting information resource requirements in terms of life cycles, costs, and risks, and put in place management controls to ensure successful implementation of the IRM plan and attainment of planning goals.

Conclusions

EPA's current IRM improvements are constrained by certain institutional barriers, such as the agency's traditional focus on media-specific IRM

applications, its current infrastructure for IRM, and its current IRM planning and budgeting practices. To overcome these constraints, we believe that EPA's IRM activities need to be structured in a more mission-based manner. This involves developing an IRM infrastructure comprised of an effective organization and information architecture and continuing to develop an effective network for transmission of data. Further, IRM needs to be linked more closely with the agency's long-range goals, through more effective long-range planning and budgeting.

Recommendations to the Administrator, EPA

We recommend that the Administrator take appropriate steps to develop a long-range, mission-based plan that focuses on the actual use and value of information in achieving EPA goals. Specifically, the plan should define the framework for developing a modern IRM infrastructure, which will establish high-level management authority for planning, directing, and implementing IRM activities; establish a data architecture that identifies the agency's data flows and relates its data assets to operational needs; and further improve data and voice networks needed for the conduct of business at operational locations across the nation.

EPA Is Moving Toward a Modern Financial Management System

EPA recognizes that improved accounting systems and better financial management information is needed to assist in managing its programs. To ensure effective financial management of its programs, EPA is working to improve the quality of financial data, including that needed for recovering cleanup costs for hazardous waste, and to develop an efficient, integrated, automated financial management system.

The Congress has also acted to enhance the integrity and effectiveness of EPA financial management by requiring annual audits of two major EPA programs. In addition, we have begun, with the active cooperation of EPA's Office of Administration and Resources Management, a financial audit to determine if EPA's financial statements are presented fairly and if EPA has complied with applicable laws and regulations.

In improving its financial activities, EPA needs to continue the support and priority given its financial systems developmental efforts and to institute an annual audit of its financial statements similar to that which we are currently performing.

Current EPA Financial Management Information Systems

Currently financial management information at EPA is generated by seven major systems. These systems budget and account for EPA's approximately $4 billion to $5 billion of annual congressional funding for its approximately 400 program elements. Table 9.1 summarizes the purpose of each system:

Table 9.1: EPA Financial Management Information Systems Overview

System	Purpose
Grants Information and Control System	Administration of grants, loans, and interagency and cooperative agreements
Financial Management System	Accounting, fund control monitoring, and overall financial management
Resource Management Information System	Budget formulation and execution
EPA Payroll System	Payroll
Contracts Information System	Contract tracking and administration
Office Resources Management System	Resource (personnel and funding) management and planning
Personal Property Accounting System	Personal property accounting

EPA's Current Financial Management Systems Have Many Weaknesses

EPA has financial management weaknesses that range from major automated financial management systems deficiencies to inadequate internal controls. These weaknesses have been identified mostly through EPA self-assessments of internal controls and accounting systems, as required by the Federal Managers' Financial Integrity Act (FMFIA),[1] and also by EPA's Inspector General, as well as in a 1985 GAO report.[2] Specifically EPA's systems

- do not provide timely and accurate information,
- require an inordinate amount of time to change and test because of a lack of system documentation that makes an understanding of how they operate difficult,
- have mostly manual interfaces to share financial data, thereby causing inefficiencies and subjecting the data to a higher risk of inaccuracy, and
- cannot expand their data structure to accommodate new program requirements.

EPA also needs to continue to improve its accounting and internal controls over Superfund activities.

Data Is Not Always Timely

Although many of EPA's financial informational requirements are being satisfied by the current systems, according to EPA documents, the systems do not always provide timely and accurate information. As an example of untimely information, in a September 1986 letter to the Office of Management and Budget, EPA cited the reliance of program managers upon manual records or other decentralized processes to stay within budget allocations. The nature of manual records and decentralized processes inhibits senior EPA managers from having current on-line information on agency-wide funds availability.

System Documentation Is Lacking

Improvements to EPA financial management systems are hindered because system documentation, which explains in detail how a particular system operates, is inadequate. Incomplete system documentation has been cited as a weakness in EPA's FMFIA reports: the 1985 report

[1] FMFIA, passed in 1982, requires an annual assessment of internal controls and accounting systems to determine if they conform to the Comptroller General's principals and standards.

[2] EPA's Implementation of the Federal Managers' Financial Integrity Act (GAO/RCED-86-34, Nov. 13, 1985).

cited actions underway for systems documentation updates in the payroll process, and the 1986 report mentioned that portions of the accounting system lacked up-to-date, complete documentation. While these reports indicated that actions are underway to correct documentation weaknesses in those two systems, the lack of documentation was reported in an EPA contracted study as a common problem among all of EPA's financial management systems. Lack of complete documentation makes it difficult to maintain, use, and operate a system, as well as to change it.

Additionally a portion of one major system is written in an outdated programming language. According to an EPA study, EPA has had difficulty locating new programmers, with experience in the old language, to maintain the system.

Inefficient Manual System Interfaces

Another weakness in EPA's systems is manual interfaces. According to EPA documents the systems were developed independently. Six of the seven systems use data processing technology that is now dated, and necessary interfaces between systems consume excessive personnel resources and time in reconciling data between systems. For example, general ledger balances for personal property are entered into the accounting system manually, rather than being electronically transferred from the personal property accounting system, which would be a more efficient use of resources and less subject to error.

Systems Cannot Be Expanded

The data structure in EPA's accounting system for recording information cannot be readily expanded to accommodate additional data for new program requirements. That means, for example, that the current system for recording the Superfund cleanup costs by hazardous waste site cannot expand to handle all the potential sites. Improvements in the cash management area are hindered because the data system needs to be expanded to charge interest and penalties for delinquent accounts, make periodic estimates of uncollectible accounts, and record total receipts. The implications of this are seen in that EPA financial management officials could not readily provide us with the total amount collected for fiscal year 1986 because their systems could not accommodate agency-wide figures.

Superfund Cost Accounting Weaknesses

Historically EPA has experienced financial management weaknesses in its Superfund program. This program, through which EPA cleans up hazardous waste sites and responds to emergency situations involving hazardous substances, requires the parties responsible for the hazardous waste situation to reimburse EPA for its expenditures. Before these moneys can be recovered, EPA must provide an accounting and documentation of the expenses incurred in the cleanup.

Since the inception of the Superfund program, EPA has improved its procedures to ensure adequate documentation and accounting for cost needed to support legal action by EPA to obtain full reimbursement of the expenditures for cleaning up hazardous waste sites. These improvements have mostly been in response to prior audit work. For example, EPA's Inspector General, in reviewing Superfund expenditures, disclosed that insufficient documentation existed to ensure that disbursements were proper Superfund charges and that errors had been made in recording expenditures.

EPA Has Actions Underway to Enhance Financial Management

EPA's major financial management improvement initiatives include the short-term goals of institutionalizing management controls and quality assurance for financial activities and enhancing procedures and systems for Superfund cost recovery and the long-term goals of developing and operating a fully integrated financial management system. These actions, combined with those of the Congress, should help correct the previously discussed weaknesses and assist in providing more accurate and timely information to support the planning, monitoring, financial, and budgeting activities of the various federal programs that EPA administers.

Institutionalizing Financial Activities Management Controls

A major EPA quality assurance initiative in fiscal year 1986 was the establishment of the Financial Compliance and Quality Assurance Staff within the Comptroller's office. This new staff developed a quality assurance program for improving EPA's financial operations.

The staff was formed to consolidate the evaluation and testing efforts of EPA's financial management activities under OMB circulars A-123 "Internal Control Systems" and A-127 "Financial Management Systems," which were issued to help agencies implement the FMFIA. In fiscal year 1986 this office headed EPA's effort for performing detailed evaluations on each of its seven financial management systems. To assist in this effort, EPA contracted with an outside accounting firm to test internal

controls over financial data and compliance with accounting objectives and applicable GAO accounting principles and standards.[3] The tests included the tracing of critical transactions through the systems to determine evidence of accuracy, promptness, and adequacy of the audit trail.

We believe that an agency's management should foster an atmosphere designed to ensure that internal controls are developed, maintained, and verified. The establishment of the Financial Compliance and Quality Assurance Staff indicates to us that EPA management has a positive and supportive attitude toward internal controls.

Enhancing Superfund Cost Recovery

Since the initial $1.6 billion funding of the Superfund trust fund in 1980, EPA has been improving its cost-tracking and documentation procedures and processes, which are especially needed for seeking cost reimbursement from responsible parties.

