BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Stronger Management Of EPA'S Information Resources Is Critical To Meeting Program Needs

Studies over the past 5 years have highlighted similar problems with EPA's management and use of information resources--computer software and hardware, personnel, data, and information systems.

A strong central management office and more top-level involvement are needed to provide direction and leadership. Better cost-accounting procedures and management control over contractors developing EPA's computer-based information systems are also needed.

Additional computer systems to support EPA's program objectives should be based on current workload projections.

The new Office of Inspector General should audit how well EPA manages its information resources.

CED-80-18
MARCH 10, 1980

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

B-196990

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

This report identifies problems the Environmental Protection Agency is experiencing in managing and using its information and computer resources. It recommends a framework for solving the agency's long-standing ADP-related problems that affect agency mission and program objectives. The report recommends increased top management involvement in managing information and computer resources, the establishment of a central management office that can maximize benefits and results, and other reforms to improve effectiveness.

We initiated this review because timely and useful information is most important to EPA's mission and program objectives. Since EPA is an information-intensive agency, its information resources, including automatic data processing, are critical to the success of all program activities.

Copies of this report are being sent to the Administrator, Environmental Protection Agency; the Director, Office of Management and Budget; the Administrator of the General Services Administration; and interested congressional committees and subcommittees.

Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE CONGRESS

STRONGER MANAGEMENT OF EPA's INFORMATION RESOURCES IS CRITICAL TO MEETING PROGRAM NEEDS

D I G E S T

For several years problems have been identified in the Environmental Protection Agency's (EPA's) management and use of information resources, but little has been done to implement generally accepted practices for improving the system. EPA needs to provide a stronger and more responsive organizational structure and management process.

Effective use of information resources is critical to meeting EPA's mission and program objectives. The agency has 50 major computer-based information systems that aid in decision-making for such programs and activities as air pollution emissions, water quality, grants, pesticides, and noise levels. To help process its information needs, EPA relies on two major computer centers, minicomputers in regional offices and laboratories, and a nationwide telecommunications network.

Collecting, processing, and analyzing data consume nearly 20 percent of the agency's annual operating budget.

Some of EPA's problems with managing its information resources include

--little top management involvement,

--no strong central management or direction of computer-based information systems,

--no mechanism to coordinate planning,

--lack of a nucleus of automatic data processing (ADP) professionals to support system development or to assist offices lacking ADP experience, and

--no provision for assigning priorities.

At the completion of GAO's review, EPA formulated an approach intended to resolve some of these long-standing information management problems. While the approach established a steering committee of top-level managers and initiated corrective measures, more needs to be done about the deficiencies identified in this report. (See pp. 15 and 16.)

GAO recommends that the EPA Administrator

--establish a central information resources management office at the deputy assistant administrator level and

--direct this office to correct existing deficiencies.

(See pages 24 and 25 for additional recommendations.)

MANAGING SYSTEM DEVELOPMENT

EPA is not effectively providing management and technical direction in the development of computer-based information systems. The results are late delivery of system products, low quality of these products, and cost overruns.

GAO did not evaluate the performance of the contractors. Instead it assessed EPA's performance in carrying out its management responsibilities.

Timely and useful computer-based information systems are needed to carry out program objectives. EPA had problems in providing direction to its contractors. Major causes were

--absence of a focal point for system development within the agency,

--scattered project officers not adhering to standards in contract management, and

--lack of technical and managerial training and experience requirements for project officers.

GAO recommends that the Administrator, EPA, make the proposed central information resources management office responsible for ensuring necessary planning, direction, and control over ADP system development. (See pages 36 and 37 for additional recommendations.)

MEETING FUTURE REQUIREMENTS

EPA is in the process of upgrading (nearly doubling) its computer system at its National Computer Center, but it has not adequately justified the need for this additional computer capability. For instance, the workload forecast is inadequate and unused computer capacity exists. Moreover, adequate steps have not been taken to manage the existing workload.

EPA needs to determine whether a consolidation of the two major centers at Research Triangle Park in North Carolina is cost beneficial. Although EPA has committed itself to such a strategy, a cost study had not been made at the time of GAO's review.

EPA also has plans to replace its entire ADP system, beginning in 1985, at a cost of about one-half billion dollars over a period of 10 years.

Management needs assurance that this long-range acquisition plan is responsive to organization and program changes, that resources are available to support the acquisition, and that the interim actions of EPA's user community will facilitate the transition to the future system.

GAO recommends that the Administrator, EPA,

--reassess the 1980s ADP requirements forecast that is basic to both interim and long-range plans and

--increase top management involvement in the long-range acquisition process.

(See pages 45 and 46 for additional recommendations.)

ADP COST INFORMATION

ADP management does not have adequate cost information for decisionmaking purposes. EPA is not using a full-costing technique, is not including full costs in its chargeback to central computer users, and has therefore substantially understated the cost of providing central computer resources.

EPA's procedures do not place the responsibility for budgeting ADP funds with the users. Further, its budgetary policies tend to encourage inefficient uses of computing resources. Because accountability has not been assigned to computer system users, they are generally unconcerned about the cost of data center services, which some perceive as free.

GAO recommends that the Administrator, EPA,

--make sure that ADP cost-accounting procedures reflect the principles of full costing and

--require that full costs for central ADP services be assigned by the chargeback system to the users.

(See pages 56 and 57 for additional recommendations.)

EPA AUDITS

EPA's Office of the Inspector General, formerly the Office of Audit, has not conducted ADP management audits because top management has not provided adequate support for this function. These audits are needed to assure management that ADP resources are effectively used. The Administrator, EPA, should direct the Office of the Inspector General to carry out its mission and responsibility by increasing its ADP capability and conducting needed ADP management audits. (See page 65 for detailed recommendations.)

