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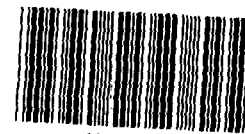
GAO

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

September 1993

ENVIRONMENTAL PROTECTION

EPA's Plans to Improve Longstanding Information Resources Management Problems



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**Accounting and Information
Management Division**

B-254189

September 16, 1993

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

Dear Mr. Chairman:

As part of its diverse environmental regulatory responsibilities, the Environmental Protection Agency (EPA) collects and manages vast amounts of data. The agency's investment in information resources has grown steadily in the last decade, reflecting an increased dependence on information to meet its environmental missions. Congressional oversight committees have become increasingly concerned about EPA's regulatory effectiveness, in part, because of information resources management (IRM)¹ deficiencies that we and EPA's Inspector General have repeatedly cited in past reports.

On March 29, 1993, in testimony for a joint hearing chaired by you and Chairman Conyers,² we reported on the types of IRM problems confronting EPA and examples of program effects resulting from the problems. Your office subsequently asked us to examine how EPA's planned actions are responding to its IRM problems. Details on our objective, scope, and methodology are contained in appendix I.

Results in Brief

EPA has several longstanding IRM problems that adversely affect many of its program operations. These problems include an inadequate strategic IRM planning process, lack of sound data management practices, and the absence of effective top management direction and oversight. EPA's Office of Information Resources Management (OIRM), which has overall agency responsibility for IRM, acknowledges these problems and plans to respond with corrective actions. First, it intends to implement a strategic planning process for the direction, control, and coordination of IRM resources.

¹Information management involves identifying needs and sharing information; ensuring standardization, security, and integrity of data; and managing records. Information technology management involves controlling computer hardware, software, and telecommunications used to help manage information. The integrated management of information and technology is achieved under what is called information resources management, or IRM.

²Environmental Protection: EPA's Actions to Improve Longstanding Information Management Weaknesses (GAO/T-IMTEC-93-4, Mar. 29, 1993); Management Issues Facing the Environmental Protection Agency (GAO/T-RCED-93-26, Mar. 29, 1993).

Second, OIRM intends to provide users with better access to data from multiple information systems. Finally, OIRM intends to (1) strengthen the agency's IRM steering committee to review and coordinate an agencywide IRM strategy and (2) implement more effective oversight activities.

Although OIRM's plans show promise for addressing many of EPA's IRM weaknesses, full implementation of these plans is not expected for several years. Program office participation in OIRM's plans is limited in most cases, and EPA lacks an executive who can devote full-time attention to IRM matters. Without agencywide involvement and top executive leadership, OIRM's efforts to resolve longstanding IRM problems are unlikely to be successful.

Background

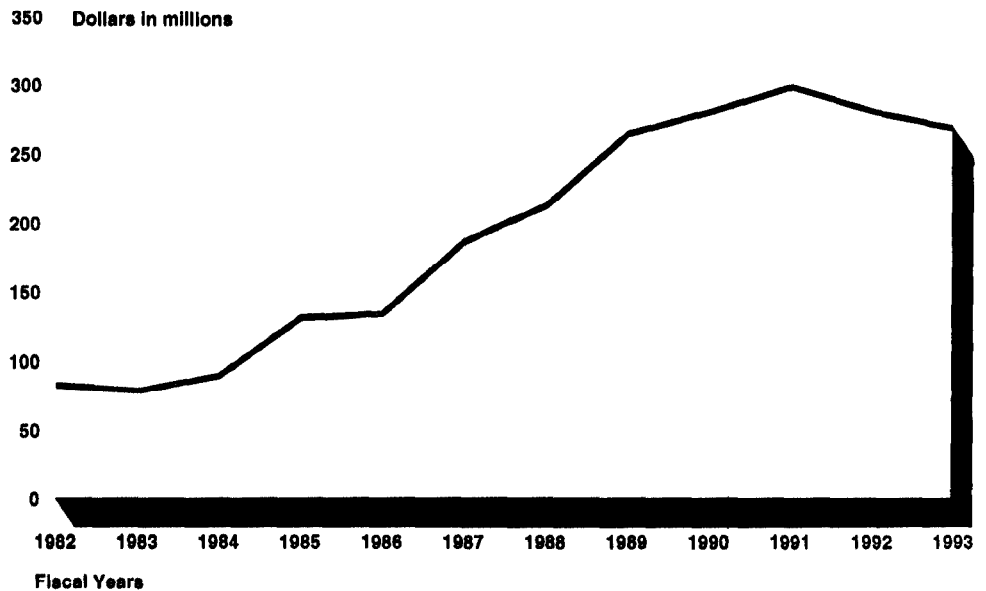
EPA regulates some 500,000 facilities for air and water pollution abatement and hazardous waste control, reviews thousands of toxic chemicals for health and environmental safety, and conducts environmental research. To help perform its missions, EPA has made a substantial investment in IRM. Its main computing center alone maintains a terabyte³ of information online, and another six terabytes are available to its mainframes within seconds. Hundreds of additional databases are used by program and regional offices; some of these databases are on EPA's mainframe computers, while others are on computers linked through local area networks.