In July 1985 the Superfund Accounting Branch was formed within the Comptroller's office starting major improvements in accounting for and documenting Superfund expenditures. In fiscal year 1986 this branch issued revised procedures for charging and documenting cost, including labor and contract costs, and established individual files to gather and reconcile costs for each hazardous waste site. A subsequent audit of fiscal year 1986 Superfund obligations and disbursements directed by the Inspector General indicated that although compliance with procedures still needed improvement and that additional controls were needed, significant improvements had been made in the overall implementation of EPA's procedures to account for Superfund costs.

According to Superfund Accounting Branch officials, the number of sites and the extensive time between recording costs for a specific site and cost recovery action increase the importance of proper recording and documenting of costs to support recovery actions. To assist in this area, according to an EPA Superfund Accounting Branch official, the agency is currently assessing the concept of an automated information

[3]The GAO Policy and Procedures Manual for Guidance of Federal Agencies contains the principles, standards, and related requirements to be observed by federal agencies. Specifically, title 2 prescribes the overall accounting principles and standards, while titles 4, 5, 6, and 7 specify requirements governing claims; transportation; pay, leave, and allowances; and fiscal procedures, respectively. In addition, agency accounting systems must include internal controls that comply with the Comptroller General's internal control standards and with related requirements, such as the Treasury Financial Manual and OMB circulars.

storage and retrieval system to provide more timely and accurate documentation packages to support cost recovery actions.

Implementing an Integrated Financial Management System

To solve the integration, documentation, and other problems previously enumerated, as well as to meet future information and internal control needs, EPA plans to establish an integrated financial management information system by fiscal year 1990. EPA judges completion of this system to be vital to overall enhancement of financial and program management efficiency.

EPA established a planning, evaluation, and system development organization to support this initiative. EPA's Office of the Comptroller is responsible for planning, developing, and evaluating the new system. The Comptroller in turn has dedicated a project team to manage the developmental efforts. This team will coordinate with a steering committee composed of senior managers from the various budget, accounting, information and resources management offices and representatives of the Inspector General's office. The steering committee will oversee the project until the system is in operation.

EPA completed a requirements assessment on this project in 1986, identifying current and future financial management requirements. EPA wants the new system to provide a fully automated and integrated system to handle its financial management needs from budget formulation through budget execution to preparation of year-end reports.

Subsequent to the project requirements assessment, EPA performed an analysis of the costs and benefits of alternative ways to implement a new system. This analysis indicated that procuring a commercially available software package was the most cost-effective approach to correct the current system deficiencies and to meet future requirements, as opposed to adopting and modifying another federal agency's financial management system. The assessment of how to correct system deficiencies indicated that to modify and modernize EPA's current financial management systems would be very costly and still not fully meet current needs or future requirements.

A contract was awarded in September 1987 for an integrated financial management information system to be in operation by October 1989. In fiscal year 1988, EPA's Office of Information Resources Management will assess progress in installing this system.

Sustaining Progress

To meet its goals for improving financial management, EPA must maintain an environment that fosters sound financial management. Our past experiences show this includes sustained support from top management for the new system's development. Further, we have seen that development of financial management systems, such as this one, places tremendous demands on agency management and staff, often does not proceed exactly as originally planned, and does not remain free of unexpected problems. Therefore EPA should ensure during system development that the project[1]

- receives consistent direction and continuous management commitment,
- is adequately documented,
- includes effective training for information users, accountants, and system operators,
- includes acceptance testing, planned and performed by an independent group, to ensure the system operates as expected, and
- provides that the new system not be placed into operation until significant problems identified by testing have been corrected.

EPA also will need to ensure that manual processes and related internal controls are operating as designed to ensure that the overall system produces timely and accurate financial management information. Such procedures as the revised Superfund procedures discussed in the previous section need to be operating as planned to help ensure accurate information and support for cost recovery.

Congressional Actions to Enhance EPA's Financial Management

The Congress has recognized the need for improvement in EPA's financial accountability, as achieved through audits, which it has required.

As a result of recent reauthorizing legislation for the Superfund program (Superfund Amendments and Reauthorization Act, October 1986) and the Clean Water Act (The Water Quality Act of 1987), the Congress is requiring annual financial audits for two of EPA's major programs. The audit requirements contained in these reauthorizations help ensure the quality and integrity of financial management information needed by EPA officials and can help increase the Congress' and the public's confidence in EPA.

[1]For a discussion of factors critical to the success of major systems projects, see GAO publication Critical Factors in Developing Automated Accounting and Financial Management Systems (Jan. 1987).

This Superfund audit requirement, according to EPA's Inspector General, calls for the Inspector General's office, starting with fiscal year 1986, to conduct an annual audit of payments, obligations, reimbursements, or other uses of the Superfund trust fund to ensure that the fund is being properly administered and that claims are being appropriately and expeditiously considered. EPA estimates that fiscal year 1988 Superfund expenditures from the trust fund will be approximately $1.1 billion, which is over 20 percent of the agency's total budget of about $4.9 billion.

Under the reauthorized Clean Water Act, EPA is to conduct or require each state to have independently conducted annual reviews and audits as deemed necessary to ensure the appropriateness of controls and procedures for payments, disbursements, and balances of the funds. Under this act, states will receive grants for establishing water pollution control revolving loan funds that are to be primarily used for the construction of water treatment facilities. States could begin establishing revolving loan funds by using a portion of fiscal year 1987's $2.4 billion authorization, which is almost half of EPA's budget. The program is authorized a total of $8.4 billion for fiscal years 1989 through 1994.

Audited Financial Statements Will Enhance EPA's Financial Management

Each year EPA is required to compile and submit financial statements to the Secretary of the Treasury, as are other executive agencies. These statements must include all assets, liabilities, and equities relating to all programs and activities under EPA's control. We believe that EPA's financial management system would be enhanced by the discipline of an annual audit of the agency's financial statements, and we are currently conducting such an audit built upon the recent congressionally required annual audits and EPA's improvement efforts.

Subjecting EPA's financial statements to the added discipline of an independent annual audit, as is the general case in the private and state and local government sectors, would provide better assurance that funds, property, and other assets are safeguarded against waste or unauthorized use and that revenues and expenditures are properly recorded and accounted for. Such a financial statement audit would also report on compliance with applicable laws and regulations and attest to the fair presentation of the statements.

A financial audit would also encourage the discipline necessary to maintain adequate systems of internal control and program accountability. It

would provide a complete and reliable financial picture of EPA's widespread activities, thereby increasing public and congressional confidence in the agency's stewardship of the billions of dollars entrusted to it.

GAO Undertakes First Audit of EPA's Financial Statements

At a June 1987 meeting with EPA's Assistant Administrator for Administration and Resources Management and the agency's Comptroller, we discussed the benefits that would result from a financial audit. These officials agreed that this was an opportune time to undertake such an effort, given that in the near future EPA will need to make a number of key decisions concerning its integrated financial management system project. Therefore, building upon the recent congressionally required annual audits and EPA's efforts to improve its financial management, we initiated a comprehensive audit of EPA's financial statements in June 1987.

Conclusions

Needed improvements in EPA's financial management systems are underway to correct the weaknesses that EPA has identified. The centerpiece of these improvements is its planned integrated financial management system.

On the basis of our experience in reviewing systems development projects throughout the federal government, no systems project proceeds exactly as originally planned, nor will it be free of unexpected problems. Therefore, EPA's top management needs to make sure that the new system is effectively developed by continuing to give the effort a high priority and by ensuring that strong management support is provided at the appropriate levels.

In reauthorizing the Superfund program in fiscal year 1987 and the water pollution control construction grant program within the Clean Water Act in fiscal year 1987, the Congress required annual audits of the funds. Instituting an annual audit, similar to the one that we are currently performing, of EPA's financial statements would provide a complete and reliable agency-wide picture of all EPA's activities. Among other benefits, it would foster increased organizational discipline to maintain proper operating financial management systems and program accountability. EPA can help ensure that it will be a leader in financial management reform efforts by requiring that annual audits be made of its financial statements.

Financial management improvements are needed to assist EPA in managing its programs while effectively achieving environmental goals.

Recommendations to the Administrator, EPA

We recommend that in modernizing and improving EPA's financial activities the Administrator, EPA,

- continue to provide the support and priority needed for financial systems developmental efforts and
- institute an annual audit of EPA's financial statements.

Management Challenges in the Years Ahead

This part of the report, consisting of chapter 10, is future-oriented rather than focused on current EPA management issues. Our objective here is to draw attention to issues and questions that, we believe, will grow in importance and urgency with the passage of time. By raising these difficult questions, we hope to encourage exploration of the underlying issues, foster constructive debate, and contribute to the development of consensus on actions that need to be taken. In this regard, we see important roles and responsibilities not only for EPA but also for its partners and constituencies in environmental protection and for society at large.