AGENCY COMMENTS

EPA concurred with the findings and agreed to initiate actions consistent with GAO's recommendations. (See app. I.)

GAO commends EPA for its recent reforms to correct management deficiencies of the agency's critical information resources. GAO also acknowledges the increased commitment of the EPA Administrator and his top-level steering committee to implement reforms identified by other external and internal management review groups.

Contents

ABBREVIATIONS

ADP	automatic data processing
COMNET	Computer Network Corporation
CPM	computer performance management
DAA	deputy assistant administrator
DOW	Directive of Work
DPA	Delegation of Procurement Authority
EPA	Environmental Protection Agency
FY	fiscal year
GAO	General Accounting Office
GSA	General Services Administration
MIDSD	Management Information and Data Systems Division
NCC	National Computer Center
OMB	Office of Management and Budget
WCC	Washington Computer Center

CHAPTER 1

INTRODUCTION

The Environmental Protection Agency (EPA) is a regulatory agency responsible for establishing and enforcing environmental standards specified in statutes enacted by the Congress. It is charged with mounting an integrated, coordinated attack on the environmental problems of air and water pollution, solid waste management, pesticides, radiation, noise, and toxic substances. The numerous environmental laws which have been enacted place unusual demand on EPA's resources. This legislation has significantly affected EPA's organization in such areas as setting standards and enforcing and monitoring environmental programs. Examples of relevant legislation follow.

--Federal Water Pollution Control Act Amendments of 1972 (33 U.S.C. 1251 et seq.).

--Marine Protection, Research, and Sanctuaries Act of 1972 (33 U.S.C. 1401 et seq.).

--Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6901 et seq.).

--Clean Air Act Amendments of 1977 (42 U.S.C. 7401 et seq.).

--Noise Control Act of 1972 (42 U.S.C. 4901 et seq.).

--Toxic Substances Control Act (1976) (15 U.S.C. 2601 et seq.).

--Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. 136 et seq.).

Effective environmental action requires precise technical data on possible threats to health and the environment posed by substances introduced into the biosphere. Timely and useful information is critical to EPA's mission and program objectives. EPA is an information-intensive agency, and information resources including automatic data processing (ADP) are critical to the success of all program activities. For instance, major information systems provide:

--A national data base on air pollution emissions for use in evaluating proposed emission standards and control strategies.

--A national data bank on water quality.

--Computerized models to forecast the impact of requirements on economic, sociological, and energy/environment conditions.

--A data base and reporting capability for tracking more than 30,000 actual and proposed grants.

--Data on the effects of pesticides use on man and environmental media such as soils, air, and water.

--Data for identifying, analyzing, and tracking violations of noise regulations.

COMPUTER AND TELECOMMUNICATIONS EQUIPMENT

To meet its information needs and information processing responsibilities, EPA uses a nationwide computer and telecommunications network to provide service to 3,000 computer users throughout the country. EPA budgeted about $15.9 million for fiscal year (FY) 1979 to operate this network, consisting of two computer centers: the National Computer Center (NCC) at Research Triangle Park, North Carolina, and the Washington Computer Center (WCC) in Washington, D.C. In addition to a nationwide telecommunications system, EPA has terminals and minicomputers in regional offices and laboratories.

NCC operations

NCC, a large computer center, supports major scientific and business applications for its user organizations and also provides high-speed telecommunications service on demand to the individual user. Its users include the Office of Air Quality Planning and Standards, the Office of Research and Development, and regional offices.

This facility is operated by Integrated Systems, Incorporated, using Government-owned equipment under a cost-plus-award-fee facilities management contract. The FY 1979 budget for this contract was $3.3 million.

WCC Operations

For FY 1979 EPA budgeted about $10 million under a facilities management contract with Computer Network Corporation (COMNET) to operate WCC, its major Washington-based computer center. This data center serves users at EPA headquarters and in regional offices and laboratories throughout the country, as well as various Government agencies and contractors in the United States and Canada. The major activities supported by this facility include water quality, pesticides, and grants. In addition to operating the data center, the contractor provides the ADP hardware, including telecommunications equipment.

FUTURE PLANS

EPA's budgets and costs for information resources will significantly increase in the immediate future. In the 1980s EPA expects to spend up to $50 million annually for its ADP resources. These resources include computer hardware, operating system and software packages, telecommunications network, and facilities management agreements.

EPA plans to increase its computing capability in three phases. Under the first phase NCC's computer capability is expected to be almost doubled. EPA has received a Delegation of Procurement Authority (DPA) from the General Services Administration (GSA) authorizing it to request contractors to submit proposals for this major interim upgrade scheduled for FY 1980. The replacement and relocation of WCC operations at NCC in FY 1981 is to occur under the second phase. In the third phase EPA's entire ADP systems will be replaced by a major procurement under Office of Management and Budget (OMB) Circular A-109 in the mid-1980s. EPA has been granted a DPA for this procurement, estimated to cost about $500 million over 10 years, and has established a team at NCC to carry out this major acquisition.