In fiscal year 1993, EPA expects to spend nearly \$270 million on computer and communications resources.⁴ As shown below in figure 1, the agency's investment in these resources—measured in constant dollars—has grown at an average annual rate of approximately 13 percent over the last decade.

³One terabyte of data is approximately 1 trillion bytes. A byte is equivalent to one character in a text file, such as the letter "a."

⁴This figure accounts for EPA's major automated data processing expenditures as reported to the Office of Management and Budget under Circular A-11. We did not review the accuracy of this information; EPA's Inspector General has found past A-11 reporting irregularities that indicate these figures could be understated.

Figure 1: IRM Expenditures, Fiscal Year 1982 to Fiscal Year 1993



Note: Expenditures for FY 1993 are planned. Figures are in constant 1992 dollars.

EPA has a decentralized structure to manage its diverse information resources. Individual program offices and EPA regional offices manage information resources on a day-to-day basis to meet their needs, while responsibility for overall direction of the agency's information resources is shared between the Office of Administration and Resources Management and the Office of Policy, Planning, and Evaluation. Within the Office of Administration and Resources Management, OIRM has primary responsibility for policy development and overall direction of the agency's IRM program. Appendix II discusses EPA's IRM structure and responsibilities in greater detail.

Reviews Have Demonstrated Longstanding IRM Problems

Since 1980, more than 50 EPA Inspector General, GAO, and General Services Administration reports and testimonies have identified IRM problems at EPA. Foremost among these deficiencies were

- an inadequate agencywide planning process that does not ensure that information technology investments support strategic management goals;

- a lack of sound data management practices that impedes user access to data from multiple systems; and
- a lack of top management attention to and involvement in agencywide IRM direction and control.

Past work has demonstrated the inadequacies of EPA's agencywide planning process, particularly the weak link between strategic management goals and information technology investments.⁵ EPA has developed new management strategies that focus on national environmental priorities based on relative risks to human health and the environment. These strategies will require coordination among existing programs as well as implementation of new programs that require an integrated approach to environmental protection. Information systems that support and contribute to these goals are critical, and without them, achieving the goals is unlikely.

However, EPA has historically not linked its program priorities and information technology investments. Instead, agencywide IRM plans have been constructed by OIRM with little input from or consultation with the program offices. For example, some EPA program offices have not submitted IRM plans to OIRM, and those offices that did construct IRM plans often did not adequately link their plans to strategic agencywide plans.⁶ This has led to EPA using cumbersome, labor-intensive processes to meet program needs.⁷ Inspector General reviews of EPA's Superfund and financial management systems also show that poor planning has made the agency vulnerable to data duplication and systems inefficiencies.⁸ Because of these problems, EPA declared agencywide IRM planning a material weakness in its 1992 Federal Managers' Financial Integrity Act report.

In addition to poor planning, we have reported that EPA's lack of sound data management practices has resulted in difficulties in accessing and

⁵Environmental Enforcement: EPA Needs a Better Strategy to Manage Its Cross-Media Information (GAO/IMTEC-92-14, Apr. 2, 1992); Computer Systems Integrity: EPA Must Fully Address Longstanding Information Resources Management Problems, Office of Inspector General, Environmental Protection Agency, Audit Report No. E1NMF1-15-0032-2100641, Sept. 28, 1992; GAO/IMTEC-93-4, Mar. 29, 1993.