Management Challenges in the Years Ahead

EPA has accomplished much to protect human health and the environment since its creation in 1970. It has put in place a comprehensive regulatory structure and has made notable progress in identifying and combating many of the major causes of pollution. Much remains to be done, however, and the challenges that lie ahead offer little prospect of quick solution. They will almost certainly tax the agency's resourcefulness and determination, as well as its ability to cooperate effectively with others on the national and international levels to achieve better understanding of the nature and causes of environmental problems and devise effective strategies for dealing with them.

Preceding chapters have dealt with some of the important management issues that claim the attention of top EPA managers and, we believe, will continue to demand their attention. Important as they are, however, other issues will provide many of the management challenges of the future. To explore these other issues, we sought information, views, and opinions from a variety of authoritative sources: former EPA administrators and officials from all levels of the agency, representatives of various organizations concerned with environmental protection matters, current literature dealing with environmental policy, and GAO consultants and other GAO groups actively working in this area. We also drew heavily on matters discussed in prior chapters.

Five issues comprise this discussion. Although they represent only a fraction of those that were identified as important, they are the ones for which general consensus existed among the authorities we consulted. The issues are framed as questions, most of which have no simple, "right" answer. In many instances the questions focus on the need for establishing or clarifying policy, improving the knowledge base for environmental decision making, planning for longer-range requirements, establishing priorities, building consensus, and achieving effective cooperation among segments of society and levels of government. These five issues are as follows:

- What is the role and responsibility of the American public in becoming informed about environmental issues, participating in environmental decision making (including the setting of priorities), and, where appropriate, changing behaviors and attitudes in ways that are more consistent with the goals of environmental protection? How can EPA assist the public in understanding and carrying out its responsibilities?
- What kinds of research and development will be needed to provide the scientific basis for decisions and actions to protect human health and the environment in the future?

- What institutional and legislative changes may be needed to achieve a more anticipatory and integrated approach to environmental problems and provide the most effective responses to future environmental challenges?
- How can the cooperation necessary to deal effectively with environmental problems be achieved at the local, national, and international levels? What is the role of EPA in providing leadership to galvanize action and mobilize concerted responses?
- What work force skills and abilities will EPA need to meet its responsibilities and confront the environmental challenges of the 1990s and beyond? How can it best ensure their availability?

Public Involvement, Education, and Information

EPA enjoys strong popular support for its broad mission of protecting human health and the environment from the harmful effects of pollution. To an extraordinary extent this widely shared concern for the environment is also matched by a public willingness to bear the costs—financial and otherwise—of acting to mitigate environmental hazards, restore damaged environmental quality, and prevent further environmental damage and loss. In spite of this good will advantage, however, EPA's mission is neither easy nor one that can be achieved through agency actions alone.

EPA's challenge, given the magnitude of its task and the many pressing claims to limited federal resources, is to effectively involve others in protecting the environment. This will require accurate assessment, communication, and understanding of environmental risks, as well as the building and reinforcement of trust so that expert judgments may enjoy credibility with the public. It will also require informed debate leading to agreement on feasible and affordable risk management strategies and a grass-roots recognition of the environmental consequences of myriad individual actions. This suggests that EPA will need to do even more than it has to make environmental protection a joint enterprise of the American people and their government. It will need, increasingly, to view its expenditures on such matters as programs, educational and informational activities, demonstrations, and community relations as a means of leveraging additional expenditures and actions on the part of others in behalf of this important national goal.

Changing Public Attitudes and Behaviors

As EPA Administrator Thomas and others have recognized, continued progress in combating pollution and protecting the environment will depend to a great extent on changing the attitudes and modifying the

behavior of all of us whose actions collectively can have an enormous impact, for good or ill, on the health of the environment. In the agricultural sector, for example, substantial progress could be achieved if individual farmers could be better informed on environmental issues and induced to combat nonpoint source pollution from runoff of agricultural chemicals and eroded soil and avoid exploitation of fragile and marginal terrains, including wetlands. By the same token, overall environmental quality could be significantly improved if the urban citizenry were educated regarding sound environmental practices in such places as the home, garage, and garden.

In view of the potential environmental benefits of such changes, the following questions suggest themselves:

- What additional actions could EPA take to heighten awareness of environmental issues at the grass-roots level and persuade individual citizens of their role in protecting the environment? Could EPA foster these objectives by borrowing from the experience of or collaborating with other federal agencies, such as the U.S. Department of Agriculture, in matters of common concern? A former EPA Administrator suggested, for example, the possibility of establishing an "Environmental Extension Service" to provide information and educational services aimed at promoting the adoption of sound environmental practices.

Encouraging Public Support for Protecting Environmentally Sensitive Lands

The protection and preservation of wetlands and other imperiled ecosystems has assumed greater prominence nationwide as the importance of these lands has come to be better understood. The destruction and virtually irrevocable loss of such lands nevertheless continue. In view of the national importance of wetlands preservation and protection, the following questions suggest themselves:

- What should EPA do to educate the public regarding the environmental consequences of the loss of these resources? How can it best support the efforts of regional, state, and local groups to discourage wetland destruction and regulate and limit development of these and other environmentally sensitive areas?

EPA Informational Activities and Support for the Education/Information Activities of Others

EPA works directly to inform the public and influence attitudes and perceptions regarding pollution-related health risks and other environmental issues. Moreover, EPA has over the years supported a variety of education/information activities conducted by nongovernmental organizations, such as the Conservation Foundation. These organizations have provided neutral forums for the convening of policy debates and informed discussion and have also conducted a variety of public outreach and information activities. The need to better inform the public regarding environmental issues, do a more effective job of characterizing and communicating risks, and create a climate more conducive to enlightened policy debate and consensus building suggests that EPA might benefit by exploring the following questions:

- What can EPA do directly to strengthen and preserve public confidence in its objectivity, independence, and expertise and thereby bolster the credibility of what it says regarding the assessment of risk and what it does or advocates be done in the way of risk management?
- In what additional ways might EPA take advantage of the expertise and influence of other environmental organizations to achieve greater public awareness and understanding of environmental problems and needs, foster constructive debate, and promote the development of a broad consensus on relative risks and priorities?

Encouraging Alternative Approaches to Waste Management

The volume of solid wastes generated by American households and businesses is rapidly outstripping our ability to dispose of it. Communities are running out of suitable landfill sites and capacity. In addition, the incineration alternative to landfills has encountered widespread opposition from groups and individuals whose battle cry of "not in my backyard" has stymied efforts of local officials to deal with mounting solid waste disposal needs. One alternative that has made relatively little headway, but which many authorities argue has clear advantages, is recycling, specifically the recycling of metal, glass, plastic, and paper materials.

- What role, if any, should EPA play in promoting the recycling alternative? How might EPA foster interest in and lend support to efforts to encourage recycling? Would it be appropriate for EPA to fund recycling demonstration projects employing innovative approaches? Should EPA provide financial or other incentives to states to encourage the adoption of recycling strategies? As a means of publicizing the advantages of recycling should EPA serve as a clearinghouse to disseminate information regarding successful experiments in recycling?

Many environmental groups and others have deplored the relative lack of attention given to techniques for reducing hazardous wastes at the source as opposed to managing and disposing of such wastes after generation. While a number of techniques for industrial waste reduction/minimization already exist and are used abroad and to some extent here, the tendency in this country has been to think primarily in traditional waste management terms rather than in terms of strategies aimed at reducing the amounts of hazardous wastes generated in the first place.

- What role should EPA play in promoting waste reduction alternatives? What actions could EPA take to bring greater interest and attention to hazardous waste reduction techniques? Would an EPA information clearinghouse/technology transfer activity provide a means to showcase successful examples of waste reduction/minimization? Would EPA-funded demonstration projects be useful in encouraging greater experimentation with waste reduction alternatives?

Capitalizing on Public Concern Over Ocean Pollution

Ocean pollution, particularly of coastal waters, shores, and beaches, received wide media attention in the summer of 1987. This publicity served to focus public attention on this problem and mobilize opinion in favor of remedial actions.

- How might EPA capitalize on the increased public awareness of and concern about ocean pollution problems and support efforts to combat these problems? In what ways could EPA spur state and local actions and, where initiatives have already been taken, support and help coordinate these efforts? Do any of these alternatives have merit: new federal legislation to comprehensively plan and coordinate the actions required to curb ocean pollution? further educating the public regarding the causes and consequences of ocean pollution? promoting bounty systems for reporting instances of ocean pollution and to heighten public awareness, increase public involvement, and deter illegal ocean dumping activity?

Increasing Public Awareness of Indoor Pollution Hazards

Research into the health hazards posed by substances commonly found in the home suggests that many people today may be at greater risk from indoor air pollution and a variety of chemicals they use daily than from all of the pollution encountered outdoors. Just one naturally occurring indoor pollutant—radon—is estimated to be responsible for between 5,000 and 20,000 cancer deaths each year. Added to this are cancers or other health problems that may be caused by such ubiquitous

indoor pollutants as asbestos, formaldehyde, lead, and combustion gases.