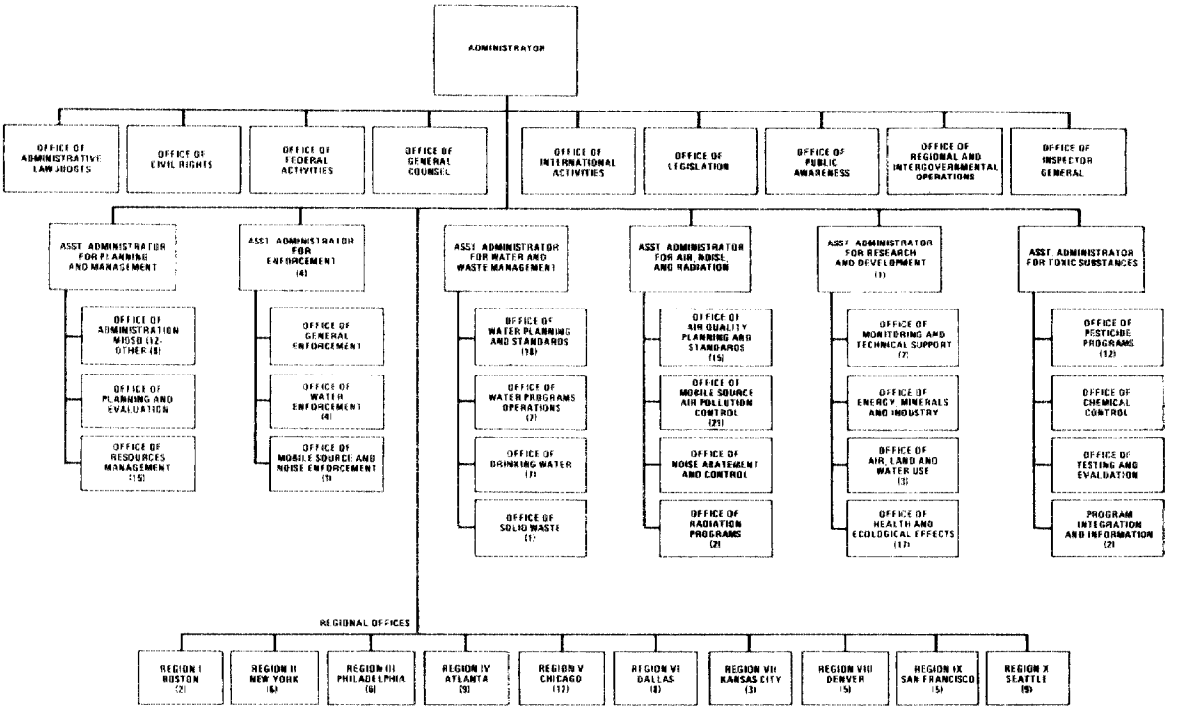
MANAGEMENT OF INFORMATION RESOURCES

Responsibility for management of information resources is shared by a central office, program offices, and regional offices, as shown on the following page. EPA has assigned the responsibility of managing certain ADP resources to the Management Information and Data Systems Division (MIDSD) in the Office of Administration, which is under the Assistant Administrator for Planning and Management. MIDSD is responsible for managing WCC and NCC and providing EPA with other computing resources needed to accomplish EPA's mission, accounting for ADP funds, developing standards, and assisting

program offices with technical support. However, the management of most information systems is assigned to the program offices which the system supports. Program office management, under the direction of assistant administrators, is responsible for the development, implementation, and operation of these information (application) systems. This decentralized organizational structure results in split and shared management responsibility among the individual program offices and MIDSD.

As shown by the organization chart, MIDSD functions at a lower organizational level than the program office (each program office has equivalent management responsibilities for its ADP systems). Also, the chart discloses that staff resources for ADP systems development and maintenance are dispersed throughout the organization. These decentralized ADP resources function independently.

U. S. ENVIRONMENTAL PROTECTION AGENCY
ADP ORGANIZATION



(-) NUMBER OF PERSONNEL DEVELOPING AND MAINTAINING SYSTEMS EXCLUDING OPERATIONS AND DATA ENTRY PERSONNEL

PRIOR REPORTING OF ADP MANAGEMENT PROBLEMS

During the last few years, congressional committees, OMB, consultants, and independent study groups have reported on EPA's ADP management weaknesses and expressed concern about the quality of the agency's data.

GAO personnel have testified before congressional committees about the need for more useful and timely information to help carry out oversight and fiscal responsibilities. We noted an ADP management study dated as early as 1974 and other studies completed in 1977, 1978, and 1979. These studies were independently conducted by private firms and by a Government-wide task force. Each study essentially pointed to the agencywide problem of top and middle management not effectively directing or managing EPA's information resources.

EPA officials explained that little action has been taken to correct its ADP management weaknesses because (1) the attention of management was focused on meeting the requirements of new legislation and (2) limited resources were available.

SCOPE AND METHODOLOGY

Information and the resources which collect, process, analyze, and distribute this information are a valuable asset critical to the accomplishment of EPA's mission and program objectives. The purpose of our review was to evaluate how effectively these resources were being managed agencywide and to recommend improvements where needed.

To carry out our review, we

--examined EPA's implementation of policies, procedures, standards, and guidelines established internally by the agency and externally by the Office of Management and Budget, the General Services Administration, the Department of Commerce, and the General Accounting Office, which relate to managing and procuring computer resources;

--analyzed plans, studies, and other documents relating to EPA's information resources management;

--interviewed program office officials at various management levels at EPA headquarters;

--interviewed EPA officials responsible for managing the two major computer centers in Washington, D.C., and Research Triangle Park, North Carolina;

--interviewed officials of EPA's Office of Audit (currently Office of the Inspector General);

--interviewed an official of Computer Network Corporation, the contractor managing and operating the Washington Computer Center;

--interviewed the officials of two consulting firms and discussed the results of their studies and reports on the management and use of EPA's information resources; and

--conducted a limited examination of system development projects developed by contractors listed by EPA.