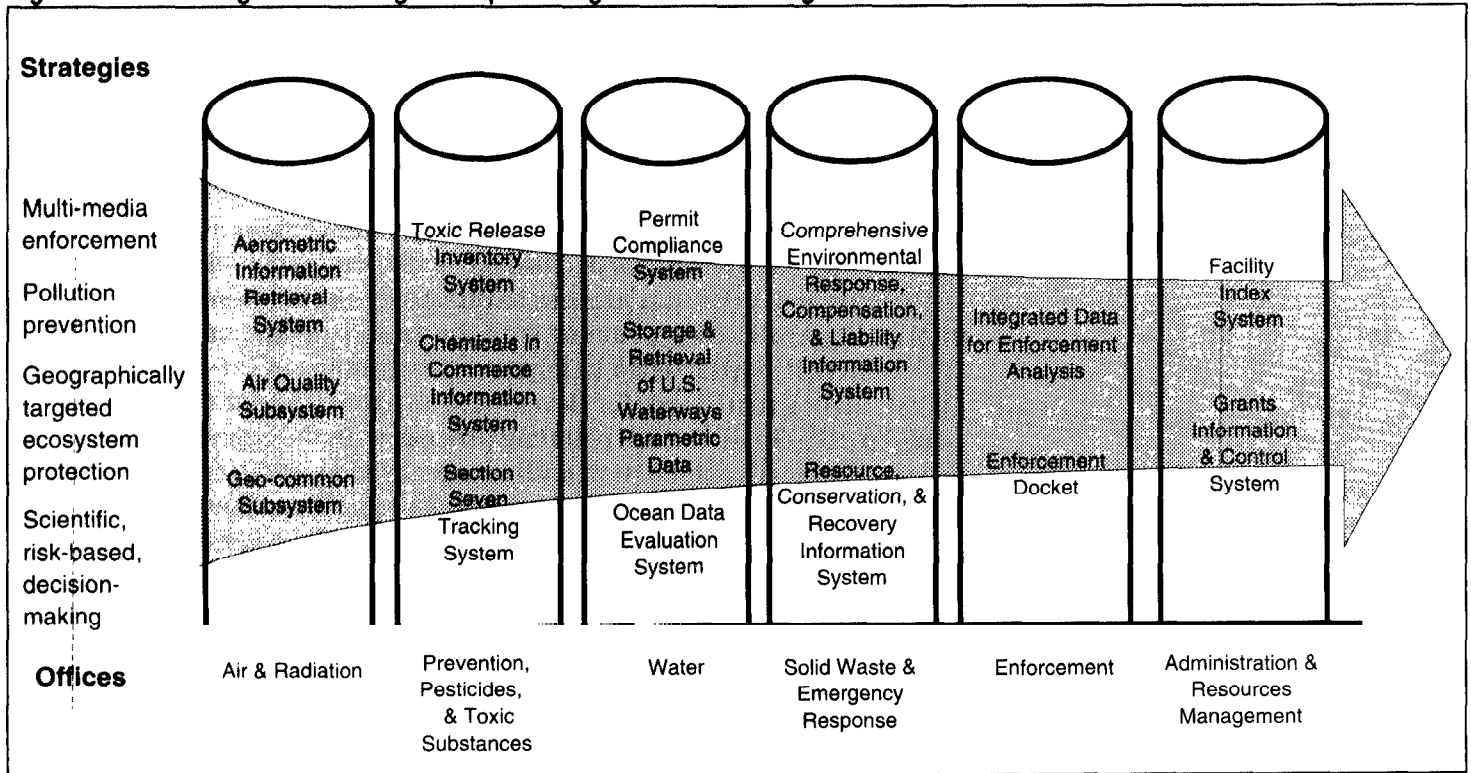
⁶Office of Inspector General, Environmental Protection Agency, Audit Report No. E1NMF1-15-0032-2100641, Sept. 28, 1992; GAO/IMTEC-93-4, Mar. 29, 1993.

⁷Pesticides: Information Systems Improvements Essential for EPA's Reregistration Efforts (GAO/IMTEC-93-5, Nov. 23, 1992); GAO/IMTEC-92-14, Apr. 2, 1992.

⁸Special Review on Follow-Up of CERCLIS Reporting and Post-Implementation, Office of Inspector General, Environmental Protection Agency, Audit Report No. E1SFG1-15-5001-2400027, Mar. 27, 1992; Integrated Financial Management System: Managing Implementation of the New Accounting System, Office of Inspector General, Environmental Protection Agency, Audit Report No. E1AMFO-11-0029-1100153, Mar. 29, 1991.

sharing data.⁹ Supporting EPA's new strategies calling for cross-media assessments of environmental and health problems requires data management practices that will allow users to easily access data from multiple existing systems. This will require development of standard definitions, common user interfaces, core data sets, and analytical tools. However, EPA has difficulties sharing data to support new strategies, such as cross-media enforcement, because basic terms, such as "enforcement action" or "significant noncompliance," are defined differently across programs. Users are often required to spend unnecessary time formulating data queries using complicated codes and data element names unique to each system.¹⁰ Figure 2 shows the current vertical structure of EPA's data systems—largely segmented along narrowly defined program lines—and how crosscutting information needs associated with several of EPA's strategic management goals will define future data integration.