The seriousness and pervasiveness of these hazards suggest a number of public policy questions. For instance,

- What is the federal government's responsibility with respect to protecting the quality of the environment inside private homes? What role should EPA play in (1) informing the public of the health risks posed by indoor pollution caused by everyday domestic activities? (2) educating the public about how to mitigate indoor pollution hazards and about less dangerous alternatives to commonly used toxic substances? (3) funding demonstrations and researching and developing techniques to protect the quality of indoor air? (4) making information available on the collection and disposal of household hazardous materials? and (5) supporting local efforts to safely dispose of household hazardous wastes?

Informing the Public of the Health Risks of Exposure to Hazardous Chemicals Outside the Home

Increasingly, the health risks posed by toxic substances in use in all sectors of our economy are perceived and characterized as "right-to-know" issues. The public is more than ever insisting upon and receiving disclosure of up-to-date information on the health risks posed by substances with which we work and live. While the emergence of this "right-to-know" philosophy has been gradual, it has gained momentum recently, as exemplified by the 1986 Emergency Planning and Community Right-To-Know amendments to Superfund.

Some of the questions relating to EPA's role in this area include the following:

- What should be EPA's role in providing the latest information on the known risks of exposure to chemical substances commonly encountered in the workplace and elsewhere in daily life? How can it do this so as to contribute to a balanced assessment of risks and benefits and at the same time avoid fueling unreasonable fears? What role should EPA take in developing standards for risk disclosure in connection with the use of potentially harmful chemical substances? How can EPA best support the educational/informational efforts of other groups that seek to educate the public on these issues?

Ensuring an Appropriate Research Base for Continued Environmental Progress

As EPA Administrator Thomas has observed, better science and technology are crucial to EPA's future success. As discussed earlier in this report, basic long-term research will increasingly be needed to more accurately assess human health risks and risk management approaches; more completely understand the workings, vulnerabilities, and recovery potential of ecological systems; and develop more effective strategies for dealing with cross-media pollution and pollution control impacts. To accomplish these, especially given current and likely future budget constraints, EPA must set priorities concerning all its research efforts, evaluate the efficiency of its in-house research, and determine how best to communicate its research findings and other scientific information.

R&D Priority Setting, Planning, and Coordination

Many believe that financial support for environmental research is currently lagging seriously behind EPA's expanded responsibilities and growing regulatory activities. Given the likelihood of continued budget pressures, most of those we consulted believe that research efforts must be carefully planned, prioritized, and coordinated to maximize the return on every dollar invested.

- How can EPA obtain the best scientific knowledge and opinion, as well as input from the public and other relevant quarters, in its efforts to identify and prioritize environmental research needs? How might the planning for research and development be improved and expanded to better take into account the views, plans, and activities of researchers and decisionmakers from the public and private sectors as well as other countries? How can the activities of these groups, both ongoing and planned, be more effectively coordinated?

EPA's In-House Research Capabilities

While much of EPA's research budget funds work done outside the agency (by contractors, through university grants and cooperative agreements), a significant fraction of its research budget supports an in-house research staff. However, funding of this in-house research has remained essentially fixed in recent years, and salaries have consumed an increasing proportion.

- Does EPA's top management need to continue an in-house research effort? If so, what is the proper balance between in-house research and EPA-funded research outside the agency? What needs to be done to achieve an appropriate balance?

- What level of funding is needed for internal research to ensure its integrity, continuity, and effectiveness? to ensure sufficient numbers of appropriately skilled and experienced researchers?
- What investments in equipment and facilities are needed to properly support in-house research and provide the state-of-the-art capabilities required to advance the state of environmental science?
- Does EPA's scientific/research staff have the mix of skills, training, and experience appropriate for a multidisciplinary research program to support policy and regulation development?

Exchange and Communication of Research Results and Other Scientific and Technological Information

Timely and effective communication of the results of research can aid the work of others, stimulate fresh thinking and new lines of inquiry, and suggest new technological applications. Given the serious constraints on research funds, it is particularly important that research results be widely shared so that costly duplication of effort can be avoided and the benefits of intellectual cross-fertilization and technology transfer can be maximized.

- Is EPA effectively using research findings from outside the agency?
- Can EPA do a better job of disseminating the latest scientific and technological information so as to stimulate and support research by others and facilitate the translation of scientific knowledge into innovative approaches to pollution control? How can the channels of scientific communication linking EPA and other government institutions with industry, the academic research community, and their counterparts in other countries be improved? What is the best way to foster knowledge and technology transfer and a creative, synergistic partnership among these groups?

Development of Recombinant DNA Technology

Many commentators on environmental science issues see great promise in environmental applications of recombinant DNA technology. At the same time, they frequently voice concerns about an overly conservative regulatory approach to this emerging technology and what they see as insufficient government effort to explore and exploit the potential of "genetic engineering" to revolutionize pollution control, waste disposal, and environmental protection generally.

- Is EPA doing enough to promote the development of recombinant DNA technology for environmental applications? Specifically, is it positioning itself to be in the vanguard of research for practical environmental uses of biotechnology by, among other things, assembling teams of scientists

with relevant expertise, consolidating knowledge and accumulated experience, and building the organizational capability to brainstorm potential environmental applications of this technology?

Organizational and Legislative Issues

EPA has made progress, within the constraints of current legislation and organization, toward forging an integrated, cross-media approach to environmental protection. Some, however, have suggested that progress could be more rapid and far-reaching with fundamental changes in legislative authority and institutional arrangements. Commentators in industry and the environmental community point to the following impediments to full realization of an integrated, cross-media approach to environmental protection:

1. EPA's organizational history has left a number of unresolved questions concerning the ability, authority, and responsibility of the agency to deal with particular environmental problems (for example, problems of acid deposition, groundwater contamination, indoor air pollution, and global warming).

2. EPA's mandate for protecting the environment is given specific form and direction under nine separate statutes, embodying divergent regulatory philosophies and standards. Such diversity complicates agency management and adoption of an integrated cross-media approach to program management.

3. EPA's organizational structure to a great extent mirrors the media-specific nature of its legislative authority, further complicating and inhibiting adoption of an integrated, cross-media perspective for dealing with environmental problems.

Flexibility in Devising Responses to Environmental Problems

EPA officials, representatives of environmental groups, and others we consulted identified EPA's fragmented legislative authority as one of the chief obstacles to adoption of an integrated, cross-media approach to protecting the environment. According to these commentators, the diverse and highly specific standards and directives contained in the media-specific statutes governing EPA programs constrain management flexibility and discretion and impede the ability of top management to foster a cross-media perspective on environmental problems and a consistent, coherent approach for dealing with them.

The Conservation Foundation, working under a cooperative agreement with EPA, has studied these issues as part of an integrated legislation project that examined the potential benefits of a comprehensive, unified environmental statute for the agency. For its part, EPA management has explored the possibilities of providing more centralized direction and more integrated management of programs across media.

According to environmentalists, congressional staff, and others, the specificity and inflexibility of some legislative directives and the constraints on management discretion that result are in part the legacy of agency difficulties in the early 1980s. In part too, the officials assert, they are the result of congressional dissatisfaction with the agency's frequent inability to meet statutorily imposed timetables and deadlines and a consequent loss of confidence and credibility.

- What problems and needs would a unified environmental statute address more satisfactorily? How might EPA best explore the possibilities of legislative reform with the Congress, identify basic areas of agreement and disagreement, and develop a strategy to overcome differences? If assessment of legislative requirements were to demonstrate a need for comprehensive reform, would not EPA be in the best position to develop legislative proposals for consideration by the Congress?
- If comprehensive environmental legislation were not enacted, what might be done to enhance management flexibility and discretion under current legislative authority? Would legislative changes that stop short of an organic, integrated environmental statute nevertheless strengthen EPA's ability to manage its responsibilities and to identify and respond effectively to environmental challenges? Would such changes improve management's ability to plan and conduct research, monitor environmental conditions and compliance with regulatory requirements, and formulate and apply consistent enforcement strategies and remedies across media-specific programs?
- Could the work of the Conservation Foundation's integrated legislation project serve as the centerpiece or focus of a renewed national debate on environmental protection? For example, could EPA's review and analysis of this project provide a basis and opportunity for the next President to convene a Presidential Commission to examine the environmental challenges of the future and how best to deal with them?
- What can EPA do to enhance its credibility with the Congress? Could it build confidence and mutual understanding by providing workshops for members of Congress and their staffs on complex and difficult issues such as cross-media pollution transfers and comparative risks?