Because the effectiveness of EPA's information resources management had been examined in studies made by several independent organizations and because the management weaknesses cited in these studies were generally accepted by agency officials, we relied to a large extent on the information found in these studies. We did, however, test the validity of the studies' findings. Our tests tended to confirm the existence of many of the deficiencies discussed in these studies.

Our audit strategy focused on identifying long-standing problems which remained unresolved and working with EPA management to find acceptable solutions to these problems. As an example of our efforts to work with EPA, at the completion of our audit work we held discussions on our findings, conclusions, and recommendations with members of the recently created Steering Committee for Monitoring and Information Management; representatives of all six major EPA offices headed by assistant administrators; and MIDSD's director and other officials in the division and in the Office of Planning and Management.

EPA's written comments are contained in appendix I and make reference to our willingness to "engage" with EPA on the important issues presented in this report. We also obtained written comments from a consulting firm whose work was referred to in our report. The consultant's comments are contained in appendix II.

CHAPTER 2

EPA NEEDS STRONG CENTRAL DIRECTION AND LEADERSHIP TO IMPROVE ITS MANAGEMENT OF INFORMATION RESOURCES

EPA is an information-intensive organization. Yet, in spite of information's recognized importance, EPA has not been managing it as a valuable resource. Until recently EPA has done little to develop and implement a central organizational structure and those management practices that would help it to efficiently and effectively use its information resources. Instead EPA has relied almost totally on decentralized management, giving responsibility for managing most information resources to the various program offices. Not enough central direction and leadership have been provided. As a result, serious problems continue to exist in the acquisition, management, and use of information resources.

Over the past 5 years, congressional committees and GAO have expressed concern about the quality of EPA's data, while the Office of Management and Budget, consultants, and independent study groups have identified problems with EPA's information management.

Near the completion of our review, EPA prepared an approach intended to resolve its long-standing information management problems. Although this approach has some merit, it does not adequately address the basic management problems described in this report. We believe that EPA needs to do more to strengthen the central direction and leadership given to its information resources management.

WHAT IS INFORMATION RESOURCES MANAGEMENT?

Since the early 1960s when Federal agencies began to rely heavily on ADP, "information resources management" has generally meant management of the large and costly central facilities where computers are concentrated. However, recent developments in information technology clearly show that this traditional emphasis on hardware or equipment is too narrow and no longer adequate. For example, while hardware costs are declining, software costs (that is, programs, languages, and information systems) are rising. Industry sources say software costs are now more than twice hardware costs. Also, agencies are slowly recognizing that information itself has a value apart from the computers.

Information is costly to collect and handle, and its use in decisionmaking can have significant economic impact. Consequently, modern managers are beginning to realize the importance of information to their organizations and to view their information resources as critical assets requiring top management attention and the application of good management practices.

EPA's information resources include much more than just the raw data and the computer equipment. They also include the monitoring devices that collect the data, the hardware and software that provide the computer technology to process the data, the software systems that transform the data into useful information for making decisions and carrying out program objectives, a nationwide telecommunications network that sends and receives information, the contractors and consultants who provide technical expertise, and the in-house personnel who perform various data collection and data-processing activities.

EXTERNAL STUDIES OF EPA's INFORMATION RESOURCES MANAGEMENT IDENTIFY SIMILAR WEAKNESSES

During the last 5 years, five studies have been made of EPA's management of information resources. Although these studies were made at different times by five independent organizations, all of them made similar comments concerning weaknesses in EPA's information resources management. These weaknesses generally involve the lack of central direction and leadership. The studies are:

--A consultant's study and 5-year ADP plan prepared for EPA in 1974.

--An analytical study of environmental monitoring prepared in 1977 by the National Research Council, National Academy of Sciences.

--A Federal Data Processing Reorganization Study of science and technology agencies made during 1978 as part of the President's Reorganization Project.

--A management audit conducted during 1978-79 by an ADP consulting firm.

--A data management and standardization feasibility study issued in June 1979 by the ADP systems department of an accounting firm.

While we have not attempted to completely review the accuracy and adequacy of these studies, our work tends to confirm many of the deficiencies and management weaknesses identified in the reports, especially their conclusions regarding the lack of central direction and leadership. These studies are discussed below.

1974 Coordinated ADP plan

EPA hired a consultant to conduct a detailed study of its ADP requirements agencywide and to develop a comprehensive 5-year ADP plan. The report, entitled "Coordinated ADP Plan," was issued in December 1974.

Regarding EPA's management, the study made the following observations:

--Senior EPA management has not guided development efforts through the setting of agency policies or project priorities. Senior management has not developed a strategy to control the growth of ADP usage or coordinated its usage between programs.

--Very few resources have been allocated to support adequate planning and control of ADP expenditures.

--New information systems are developed by program offices without regard to overall agency priorities.

--The scattering of ADP personnel throughout EPA inhibits the development of ADP managers and senior technical personnel. Also, the limited opportunities for advancement within EPA hinder the recruitment and retention of qualified ADP personnel.

During 1975 top management formed a steering committee of assistant administrators and initiated efforts to act on the plan's recommendations. However, by 1976 the steering committee was dissolved, and the plan was "put on the shelf." EPA officials explained that assistant administrators were not able to devote enough time to the steering committee and, consequently, delegated duties to lower level officials and technical personnel who did not have enough authority to carry out corrective action.

National Research Council report on environmental monitoring

The National Academy of Sciences' National Research Council issued a report in May 1977 evaluating EPA's environmental monitoring. The report suggests in general terms what monitoring is needed and methods to improve the collection and use of scientific data for environmental management.