Figure 2: EPA's Long-Term Strategies Require Integrated Crosscutting Information



⁹GAO/T-IMTEC-93-4, Mar. 29, 1993; GAO/T-RCED-93-26, Mar. 29, 1993; GAO/IMTEC-92-14, Apr. 2, 1992.

¹⁰GAO/IMTEC-92-14, Apr. 2, 1992.

Lastly, EPA suffers from a lack of top management attention to and involvement in agencywide IRM direction and control.¹¹ In September 1992, the Inspector General reported (1) the absence of a designated senior official for agencywide IRM, as required by the Paperwork Reduction Act and the Office of Management and Budget Circular A-130, and (2) that EPA's OIRM was at too low an organizational level to be effective in directing the IRM activities of major offices headed by assistant and regional administrators. The Inspector General concluded that the absence of strong authority and leadership had contributed to serious deficiencies in how EPA manages its IRM resources, including inadequate oversight of contracted automated data processing services,¹² computer security vulnerabilities,¹³ and ineffective quality assurance policies and procedures for acquisition contracts and systems development efforts.¹⁴

Corrective Actions Are Planned to Resolve Problems

To its credit, EPA's OIRM has started several initiatives designed to address key agencywide IRM problems reported by us and the Inspector General. However, these efforts will not be fully implemented for several years. Most program offices have not been involved in them, and EPA lacks a top executive who can devote full-time attention to IRM matters.

Agencywide Planning Process Being Reexamined

OIRM has recently initiated an effort to link IRM planning with the agency's strategic management goals and to define and implement an agencywide, strategic IRM planning process. Through a six-person planning group, OIRM is planning to (1) define a process to integrate mission-based and information technology planning with the agency budget process, (2) identify all steps needed to improve IRM planning at the agency, and (3) establish a time frame for developing an agency 5-year strategic IRM plan. To coordinate the IRM planning process with the agency budget process, OIRM—in conjunction with an agencywide IRM steering committee—intends to review IRM funding requests and endorse plans that are consistent with agencywide strategies and goals. After collecting

¹¹Office of Inspector General, Environmental Protection Agency, Audit Report No. E1NMF1-15-0032-2100641, Sept. 28, 1992.

¹²Contract Management: EPA Needs to Strengthen the Acquisition Process for ADP Support Services Contracts, Office of Inspector General, Environmental Protection Agency, Audit Report No. E1NMF1-15-0032-2100300, Mar. 31, 1992.

¹³Software Integrity: EPA Needs to Strengthen General Controls Over System Software, Office of Inspector General, Environmental Protection Agency, Audit Report No. E1NMF1-15-0055-2100591, Sept. 22, 1992.

¹⁴Office of Inspector General, Environmental Protection Agency, Audit Report No. E1NMF1-15-0032-2100641, Sept. 28, 1992.