The idea of flexibility in devising responses applies not only to the array of environmental problems but also to the manner of compliance with any specific environmental regulation or emission standard. Emissions trading has been advanced as a way to provide firms the flexibility and incentive to use the most cost-effective means of controlling pollution without jeopardizing the attainment of specific environmental goals. As an alternative to conventional regulation, emissions trading could be considered when the costs of controlling pollution differ among firms. It allows firms to realize compliance cost savings through trading of emission entitlements as long as such trades do not prevent the achievement of environmental quality goals. EPA now supports some emissions trading programs where permitted by environmental legislation. Some studies, including our report, A Market Approach to Air Pollution Control Could Reduce Compliance Costs Without Jeopardizing Clean Air Goals (GAO/PAD-82-15, Mar. 23, 1982), have concluded that significant savings in compliance cost would be possible with emissions trading. Opponents of this approach believe the dollar and pollution savings attributed to emissions trading have been overstated. They also believe that emission trading requires acceptance of higher levels of pollution than are achievable using other means, such as installation of best available technology at all pollution sources. Supporters contend the issues of (1) setting pollution standards and (2) cost-effectively attaining them are distinct, contending that emissions trading is a cost-effective method of attaining any nonzero pollution standard.

- What compliance cost savings have been realized with existing emissions trading programs? What levels of pollution reduction have been achieved? How much reduction would have been achieved, and at what cost, if other regulatory approaches had been used? If realized savings or pollution reductions are less than expected, are institutional or legislative changes possible that could improve the effectiveness of emissions trading programs?
- If found to be effective, can emissions trading programs, or any market incentive approach, be applied to emerging nonpoint-source pollution problems as they have been applied to the point-source problems for which they were originally derived? Could emissions trading be useful in managing cross-media problems?

EPA's Role in Fostering National and International Environmental Cooperation and Providing Leadership to Confront Future Challenges

Many environmental problems of the future—such as stratospheric ozone depletion, global warming, acid deposition, ocean pollution, and destruction of tropical rain forests—are worldwide concerns and have causes and impacts that transcend local, state, and national boundaries. They can be dealt with effectively only through regional, national, and international cooperation. EPA Administrator Thomas has said that "cooperative ventures" to exchange information, expertise, and management approaches will be essential to future environmental progress. Consistent with this view, EPA in recent years has participated in a number of cooperative undertakings with states, other nations, and a variety of private environmental groups. Some examples include

- the February 1987 signing of an agreement between environmental officials of the United States, Canada, the state of New York, and the province of Ontario to combat toxics in the Niagara River,
- negotiation of an international protocol to help protect the Earth's atmosphere from stratospheric ozone depletion, and
- the convening of a major policy dialogue under the auspices of the Conservation Foundation to bring together representatives of a broad range of interests in an attempt to formulate a coherent national policy for wetlands.

Some of the specific questions that relate to what EPA's role should be in stimulating needed action; providing direction, coordination, and technical advice; and generally facilitating cooperation among relevant parties include the following:

- How can EPA contribute to clarifying and framing environmental issues that require concerted responses? How can EPA best assist the efforts of existing national and international bodies to develop effective multilateral responses to regional and international environmental problems?
- Should EPA provide greater technical assistance and expert advice to aid the work of environmental advocates and officials in other countries? What kinds of assistance are most needed and in what forms would such assistance be most readily accepted?
- Would formal EPA-sponsored programs for the exchange of scientists and other environmental professionals and the offering of environmental internships aid in the development of an international corps of environmental specialists? Would such programs promote better understanding of the political, economic, cultural, and other factors that shape perceptions of environmental problems and result in differing national perspectives on environmental issues?

Cooperation Among Federal Agencies Concerned With Environmental Protection Issues

Cooperation in addressing environmental needs is also necessary on the home front, between state and federal governments, among federal agencies, and between the private and public sectors. One important form of cooperation is that between EPA and assorted other executive branch agencies whose actions can have significant environmental repercussions and whose mandates include the responsibility for monitoring the environmental impacts of activities within their purview.

EPA depends on other agencies to shoulder a portion of the total U.S. environmental protection effort. For example, the Departments of Energy, Agriculture, Interior, Commerce, Defense, and Transportation, among others, all engage in activities and have responsibilities that bear directly on environmental quality and the goal of environmental protection. In addition, a number of federal civilian and defense agencies also control lands and facilities on which are located hazardous wastes that pose potentially serious environmental and health risks. These agencies sometimes do not provide the needed support and cooperation, including demonstrating willingness to move quickly to clean up their own hazardous wastes. Reasons cited include jurisdictional conflicts, organizational structures, and cultures that are not conducive to cooperation with EPA; basic missions that conflict in important respects with EPA's; bureaucratic inertia; and a lack of scientific and technical skill that prevents effective support of environmental objectives. Nevertheless, the need to ensure, insofar as possible, that agencies will work together in support of national environmental policy goals rather than at cross purposes means that ways need to be found to strengthen environmental cooperation at the federal level.

- What could EPA do to help other agencies be more effective partners in carrying out the mission of environmental protection? Would temporary details and interagency rotations of staff increase mutual understanding among agencies and build more effective working arrangements in support of environmental policy objectives? Might such exchanges help EPA to achieve a broader, more multidisciplinary perspective on environmental problems?
- Are there practical organizational steps EPA could take to facilitate cooperation and coordination with other agencies in dealing with environmental protection issues? For example, would streamlining and simplifying coordination procedures improve communications between EPA and other agencies?

- Would there be value in EPA sponsorship of conferences and workshops with personnel of other agencies to foster mutual understanding, air differences and difficulties in day-to-day working relationships, and develop staff well versed in multimedia environmental problems?
- Is there a need, despite legislative changes made in the 1986 reauthorization of Superfund, to further clarify EPA's role with regard to federally owned hazardous waste sites and strengthen EPA's ability to promote federal agency compliance with relevant environmental statutes? Is there, for example, a need to further spell out EPA's authority to issue compliance orders to other federal agencies, orders that may be enforced through the courts? Is there a need to clarify EPA's authority to regulate mixed radioactive and hazardous wastes of the type found at a number of sites, particularly those controlled by the Department of Energy?

Toward a More Effective Federal/State Partnership

Chapter 6 discussed in some detail EPA's relationships with its primary partners in environmental protection—the states.

- What can EPA do to improve its cooperation with the states and help states to cooperate better among themselves?
- How can EPA support and give encouragement to the states in developing innovative policies and management approaches to protect the environment?
- What role can EPA play in facilitating the exchange of experiences among states? Would an EPA information/innovations clearinghouse function help? As a means to disseminate "lessons learned," could EPA inventory state approaches to various programs and provide such data to state managers?
- Using the EPA regional office structure, could EPA encourage or provide incentives for states to form regional associations to more easily share information and better combat pollution that crosses state borders?

Improving Private Sector Compliance

Environmental regulation can be only as effective as the level of compliance achieved. Two types of firms pose special problems of compliance. The first consists of firms that are disposed to comply but are either ignorant of requirements or find them too complex, cumbersome, or expensive. The second consists of more willful violators who, while aware of requirements, seek to avoid or circumvent them for their own advantage. While each type poses its own set of enforcement problems,

together they raise an important question for EPA: What is the best strategy or combination of strategies for enhancing compliance with regulatory requirements? A corollary question: What can EPA do to create a climate conducive to greater compliance and take greater advantage of the self-regulatory discipline of the marketplace?

Where noncompliance results chiefly from ignorance, lack of understanding or inability to comply, the following questions suggest themselves:

- What organizational and procedural changes would make it easier for businesses, particularly small businesses where the need is likely to be greatest, to learn about EPA requirements and obtain guidance and assistance on compliance? What educational and outreach activities would help? What innovative financing mechanisms and/or relief might be devised to make the "economics" of pollution control work for smaller firms and those that are undercapitalized or only marginally profitable?

Where noncompliance is deliberate and willful, the following questions seem pertinent:

- How can EPA more effectively enlist the support of industry and market forces in improving compliance and policing the behavior of firms? Are there opportunities for greater use of bounty provisions and anonymous disclosure in the detection and prosecution of violators? Are there additional opportunities to publicize violations and marshal public indignation against violators so as to increase the perceived risks of noncompliance? Is there a deterrent benefit to be gained from increased use of penalties, including fines, particularly in the case of more flagrant and egregious violations?

Human Resource Management in a Climate of Change

Born in a period of social ferment and developing environmental awareness and activism, the EPA has experienced more change in its relatively brief history than some agencies several times its age. These include added responsibilities, changing division of responsibilities and functions between EPA and state environmental agencies, and evolution in the basic science underlying environmental protection and pollution control. More recent changes include pressures to curb federal spending and reduce mounting budget deficits; a decline in the prestige and attractiveness of federal employment; an erosion of the government's ability to

hire and pay in competition with other employers; and a political climate favoring deregulation, defederalization, privatization, and contracting out of government services.