Although the report discusses many aspects of EPA's monitoring programs, one of its primary concerns is the fragmented assignment of EPA's monitoring responsibilities and the lack of leadership. The report states that there is a proliferation of uncoordinated, inefficient, and inflexible monitoring programs that produce, at great expense, data of poor or unknown quality. The report concludes that a major reason for these problems is a lack of leadership in positions that could influence monitoring. Finally, the report notes that it is essential that top management be involved in the creation of effective monitoring programs by assuming responsibility for establishing objectives and criteria to guide their development.

The report also identifies deficiencies in EPA's data systems. Some of these deficiencies follow.

--Many varied data systems exist that are separate and uncoordinated.

--No provision has been made for assigning priorities to unmet needs.

--Primary emphasis has been on establishing and maintaining data-handling capabilities without adequate emphasis given to the quality of the data or to the uses of the data for analysis and other purposes of environmental management.

--Little evaluation is done of how well the data systems contribute to managing the environment, detecting violators, analyzing trends, or solving scientific and policy problems.

EPA's response to the National Research Council's report has been to establish a Select Committee on Monitoring. The principal effort of the committee has been to address the technical problem of assuring data quality. Based on the committee's work, policy statements were issued in May and June 1979, requiring participation in

an agencywide quality-assurance program by all regional offices, program offices, EPA laboratories, and those monitoring and measurement efforts supported or mandated through contracts, regulation, or other formalized agreements. The policy designated the Office of Research and Development to be the focal point for the quality-assurance program.

Although the Select Committee on Monitoring continues to function, in July 1979 the Administrator formed an advisory group of deputy assistant administrators to address the management aspects of monitoring and information systems. The work of this group is discussed in another section of this chapter.

President's Reorganization Project Report

The Federal Data Processing Reorganization Project was initiated by the President to study and recommend improvements in how the Federal Government acquires, manages, and uses information technology. Five teams were established to review the management of information technology by executive branch departments and agencies. These were the Human Resources Team, the General Government Team, the National Security Team, the Science and Technology Team, and the Small Users Team.

The Science and Technology Team was formed and staffed to deal with six agencies having a strong scientific and technological emphasis inherent in their mission. EPA was one of the agencies reviewed. Although findings were not attributed to specific agencies, the team's report, issued in June 1978, stated that its findings were presented "as being the usual condition, pattern, and/or situation found to exist on a widespread basis throughout the six agencies reviewed."

Major findings include:

--Senior management does not recognize data processing as a management resource which has widespread influence on the total organization. Instead, it most frequently is viewed as a narrow-based technical specialty. Management expects the technical experts to solve what is basically a management problem.

--The senior data-processing official is generally forced into the inappropriate role of resolving all interorganizational priority conflicts and of satisfying an ever-widening demand for service

from the functional users regardless of resource constraints.

--The senior data-processing policy official in the agency is generally found to be primarily a hardware acquisition expeditor, with little or no broad policymaking role within his agency.

The report concluded that the management process for information resources lacks focus. The report states:

> "The current management process controlling information management resources today produces inordinate delays, responsibility is fragmented, and the process lacks focus as to the end result. Attitudes throughout were found to be process-oriented ('But I have filled out all the forms') rather than resource management oriented (balancing all resources to obtain optimum performance within prescribed time). This management decision process is not considered to be unique to data processing. The results observable in the information management activities are recognized as being only a symptom of a broader and more global decision-making process."

EPA has not responded directly to the findings and conclusions made by the Science and Technology Team.

The Nolan study

In 1979 Nolan, Norton & Company, Inc., an ADP consulting firm hired by EPA, issued a report assessing the effectiveness of ADP support in the agency. The report cited many serious deficiencies in EPA's management of its computer resources. It concluded that ADP (1) is suffering from a dispersed organizational structure, (2) is lacking leadership, and (3) is not effectively supporting EPA's priority objectives. The report included a recommended ADP strategy and a 5-year ADP management plan as a framework for improving EPA's management.

Many deficiencies were identified by Nolan in his report and briefing material. The following is a list of those deficiencies we consider the most serious.

--Data quality is poor.

--Expensive consulting studies are ignored.

--Very few new major information systems have been delivered in the last 2 years. EPA has little to show for its ADP investment of $9 million during this period.

--Technical direction of contractors developing information systems is weak.

--Very little data is shared among systems.

--Documentation deficiencies abound.

--MIDSD standards are not uniformly adhered to.

--Data collection and analysis activities are fragmented.

--No mechanism exists for coordinated planning involving multioffice requirements.

--Redundant data proliferates.

--ADP support for policy and decisionmaking purposes is weak.

The Nolan report attributed these deficiencies to lack of critical technical management skills and lack of effective leadership. According to Nolan's evaluation of EPA's stage of ADP development, EPA has the most diffused system development organization that Nolan, Norton & Company has ever seen. Most deputy assistant administrator offices have their own system development groups, each independently responsible for managing contractor activities. The result is an organization very difficult to coordinate. Organizational support is not provided for coordinated planning, data resource management, or ADP personnel management. A "critical mass" of professionals does not exist to support the needs of crossfunctional system development or to help those offices that lack ADP experience.

We have attended three briefings given by the consultant. One briefing was held for ADP personnel at Research Triangle Park, another for the ADP personnel and other staff at Washington headquarters, and a third for deputy assistant administrators at Washington headquarters. In question-and-answer sessions following these briefings, no serious objections were raised to the accuracy of the findings. In our discussions and meetings with MIDSD staff, program office ADP staff, and numerous middle- and high-level officials, no serious objections were raised to the Nolan

study. Almost everyone with whom we discussed the Nolan study agreed with its "thrust"--that ADP is not effectively supporting EPA's needs.