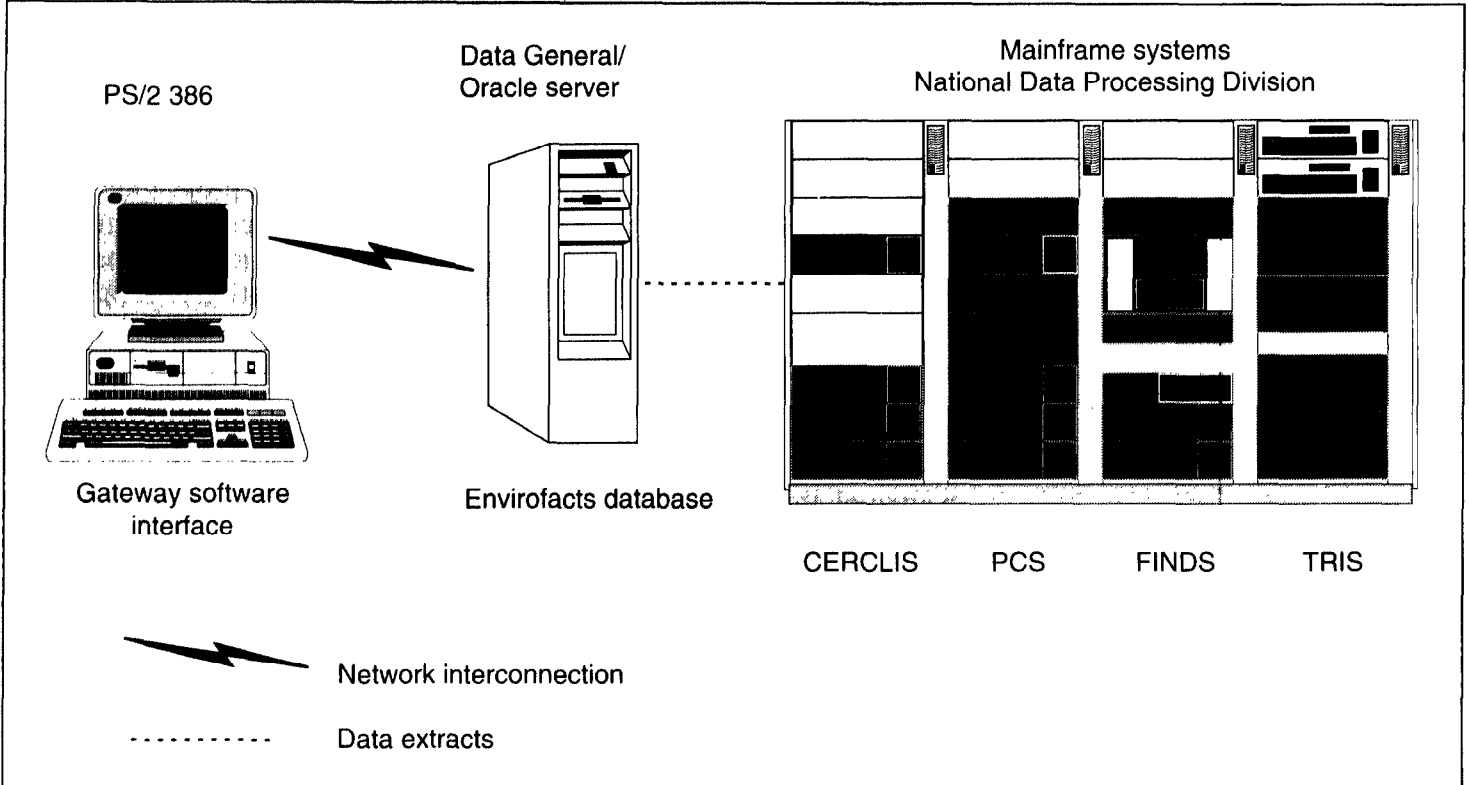
baseline information about existing agency programs, OIRM plans to pilot test the new IRM planning process by the spring of 1994.

Projects Underway to Improve Data Management Practices

Recognizing the need for an integrated approach to managing environmental information, OIRM has initiated projects to promote data sharing throughout EPA. For example, EPA has initiated a project known as Gateway/Envirofacts that is expected to apply geographic information systems (GIS) technology.¹⁶ Gateway/Envirofacts is intended to enhance the availability and utilization of environmental information to support decision-making. The Gateway project was initiated by OIRM in July 1990 in response to the changing information demands of EPA programs. A new database, Envirofacts, was developed under the project and contains excerpts of individual program systems databases—the Permit Compliance System (PCS), the Toxic Release Inventory System (TRIS), the Facility Index System (FINDS), and the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS). OIRM plans to use GIS mapping capabilities with the Gateway/Envirofacts user interface to display information geographically. As shown below in figure 3, users will be able to access these environmental data in the Envirofacts repository through Gateway.

¹⁶A GIS is a computer system that captures, stores, displays, analyzes, and models natural and artificial environments using data referenced to locations on the earth's surface.

Figure 3: Overview of the Gateway/Envirofacts System



In May 1992, OIRM also initiated its Information Management/Data Administration program to develop data management practices that could better address changing information requirements. The program is using a structured approach that is intended to allow data to be shared regardless of where they are located geographically or organizationally, while also maintaining control over the quality of the data. A six-member group, with assistance from three contractors and the National Institute of Standards and Technology, is focusing work on (1) data management policies and standards; (2) an agencywide information infrastructure with established IRM controls, standards, and processes; and (3) incorporation of the data management policies, standards, and infrastructure into a systems engineering approach to life-cycle management.

OIRM Plans to Strengthen IRM Leadership and Oversight

To address the lack of top management involvement in IRM, in December 1992 the Administrator appointed the Assistant Administrator for the Office of Administration and Resources Management as the agency's designated senior official for IRM with authority to exercise responsibilities pursuant to the Paperwork Reduction Act, the Office of Management and Budget Circular A-130, and the Federal Information Resources Management Regulation. The Assistant Administrator is also the chairperson of EPA's agencywide IRM steering committee. Plans call for focusing the committee structure, agenda, and role on reviewing and coordinating the agencywide IRM strategy; and reviewing and endorsing strategic IRM plans in conjunction with the agencywide budget process. EPA is also finalizing a new directive that clearly delineates responsibilities and chain-of-command reporting among the offices involved in agencywide IRM activities.