These and other factors challenge EPA management's ability to adapt by developing appropriate strategies for carrying out EPA's mission. In a number of noteworthy respects, the agency has risen to this challenge; one example is in the area of strategic planning for the development and management of its human resources.

In 1983 the Administrator committed EPA to developing its human resources, including rebuilding employee confidence and morale. Building upon recommendations made by a panel of the National Academy of Public Administration, EPA undertook a number of actions to improve in this area. In a 1985 follow-up on its report, the National Academy concluded that EPA's progress had been good and that employee morale had clearly improved. Because EPA's effectiveness is highly dependent on its work force, the Academy observed that EPA "must be able to attract and retain the highest level of professionalism and dedication possible" and stressed the need for EPA to continue its efforts in human resources management.

Recognizing the importance of such efforts to the future effectiveness of the agency, the following areas merit attention as EPA continues its endeavors to develop its staff.

Commitment to EPA's Mission

Many organizations that have sought to renew themselves and adopt a strategic approach to managing change have found it useful to reinterpret their missions in light of new circumstances and articulate an appropriate organizational theme for rallying their work force.

- How might EPA management reinterpret the environmental protection mission of the agency to develop a rallying theme for its people? How could employees be involved in this activity? How can EPA's top leadership better communicate to employees its vision of the agency's future, including its understanding of what the future environmental challenges will be; how they will have to be addressed; and the ways in which the agency will have to change to confront them effectively?

The National Academy of Public Administration studies in 1983-84 and again in 1985 found that the opportunity "to accomplish something

worthwhile" ranked as the most powerful motivation and source of satisfaction for EPA employees.

- In view of the importance of this factor, how could EPA management reinforce motivation and commitment? Would publicizing agency successes more extensively and demonstrating to employees in concrete ways how their efforts are making a difference in the health and quality of the environment be useful?

  Another explanation for the dedication and commitment of EPA employees has been the perceived high priority given to environmental protection by the nation's leaders and the public at large.

- What steps could top management take to keep environmental concerns in the public eye and ensure top level political support for EPA's mission and the goals of environmental protection? In this regard, what opportunities are presented by the upcoming election and transition to a new administration?

Enhancing Employee Confidence and Morale

Effective communication between management and employees has been shown to be an indispensable element in building and maintaining employee morale and confidence. At the same time, concrete actions often speak louder than words in communicating management's concern about employee attitudes and welfare, as demonstrated by surveys taken after EPA's invitation to the National Academy of Public Administration to study the agency and recommend measures for improving organizational effectiveness.

- How, on a continuing basis, can EPA management best demonstrate its concern for employees and its commitment to building its human resources? Is there a need for a regular, institutionalized process for obtaining information on employee attitudes and the state of employee morale? If so, how would this best be accomplished? What other steps by top management would demonstrate seriousness of purpose as well as provide useful feedback on the effectiveness of actions already taken?

  Effective organizational communication implies a dialogue between management and employees, not just a top-down flow of information. Moreover, employees in many organizations are increasingly seeking to participate in decisions affecting them, extending even to decisions relating to organizational policy, goals, and priorities.

- Are there additional ways EPA management could usefully involve employees in such decision making and, in the process, benefit more from the talent, ingenuity, and expertise available within the agency?

The ultimate success of agency efforts to strategically manage human resources depends on the clear communication of human resource goals to the managerial ranks and their acceptance of these goals. Acceptance, in turn, requires that managers be convinced of the value of a human resource management approach.

- How can top management convince line managers of the value of human resource management? Is there a need to advertise successes and positive results of human resource management more broadly to build support and convert skeptics? Should greater prominence be given to human resource management considerations in appraising the performance of line managers?

Recruitment and Retention

Much has been made of the need for EPA to attract and retain people with the highest possible levels of skill, competence, and experience if it is to be successful in carrying out its complex mission.

- How will EPA be able to do this in an era of constrained resources? Are there job considerations other than pay and financial benefits that EPA management could develop and promote as inducements to highly qualified candidates?

Training and Employee Development

Training is a key component of strategic human resource management and a particularly important one in an area as complex and rapidly changing as environmental protection.

- How can EPA best ensure the integrity and effectiveness of the agency's training program and still respond to the exigencies of deficit reduction?
- Do opportunities exist for greater cooperation and pooling of efforts with other agencies?
- With regard to development of course curricula and training materials, are there opportunities to use or adapt materials already developed by other public and private sector organizations? Could training costs be reduced through greater use of EPA employees who are expert and/or trained in particular areas to instruct other employees?
- Do opportunities exist for greater federal/state cooperation in training and professional development?

A distinguishing characteristic of strategic human resource management is that it places responsibility for effective personnel management squarely in the hands of line managers. This, in turn, requires that managers possess not only the technical skills and knowledge appropriate to their positions but also understanding and competence in the area of human relations.

- How can EPA management identify, particularly at the lower and middle management levels where technical skills are still an important component of the job, those individuals who possess the human relations aptitudes and competencies important for promotion to higher level management positions?
- What training will be needed to impart human relations skills to those managers needing improvement in this area?
- What is the appropriate balance between technical training and management training, including human relations? Do opportunities exist for greater use of human relations training resources outside of EPA?

Achieving an Integrated Environmental Perspective

The current policy of rotating senior EPA managers is considered by many to be a good way of overcoming the media-specific perspectives and biases that to some extent have been institutionalized by EPA's legislative and organizational arrangements.

- Would even greater use of rotation, particularly at the middle and lower management levels, promote the development of an integrated, holistic environmental perspective?

Leadership in Environmental Science

The ability to attract and retain the best scientific talent, and thereby to play a significant role in advancing scientific knowledge, is a growing concern throughout the federal government. EPA, like other agencies heavily involved in research, can probably expect increased difficulties in competing for top scientific talent against private sector organizations.

- What are the factors that persuade many highly qualified research scientists to remain in agencies like EPA even when tempting financial offers are made to induce them to leave? How might EPA capitalize on such factors to strengthen the appeal and prestige of EPA research work and thereby enhance its ability to attract and retain the talent it needs?
- Do opportunities exist for increased reliance on talent available in academic institutions, e.g., through arrangements under which scientists on

leave from these institutions would receive compensation from both EPA and their private employers?

As the debate on pollution control and environmental and health protection turns increasingly on complex and subtle scientific arguments, some observers believe that practicing scientists should be involved to a greater extent in the environmental decision-making process.

- How might EPA top management go about inducing those scientists who have the greatest understanding of cutting edge issues to get more involved in policy decision making? Is it possible to do this and still ensure that these individuals are able to operate at the forefront of their respective disciplines?

Conclusions

Approaching the end of its second decade of existence, EPA is in bureaucratic and institutional terms a young agency, one with a still evolving mandate and steadily expanding and diversifying responsibilities. A youthful sense of mission combined with employee dedication and a high degree of professionalism are among the distinguishing characteristics and strengths of the agency and the qualities that will be called upon to guide and sustain it as it confronts the challenges of the years ahead.

As this report has shown, a number of important initiatives are underway within EPA to increase the effectiveness and efficiency of its environmental protection efforts and strengthen and build on the partnership that already exists between it, the states, and others. We have attempted to point out some of the problems and obstacles that could interfere with the success of these initiatives and, at the same time, to offer suggestions on ways EPA top management might overcome these impediments to improved performance. This final chapter raises many more questions than it answers. However, our aim has been to highlight the dynamic and evolving nature of environmental protection and the resultant need—notwithstanding the crowded agenda and resource constraints currently facing EPA—to keep one eye on the future and be prepared to deal effectively with challenges that have not yet made it to the top of the agenda or, indeed, may not yet be part of the agenda at all.

Comments From the U.S. Environmental Protection Agency

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

MAY 5 1988

THE ADMINISTRATOR

Mr. J. Dexter Peach
Assistant Comptroller General
Resources, Community, and Economic
Development Division
General Accounting Office
Washington, D.C. 20548

Dear Mr. Peach:

As you know, the Agency is actively reviewing the General Accounting Office (GAO) draft report on program and administrative management at the Environmental Protection Agency (EPA) that we received February 26. The report is entitled "Protecting Human Health and the Environment Through Improved Management."

I appreciate your briefing on the report's tentative findings last year and the March 4 briefing for Linda Fisher, Assistant Administrator for Policy, Planning and Evaluation. I have reviewed the report and find that it is well researched, thorough, and presents a balanced point of view. It will be useful in helping senior Agency management shape current initiatives and plan future ones to achieve improved program effectiveness. The report demonstrates GAO's ability to grasp complex environmental issues in a comprehensive manner and skill in presenting interrelated concerns in a well-formulated and clearly written style. I applaud you and your staff in this effort.