EPA's response to the Nolan study and some of the other studies noted above was the formation of an advisory group of deputy assistant administrators in July 1979. The work of this group is discussed in another section of this report.

Data management and standardization study

In 1978 a contractor (the ADP systems department of an accounting firm) initiated a study for MIDSD to evaluate the possibility of a data management and standardization program for EPA. One reason for initiating the study was that MIDSD, as well as several program offices and regional offices, felt that information in the agency was not being effectively managed.

Based on its review of the current status of EPA's data management, the contractor's report, "Data Management and Standardization Program Feasibility Study," issued in June 1979, concluded:

> "It is apparent from interviews with cognizant individuals within EPA and a review of the current level of data management and standardization activities that, although data management policies existed and are documented, they are not being actively implemented. There are many factors contributing to this circumstance including:
>
> --Decentralized management of data and systems.
>
> --Little high level management awareness of the need for data management.
>
> --Limited resources in MIDSD.
>
> The policies and procedures are not currently accompanied by a dynamic program structure nor adequate tools for effective implementation and operation."

The report stated that the basis for an effective EPA-wide data management and standardization program is an organizational structure. The report recommended that such a structure provide for both an "ADP Oversight Committee" which reports to the Administrator and individual oversight committees for each program. The ADP Oversight Committee would

be responsible for setting and promulgating policies for the data management program. The oversight committees for each programmatic area would monitor adherence to programmatic-level data management concepts and provide input to the ADP Oversight Committee in terms of additional policy and procedures requirements and data management program operations.

At the completion of our field work, the contractor was preparing an executive summary of the study for EPA management.

SOME PROGRESS MADE BUT MORE NEEDS TO BE DONE

In response to concerns expressed by the Office of Management and Budget regarding management inadequacies of EPA's monitoring programs, 1/ the Administrator in July 1979 established a Deputy Assistant Administrator Advisory Group on Monitoring and Information Management. Based on the group's review of the management aspects of monitoring and information systems, an approach was prepared for the Administrator which included recommendations for changes in EPA's management of monitoring and information systems.

On September 18, 1979, the Administrator issued a Monitoring and Information Management Policy memorandum which accepted the advisory group's basic recommendations. The policy memorandum directed that the following major actions be carried out:

--The establishment of a standing steering committee of key deputy assistant administrators (DAAs) who will have responsibility and authority to oversee all agency monitoring and information systems.

--The development by the Assistant Administrator for Planning and Management of procedures for using ambient environmental data in EPA's key decision processes.

--The establishment of a single clearinghouse for all major EPA monitoring programs to facilitate their coordination.

1/Environmental monitoring is interpreted broadly to comprise aspects of the collection, analysis, interpretation, and dissemination of scientific data related to environmental problems, whether the data are physical, biological, ecological, or epidemiological.

--The development of an improved planning mechanism for ADP.

--The development of further recommendations by the steering committee on action needed to establish a process for coordinating monitoring programs through which all new data collection activities will be reviewed for consistency, redundancy, and utility.

We believe that this approach, if carried out, will help improve the management of information resources. But the plan has been weakened by not addressing the role of a central information resources office in (1) implementing policies and procedures promulgated by the DAA steering committee or top management and (2) managing information resources agencywide. In our view the DAA heading the central office would also be a member of the DAA steering committee and thus serve as a "linking pin" between the central office and the committee. With the assistance of office staff, the DAA would provide continuous management and technical support to the steering committee and other organizational units in EPA.

Another weakness in the plan is that it did not address what EPA intends to do about the many ADP and data-related deficiencies identified by the Nolan study, the National Research Council report, and GAO. While the DAA plan is correct in focusing on improvements in new data collection activities, the existing problems must be dealt with.

EPA CAN IMPROVE ITS MANAGEMENT OF INFORMATION RESOURCES

We believe that EPA can provide the needed central direction and leadership and strengthen its approach for improving its information resources management by developing and implementing certain generally accepted practices. These are

--an appropriate central organization structure made up of a top-level steering committee and a strong central management office,

--a long-range planning process,

--the setting of policies and objectives,

--a program to measure and assess performance,

--sound cost accounting and control, and

--adequate internal audit coverage.

The importance of good cost accounting and control and the need for internal auditing are discussed in subsequent chapters of this report. The other management practices are discussed below.

Central organization

An effective central organization to manage EPA's information resources requires a strong central management office and the involvement of top management through a steering committee.

Any resource that is critical to effectively accomplishing an organization's objectives requires the attention of top management. A steering committee is an accepted way for top management to provide leadership and direction and to assure efficient and effective use of its information resources. A leading management consultant has stated that the senior management steering committee is an essential ingredient for effective use of information resources. The need for and importance of a steering committee has been repeatedly stressed in GAO reports. 1/

An effective steering committee should serve EPA in both a leadership and a monitoring capacity. The committee's leadership role would involve formulating (1) strategy and policies for the effective use of information resources throughout the agency and (2) measurable objectives so that progress toward their achievement can be measured. The strategy and policies and objectives developed and recommended by the steering committee should be approved by the Administrator and communicated throughout EPA. The committee's monitoring role would involve periodically reviewing and evaluating the performance of EPA's information resources and submitting its conclusions to the Administrator. At EPA a steering committee would serve a particularly

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1/"National Bureau Of Standards Needs Better Management of Its Computer Resources To Improve Program Effectiveness" (CED-79-39, Apr. 17, 1979); "Inadequacies in Data Processing Planning in the Department of the Interior" (FGMSD-78-41, June 23, 1978); "Inadequacies in Data Processing Planning in the Department of Commerce" (FGMSD-78-27, May 1, 1978); and "Farmers Home Administration Needs To Better Plan, Direct, Develop, And Control Its Computer-Based Unified Management Information System" (CED-78-68, Feb. 27, 1978).

important function in overseeing the development of information systems by monitoring progress and recommending priorities.