In addition to enhancing the role of the IRM steering committee, OIRM has created a four-person Oversight and Compliance Support Team to address the lack of oversight that we and the Inspector General have identified in past reports. Specifically, the team plans to (1) direct reviews of information systems contracts; (2) develop a complete, up-to-date repository for IRM policies, standards, and procedures; (3) construct a quality assurance process for information systems reviews; and (4) pilot several application systems reviews to serve as the initial input for quality assurance reviews. According to the head of this group, OIRM expects to have initial activities underway by the end of 1993, with agencywide implementation occurring 2 to 3 years later.

OIRM's Long-Term Initiatives Lack Program Involvement and Top Management Leadership

OIRM's plans to address IRM weaknesses will not be fully implemented for several years. For example, the first agencywide, strategic IRM planning effort is not expected to influence the agency budget process until fiscal year 1997. In addition, the key results of the Information Management/Data Administration program are not expected until at least 1994.

In order for OIRM's plans to be implemented and to succeed, it must secure the commitment of EPA top management and program offices to be active proponents of the initiatives. The initiatives are primarily OIRM's attempt to resolve longstanding problems and to support EPA's new management goals. OIRM plans to work with program offices on specific initiatives. For example, it recently held an agencywide strategic IRM planning conference with representatives from all EPA offices. However, program office participation in OIRM's efforts has been limited. Office of Enforcement

officials explained that OIRM data integration initiatives have not incorporated the information needs of their office. In addition, senior officials in the Office of Air and Radiation, the Office of Solid Waste and Emergency Response, and the Office of Prevention, Pesticides, and Toxic Substances said that their priorities are focused on their internal IRM activities rather than being involved in OIRM initiatives.

Another key factor in ensuring the success of OIRM's plans is the need for a senior official at EPA whose sole responsibility is IRM. Currently, the agency's designated official for IRM has many other responsibilities dealing with human resources, facilities management, and financial management. We have previously testified that information management should not be viewed as a subset of facilities management or administration; it needs to be recognized and dealt with at a strategic level.¹⁶ We further testified that having a Chief Information Officer at EPA who reports to the Administrator and can devote full-time attention to IRM issues, combined with the adoption of proven, disciplined practices for managing information resources, is a sound investment and can provide major benefits. The Chief Information Officer can become an authoritative, indispensable partner to EPA senior management by helping them determine where and how strategic information investments should be made.

Conclusions

EPA has significant IRM problems that impede its ability to carry out its programs effectively. OIRM has developed plans to remedy these problems, such as developing a structured planning process and giving attention to requisite policies, standards, and procedures. These plans show promise for improvements; however, many elements are not expected to be implemented for several years. Furthermore, most program offices have not been involved in OIRM's initiatives, and EPA lacks a top executive who can devote sole attention to IRM issues. Without such involvement and leadership, OIRM is unlikely to fix longstanding problems.

Recommendations

To help ensure that the agency's IRM problems are alleviated, we recommend that the Administrator of EPA

- direct Assistant Administrators for the program offices to participate in and provide leadership, as necessary, for OIRM's initiatives by working with OIRM to develop integrated plans for implementing the initiatives, including

¹⁶Creation of a Department of Environmental Protection (GAO/T-RCED-93-39, May 6, 1993); GAO/T-IMTEC-93-4, Mar. 29, 1993.

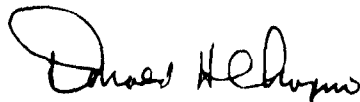
identifying sources of required funding and time frames for implementation; and

- appoint a Chief Information Officer who reports to the Administrator, has full-time IRM responsibilities, and can effectively influence IRM investments at all levels to meet agency goals.

As requested, we did not obtain written comments on a draft of this report. However, we discussed the results of our work with OIRM and program officials, who generally agreed with the information presented. We have incorporated their comments where appropriate. As arranged with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days after the date of this letter. We will then send copies to the Administrator, EPA; interested congressional committees; the Director, Office of Management and Budget; and other interested parties.

Our work was performed between August 1992 and July 1993, in accordance with generally accepted government auditing standards. This report was prepared under the direction of Dr. Rona B. Stillman, GAO's Chief Scientist for Computers and Communications, who can be reached at (202) 512-6412. Other major contributors to this report are listed in appendix III.