Currently EPA and GAO personnel are discussing the report's findings and recommendations in a very constructive way, including long-term implications. We are providing your staff our candid impressions of the draft and additional information to include in the final report. We have also agreed that continued dialogue on this subject between our organizations is mutually beneficial.

EPA generally agrees in principle with the findings and recommendations presented. However, there are a few specific findings I would like to address.

First, I agree with the report's emphasis on managing for measurable environmental results. This has been a major goal at the Agency for several years. Since ambient environmental conditions are influenced by many natural and biological factors and changes may only be observable over many months or years, the Agency will need to continue to track administrative actions for management purposes. In order to improve our ability to measure for environmental results, we are trying to identify environmental indicators in each program. These indicators would be used to measure the effectiveness of our program strategies. Several efforts are underway to develop such indicators, including very promising progress in the Superfund program.

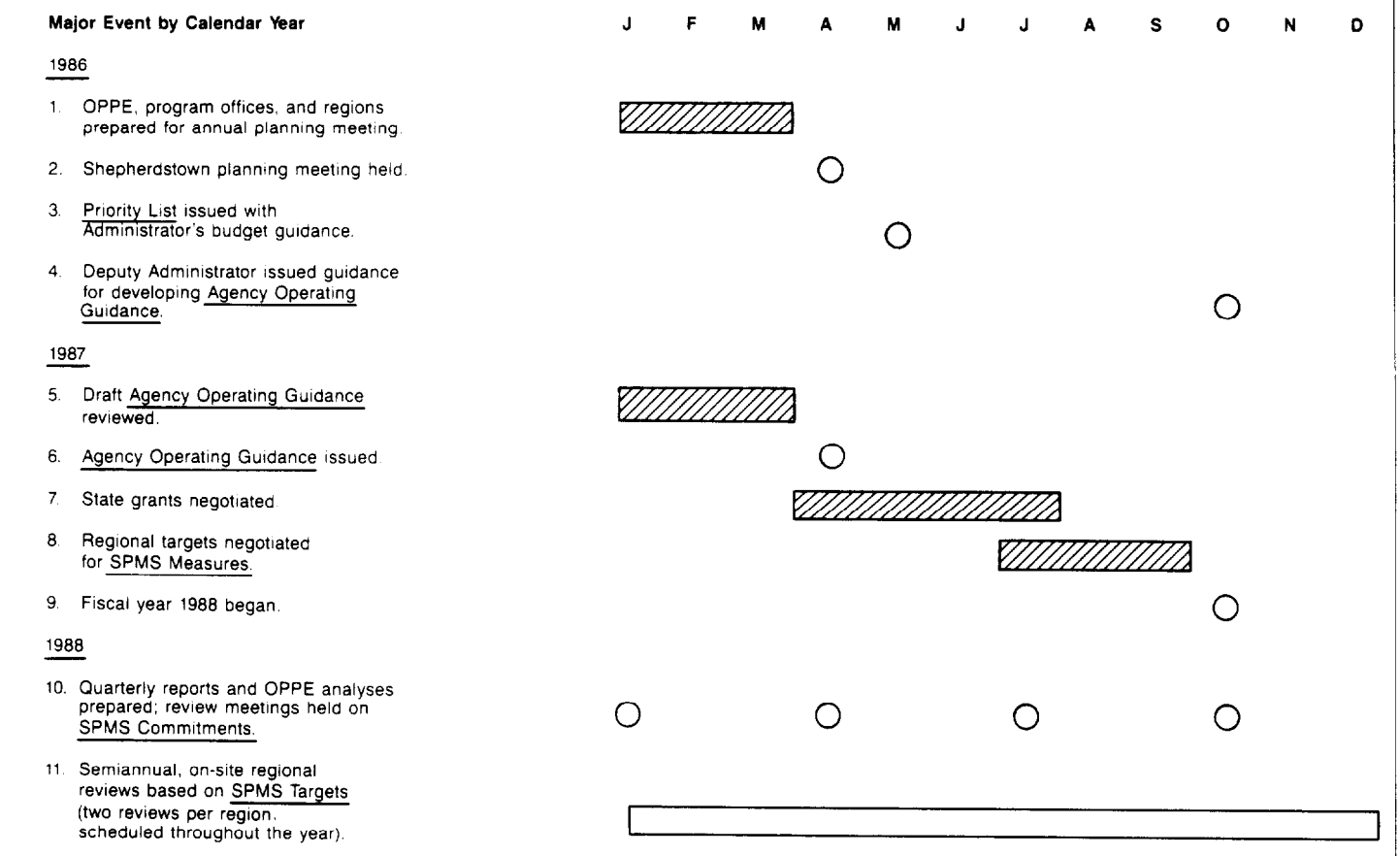
The report recognizes the importance of an effective relationship between EPA and States. Under many of our statutes, States exercise environmental program implementation responsibilities under Federal law or comparable State statutes. There are inevitably tensions in such a relationship, but I will continue to devote a major effort to strengthening and improving it.

GAO also suggests that EPA reprogram funds more frequently to address emerging issues. In the budget process, EPA strives to appropriately match environmental issues with resources based on analyses provided by program offices, the Office of the Comptroller, and the Office of Policy, Planning and Evaluation. To reprogram funds, we examine not only flexibility available through legislative means, but consider other factors such as statutory mandates, environmental results and public concerns. The Agency has demonstrated a willingness to reprogram funds, and I personally examine the resources allocated to emerging environmental issues.

Finally, we agree with the report's findings concerning our integrated financial management system. The Agency is devoting substantial resources to the new finance system to ensure that it meets the administrative and program requirements for sound fiscal management.

The Agency has the capacity to manage its programs more effectively, and we will incorporate GAO's suggestions and recommendations, where appropriate. We agree that more can be done. We need to better integrate our planning and budgeting processes. We need to more clearly communicate our mission, goals and direction. We must provide increased attention to cross-media issues and administrative systems.

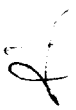
Time Frames for Key Planning Activities of the SPMS Cycle for Fiscal Year 1988



Note: OPPE = Office of Policy, Planning, and Evaluation
SPMS = Strategic Planning and Management System

I have asked the Assistant
and Evaluation to take the lead
Agency's responses to the recomm
final report. These findings wi

Thank you for providing thi
draft general management review
receiving the final report.



Budget Execution Phase

Sept.

Oct.

Nov.

Dec.

CY1988

Jan.

Feb.

Mar.

Apr.

May

June

July

Aug.

Sept.

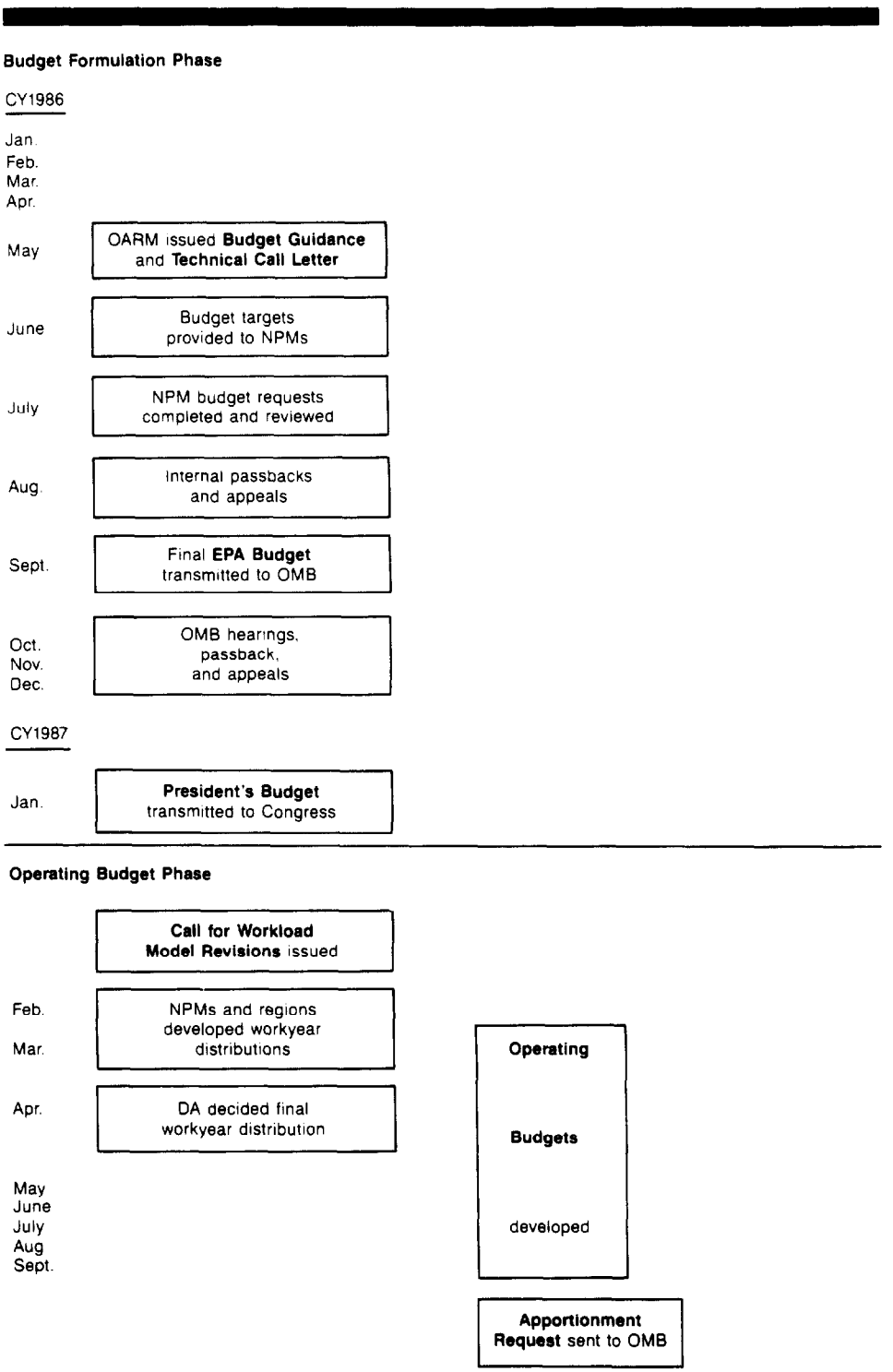
Oct.