EPA top management must exercise stronger leadership in information resources management. Rapid growth in computer inventory, data collection costs, and manpower support; rapidly changing technology and increased diversity of use; and increased Office of Management and Budget control and congressional interest all have had a significant impact on EPA. They indicate needs and opportunities for top management to undertake measures that will advance optimum use of information resources. The objective should be to improve the ability of managers to achieve program goals.

But EPA cannot rely solely on a steering committee to oversee the management of its information resources and provide the necessary central direction and leadership. First, there are the well-known limitations associated with committees, especially the difficulty of fixing responsibility and accountability for performance. Second, based on our observations and our discussions with agency officials, it is evident that EPA top management does not have sufficient time to get involved in all the management functions required. And third, a steering committee cannot adequately oversee such significant changes occurring both inside and outside EPA as

--the fast pace of developments in information technology;

--the current efforts to upgrade EPA's central computer capacity;

--our society's concern with Federal agencies' use of personal and sensitive information;

--the increasing need for the integration of information across EPA's program areas; and

--the proliferation of computer and word-processing equipment in EPA's program offices, regional offices, and laboratories.

We believe that EPA needs a strong central office to improve management control and accountability over its information resources and to provide direction to EPA's

decentralized program offices, regional offices, and laboratories.

Currently, MIDSD serves as EPA's central ADP office. MIDSD provides central computer services, reviews the technical adequacy of ADP procurement requests, develops standards, and assists program offices with technical support and guidance on various aspects of ADP operations. We believe that MIDSD functions in too narrow an area. It acts more as an ADP technical support unit than as the manager of EPA's valuable information resources. In our opinion, MIDSD does not have either the appropriate responsibility and authority or the necessary resources to carry out those management functions needed to ensure efficient and effective use of information resources throughout the agency.

The organization chart in chapter 1 shows the placement of MIDSD within EPA. To optimize results, we believe that a central information resources management office located at a higher level and headed by a deputy assistant administrator would be in a position to more effectively carry out functions essential for managing resources. Further, a central office operating at the DAA level would be better able to (1) address overall agencywide information needs and priorities, (2) enforce standards, policies, and regulations, (3) apply the best management practices to ensure that information resources are used and managed as a critical asset, and (4) manage these resources so that they adequately support mission and program objectives.

In a special study prepared in October 1976 for EPA by a consulting firm, the following five reasons were given for establishing a central office at the deputy assistant administrator level:

1. "ADP professionals could develop their management and technical skills more effectively within a central group.

2. "Agency-wide planning and common system services could be coordinated and be provided more economically.

3. "Zero-based budgeting and allocation of resources to competing projects could be managed more equitably.

4. "Use of systems which are no longer needed would diminish.

5. "Systems planning could be introduced more effectively into environmental program planning."

The study concluded that a DAA-level office provides the best opportunity to sustain control of agencywide activities.

We believe that a central information resources management office should be responsible for the following major functions.

--Planning: The central office should direct, coordinate, and review program office information resource plans and, with these plans as a foundation, prepare an agencywide plan consistent with agency mission and program objectives. This function should be a formal and continuing process.

--Administering a performance management program: The central office should develop and administer a program that provides management with reports measuring the performance of its information resources.

--Controlling and monitoring development of information systems: EPA should assign responsibility for controlling and monitoring new system development projects to the central office. The program offices would be responsible for operating the systems once they have been accepted. This function is discussed in chapter 3.

--Administering a data management program: The central office should develop and administer a data management and standardization program which provides for the coordination, management, and integration of information systems across program areas.

--Developing and enforcing standards: The central office should develop and enforce agencywide standards to ensure compatibility in ADP/telecommunications hardware and uniformity in software (that is, information systems, database management systems, file structure, programing, and documentation).

--Operating all central computer support: The central office should manage and operate the

agency's central computer facilities currently managed by MIDSD.

--Reviewing and approving procurement: The central office should not limit its review of ADP procurement requests only to technical adequacy, as it does now. The office should also review requests in terms of agencywide needs and plans. Centralized review and approval is necessary not only because information technology is complex and fast changing but also because individual procurements should meet overall agency requirements.

--Training and developing personnel: The central office should develop a long-range plan for training and developing the agency's ADP professionals.

In our discussions, EPA officials generally agreed that a strong central office responsible for these functions would help improve the effectiveness of information resources supporting agency mission and program objectives. However, most of the officials believed that EPA would be reluctant to form such an office because of the program offices' perceptions that a central office would try to usurp their authority and responsibility for determining their own information requirements. Other officials said that EPA should be allowed to let such an organization "evolve" over a few years.

We do not see where a central office, if assigned the functions listed above, would take over program offices' prerogatives. Obviously, the program offices are the ones best able to formulate information requirements for meeting their objectives. We are not suggesting otherwise. However, we also believe that certain functions needed for effective information resources management would be handled best by a strong central office. This office would also help provide the direction and leadership that many studies have noted are lacking at EPA. Regarding the length of time needed to establish such an office, we agree that some period of time is needed for this type of organizational change; but we also believe that a central office will not "evolve" unless EPA commits itself to make this change happen.