Sincerely yours,



Donald H. Chapin
Assistant Comptroller General

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Abbreviations

AIMD	Accounting and Information Management Division
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
EPA	Environmental Protection Agency
FINDS	Facility Index System
GAO	General Accounting Office
GIS	geographic information system
IRM	information resources management
OARM	Office of Administration and Resources Management
OIRM	Office of Information Resources Management
PCS	Permit Compliance System
TRIS	Toxic Release Inventory System

Objective, Scope, and Methodology

Our objective was to review EPA's progress in resolving its longstanding IRM weaknesses. To accomplish this objective, we reviewed prior GAO and EPA Inspector General reports discussing IRM weaknesses. We synthesized the IRM problems into specific categories and identified the programmatic impacts resulting from these problems. We discussed the problems with OIRM program managers and staff. We also coordinated with staff from EPA's Inspector General office on their work on longstanding IRM problems.

We discussed EPA's plans to address IRM weaknesses with EPA officials from both OIRM and program offices. We met with assistant administrators and deputy assistant administrators in the Office of Administration and Resources Management, the Office of Water, and the Office of Air and Radiation. We also met with the Director and Deputy Director of OIRM, as well as the directors of OIRM divisions including Administrative Systems, Program Systems, and Information Management and Services. In addition, we met with managers and staff working on key OIRM initiatives—Oversight, Compliance, and Support; Information Management/Data Administration; Strategic Information Resources Management Planning; Gateway/Envirofacts; and Geographic Information Systems. We also interviewed the senior IRM officials in five program offices and met with managers and staff at the Great Lakes National Program Office in Chicago, Illinois, where OIRM is focusing some of its data integration efforts.

In addition to our interviews with EPA managers and staff, we held a day-long working session with senior EPA OIRM staff to discuss past GAO work pertaining to the development and implementation of agencywide information architectures. We also reviewed agency documentation pertaining to strategic planning, specific OIRM initiatives, and EPA's automated data processing budget. We performed our work at EPA Headquarters in Washington, D.C., and EPA's Great Lakes National Program Office.

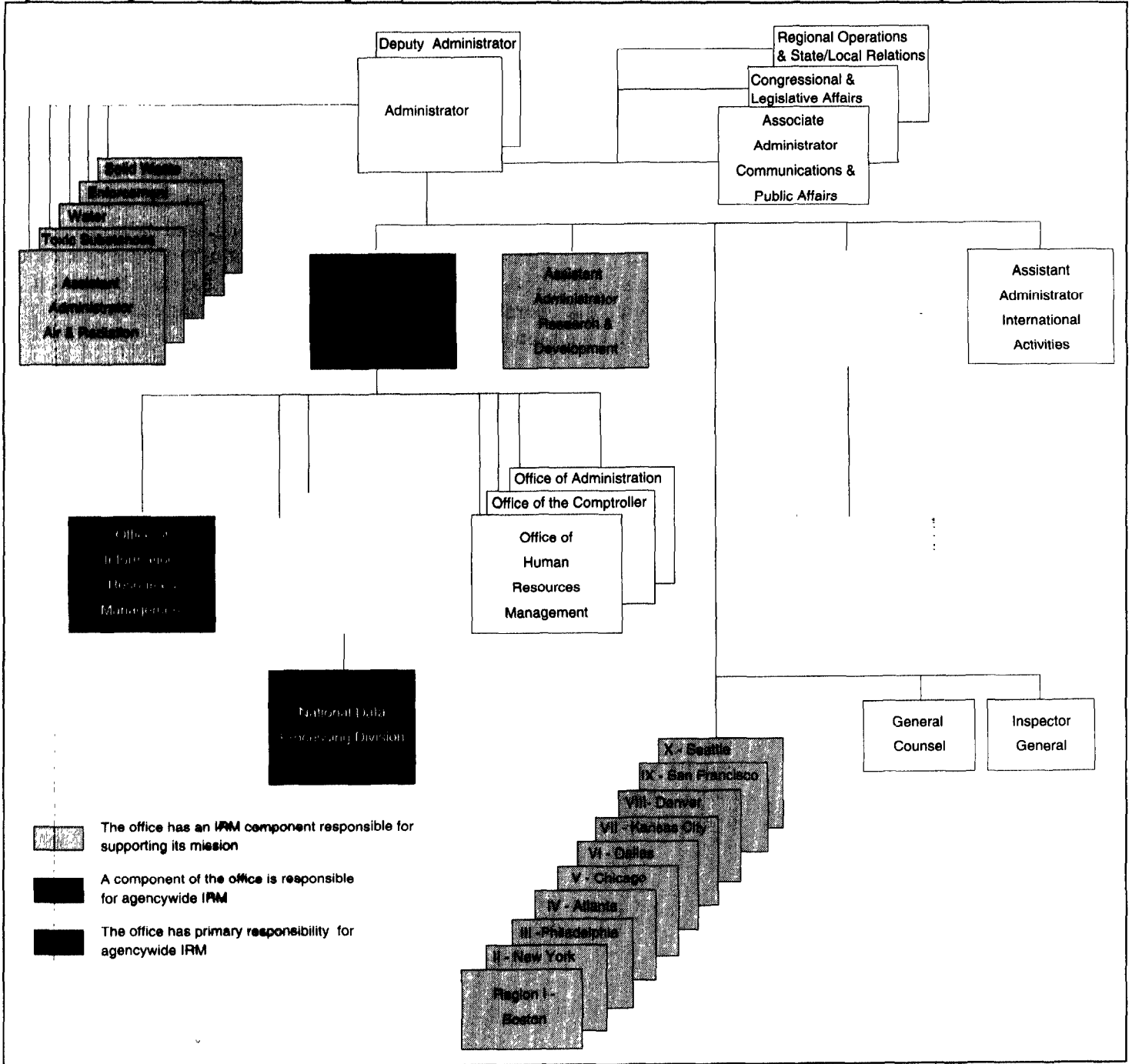
EPA's IRM Program and Management Structure