OMB apportioned funds; Comptroller issued **Advices of Allowance**

FY 1988 began. Funds obligated by allowance holders. Changes requested as needed. Revised **Advices of Allowance** issued by the Comptroller's Office.

Note: NPM = National Program Manager
OARM = Office of Administration and Resource Management
OMB = Office of Management and Budget
CY = Calendar year

Key Events in EPA Budget Cycle for Fiscal Year 1988



existing federal, state and local emission controls and institute new controls where necessary. Implement "reasonable extra efforts" programs in the worst ozone areas.

c. Reduce risks of exposure to unhealthful levels of indoor air pollutants, especially radon from both soil and tap water. Implement the indoor radon assessment and mitigation strategy. Continue field studies to measure human exposure to air pollutants. Ensure consistent Agency-wide policy analysis, risk assessments and strategy development for indoor air pollution.

d. Promote effective remedial actions for asbestos. Strengthen educational and technical assistance programs. Support development of state contractor licensing and certification programs. Develop state inspector training programs. Strongly enforce asbestos NESHAPSs [National Emissions Standards for Hazardous Air Pollutants].

Prevent ground-water contamination and reduce other risks from hazardous wastes.

a. Protect ground water resources. Continue to develop and undertake a comprehensive approach to ground-water management in cooperation with the states. Implement the Wellhead Protection Program.

b. Reduce imminent threats to public health and the environment from abandoned hazardous waste sites. Use increased Superfund removal authorities to stabilize National Priority List [NPL] and non-NPL sites.

c. Control hazardous waste releases to ground water. Make permit decisions on operating land disposal facilities by the 1988 HSWA deadline and ensure compliance. Establish priorities and approve and monitor plans for closing land disposal facilities. Respond to petitions to continue underground injection of hazardous wastes and enforce UIC [Underground Injection Control] Class I injection well bans.

d. Clean up significant releases of hazardous substances. Accelerate use of corrective action authorities at environmentally significant land disposal facilities. Streamline the Superfund cleanup process and use enforcement efforts to increase Potentially Responsible Party settlements. Encourage state-lead projects and federal facility activity. Pursue cost recovery to reimburse the CERCLA [Comprehensive Environmental Response, Compensation, and Liability Act] Trust Fund.

Agency Priority List for Fiscal Year 1988

The following is EPA's priority list for fiscal year 1988 contained in the Agency Operating Guidance, Fiscal Year 1988.

Reduce risks from exposures to pesticides, toxic chemicals and pathogens.

a. Reduce risks from pesticides. Continue to give priority to the re-registration process. Place appropriate pesticides in Special Review. Continue the emphasis on ground-water contamination. Strengthen performance of regional and state enforcement programs and state certification and training programs. Build technical capability in the regions to support Agency programs addressing ground-water and other site-specific pesticide problems.

b. Reduce risks from new and existing toxic chemicals. Emphasize the review of categories of chemicals and the products of emerging biotechnology. Use the National Human Monitoring Program to identify, test, and control chemicals posing significant risks. Strengthen performance of regional and state enforcement programs, emphasizing enforcement against serious violations of PCB regulations. Use TSCA [Toxic Substances Control Act] to resolve cross-media problems in an integrated manner.

c. Control drinking water contaminants. Improve enforcement of drinking water regulations. Develop standards for radionuclides, disinfection byproducts and other statutorily-mandated contaminants. Develop health advisories for agricultural chemicals and other drinking water contaminants, and to support RCRA and Superfund decisions.

Reduce exposure to unhealthy air quality.

a. Control air toxics. Implement the comprehensive national air toxics strategy. Continue to identify hazardous air pollutants and develop federal control requirements for vehicle fuels and stationary sources, especially hazardous waste and Superfund sites. Strengthen state and regional enforcement programs. Increase support to states to implement multi-year air toxics program development plans. Provide assistance for accidental release planning through the Chemical Emergency Preparedness Program.

b. Reduce violations of the ozone standard. Implement the national ozone reduction strategy. Enforce federal standards for vehicles and fuels, and improve compliance with state implementation plans. Tighten

e. Protect wetlands. Aggressively implement the Wetlands Protection Strategy. Increase emphasis on use of advance identification and strengthen enforcement for protection of priority wetlands.

Improve the agency's ability to manage risk.

a. Develop risk assessment methods for human health effects. Focus on methods development for non-cancer health effects. Improve techniques for using animal studies to estimate risks to humans. Develop statistical models to characterize dose-response levels of toxic chemicals and to characterize uncertainty. Determine Structure Activity Relationships to determine toxic effects of untested chemicals based on physical similarities to other chemicals for which effects are known.

b. Develop ecological risk assessment methodologies. Develop integrated environmental risk methods through the use of ecosystem function and structure information. Develop methods to assess effects from exposures to complex mixtures without the need for chemical-by-chemical analysis. Use statistical models to characterize uncertainties associated with risk estimates.

c. Develop total exposure methodologies. Improve monitoring of exposures to human and ecological populations through development of biological indicators and use of pharmacokinetic and metabolism information. Improve exposure monitoring systems and other analytical methods to better identify the total amount of chemicals absorbed and retained in exposed populations.

d. Work with industry to ensure availability of cost-effective risk reduction technology. Explore alternative treatment technologies such a biodegradation, biotechnology and advanced separation. Conduct pilot-scale evaluations of advanced incineration and techniques for stabilizing wastes to prevent releases into the environment. Conduct collaborative, full-scale demonstrations with [the] private sector on promising innovative technologies.

e. Prevent and clean up leaks from underground storage tanks. Complete and enforce tank standards. Approve state UST [Underground Storage Tanks] programs.

f. Develop adequate hazardous waste treatment capacity by promulgating regulations, streamlining permit requirements, and encouraging alternatives to land disposal.

g. Prevent ground-water contamination from injection wells. Assure compliance with UIC [Underground Injection Control] permits. Control contamination from Class V wells.

Improve protection of aquatic life and human uses of surface waters.

a. Control the release of toxic discharges and hazardous wastes to surface waters. Issue and enforce third-round NPDES permits for major discharges and significant minors, with BAT [Best Available Technology] and water quality based requirements. Develop additional toxic and hazardous waste controls. Screen, investigate and determine control strategies for unregulated chemicals. Develop technical guidance for assessing human risks from ingesting toxics-contaminated fish and shellfish. Improve the coverage and effectiveness of local pretreatment program requirements by developing and enforcing categorical standards and local limits for toxics and hazardous wastes not adequately regulated.

b. Reduce discharges of inadequately treated wastes from municipal treatment facilities. Aggressively enforce compliance with the statutory deadline under the National Municipal Policy, taking judicial enforcement actions where necessary.

c. Reduce nonpoint source pollution. Implement the Agency's Nonpoint Source Strategy to encourage state development of NPS [Nonpoint Source] control programs for high priority surface and ground waters. Work with other federal programs to ensure that they complement state NPS control efforts.

d. Restore the integrity of near coastal waters. Implement an integrated approach to control toxics and nonpoint source pollution in near coastal waters, consistent with the recommendations of the Near Coastal Waters Strategic Plan.

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