In December 1992, the Assistant Administrator for the Office of Administration and Resources Management (OARM) was designated the senior official responsible for directing and overseeing the agency's activities administered under the Paperwork Reduction Act, in addition to his existing responsibilities for financial and human resources management. While the Assistant Administrator serves as the chair of EPA's IRM steering committee, much of the responsibilities under the act reside with two separate components of OARM—OIRM at EPA headquarters in Washington, D.C., and the National Data Processing Division in Research Triangle Park, North Carolina. OIRM has primary functional responsibility for IRM policy development and overall management of EPA's IRM program. The National Data Processing Division is responsible for the acquisition, management, and operation of automated data processing resources including telecommunications resources.

EPA's information management reflects its media-specific legislative and regulatory framework. Each environmental program and regional office has a senior IRM official who is responsible for directing and managing officewide information resources planning and for ensuring that the information systems and information technology acquisitions within their organizations comply with federal and EPA policies and regulations. To support EPA's media-specific programs, EPA has 14 major national information systems and hundreds of other information systems in headquarters and regional offices. Program offices and regional offices have designed and built most of these systems, which vary in size and complexity. Some systems are on the Research Triangle Park mainframes, and others reside either on individual personal computers or computers linked through local area networks. Many of the offices contract for a large portion of their systems development activities, and as a result, they acquire their own contractor support for software development and maintenance. The organization chart in figure II.1 highlights those offices in EPA that have IRM responsibilities.

**Appendix II
EPA's IRM Program and Management
Structure**

Figure II.1: Organization Chart Showing Components With Responsibility for Information Resources Management



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Related GAO Products

Environmental Protection Issues (GAO/OCG-93-16TR, December 1992).

Information Management and Technology Issues (GAO/OCG-93-5TR, December 1992).

Pesticides: Information Systems Improvements Essential for EPA's Reregistration Efforts (GAO/IMTEC-93-5, Nov. 23, 1992).

Water Pollution Monitoring: EPA's Permit Compliance System Could Be Used More Effectively (GAO/IMTEC-92-58BR, June 22, 1992).

Environmental Enforcement: EPA Needs a Better Strategy to Manage Its Cross-Media Information (GAO/IMTEC-92-14, Apr. 2, 1992).

Waste Minimization: Major Problems of Data Reliability and Validity Identified (GAO/PEMD-92-16, Mar. 23, 1992).

Geographic Information Systems: Information on Federal Use and Coordination (GAO/IMTEC-91-72FS, Sept. 27, 1991).

Waste Minimization: EPA Data Are Severely Flawed (GAO/PEMD-91-21, Aug. 5, 1991).

Toxic Chemicals: EPA's Toxic Release Inventory Is Useful But Can Be Improved (GAO/RCED-91-121, June 27, 1991).

Hazardous Waste: Data Management Problems Delay EPA's Assessment of Minimization Efforts (GAO/RCED-91-131, June 13, 1991).

Disinfectants: Concerns Over the Integrity of EPA's Data Bases (GAO/RCED-90-232, Sept. 21, 1990).

Hazardous Waste: EPA's Generation and Management Data Need Further Improvement (GAO/PEMD-90-3, Feb. 9, 1990).

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

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