Long-range planning process

Information resources management requires multiyear planning. Developing a comprehensive, long-range plan

is a recognized way to (1) achieve efficient and effective use of resources, (2) assure that these resources support agency missions and objectives, and (3) commit top management to action. The importance of ADP planning is emphasized in OMB Circular A-71. At least one congressional committee concerned with the lack of ADP planning in Government has emphasized to Federal agencies that they should develop and maintain a long-range planning process.

EPA does not have a formal long-range planning process to help acquire, manage, and use its information resources. Responsibility for such planning lies with EPA's program and administrative offices. Consequently, plans are either not prepared, or their quality varies substantially.

Information resources should provide management with the information needed to help the agency accomplish its program objectives and missions. A formal long-range plan, encompassing the data-processing and information needs of the organization as a whole, serves as a foundation for the design, development, and operation of information systems. The plan should be more than just a consolidation of individual plans prepared by EPA's program and administrative offices. By setting milestones, the plan can also be a valuable management tool for measuring and controlling activities. In addition, an EPA-wide plan can identify opportunities for eliminating waste and duplication.

Planning is an important activity that has the potential for improving EPA's performance. A comprehensive EPA-wide plan for acquiring, managing, and using information resources is necessary for making decisions and setting priorities. Such a plan also provides top management with a formal mechanism to communicate its commitment to act throughout the agency. In this way top management can provide EPA with direction and leadership.

Performance management program

EPA needs a comprehensive performance management program to measure and evaluate the efficiency and effectiveness of its use of information resources. EPA does not have such a management program except for a limited review of the technical aspects of computer systems recently initiated at its National Computer Center. However, MIDSD has recognized the need for a performance management program. It hired a consulting firm in 1978 to develop such a program, but this effort was canceled due to a shortage of funds.

The need for a performance management program is recognized by the National Bureau of Standards in Federal Information Processing Standards Publication 49, "Guideline on Computer Performance Management: An Introduction." The General Services Administration also recognizes the need for developing such programs in a very detailed document entitled "Management Guidance for Developing and Installing an ADP Performance Management Program." This document was prepared as a result of a GAO recommendation that GSA prepare and issue detailed guidance to Federal agencies on methods of improving their ADP systems. These publications are only two of many that provide guidance on the use of performance management.

It must be emphasized that an effective performance management program for information resources should not be limited to the operation of a central computer facility but should be applied to all areas of EPA's information resources, including information design and development, personnel productivity, and regional offices' use of minicomputers.

An important concept in performance management is integrating data collected from various sources within the organization into a formally structured program to measure performance. This data must be recognized as a valuable resource and treated, handled, and maintained as a data base. This data base should be the source of regular and meaningful reports to the agency's various management levels. These reports, in turn, can become the source for management decisions on planning, operations, and procurement. This data can serve the functions of operational control, management control, and strategic planning. The performance management data base can also provide a vital element in an overall information resources management system which is responsive to the needs of top management, users, and information resource personnel.

EPA needs to establish a coordinated and systematic approach toward managing the performance of its information resources. This approach is especially important in a decentralized organization like EPA. We believe that the appropriate organization for administering the program agencywide would be a central group with clear responsibility and authority.

CONCLUSIONS

The Environmental Protection Agency is aware of the need to manage information as a valuable resource. Over

the past 5 years, numerous studies and organizations have expressed concern about how EPA manages information. However, until recently EPA had done little to develop and implement the central organizational structure and those management practices that would help it to use its information resources efficiently and effectively. Because problems with the management and use of information resources have been identified over time in various studies, EPA should initiate actions that will result in needed short-term as well as long-term improvements.

Although EPA prepared an approach near the completion of our review that is intended to resolve its long-standing information management problems, we believe that it needs to do more to strengthen the central direction and leadership given to its information resources management. This can be done by implementing certain management practices; these include (1) a central management office, (2) a formal ADP planning process, (3) the setting of policies and priorities, (4) a system to measure and manage performance, (5) sound cost-accounting procedures, and (6) adequate internal audit involvement. We do not believe that these practices take away program offices' prerogatives to determine their own information requirements or to operate, if justified, their own computer and monitoring equipment.

RECOMMENDATIONS

We recommend that the Administrator of EPA:

--Establish at the deputy assistant administrator level a central information resources management office.

--Assign to the central resources management office responsibility and accountability for carrying out an information resources management system that includes such practices as an agencywide planning process, a performance measurement program, and management control procedures.

--Direct the central information resources management office to correct the existing ADP deficiencies identified by GAO, the Nolan study, and the National Research Council report. This effort should be coordinated with the DAA Steering Committee. We suggest the following methodology:

1. Assess problems and establish priorities--This phase should result in setting priorities for the numerous deficiencies identified in various independent studies or from within the agency.

2. Discuss solutions--This phase should discuss and analyze the various organizational, budgeting, and other management alternatives available to the agency for solving its ADP problems.

3. Develop an action plan--An action plan for correcting ADP and data deficiencies should be prepared setting forth measurable objectives and clear milestones. This plan should be approved by the Administrator.

4. Review implementation--A mechanism must be developed to ensure implementation of the action plan. Preferably, each quarter the steering committee should assess progress in meeting objectives and milestones.

AGENCY COMMENTS AND OUR EVALUATION

In its written comments EPA agreed with our findings that its top management has not sufficiently involved itself with information management and that central capacity for information management is lacking.

EPA agreed that the information management function should be consolidated and elevated organizationally by creating a new deputy assistant administrator or some similar office. However, for several reasons, EPA does not believe this should be the first step in current efforts to reform its information management. EPA stated it does not yet know enough to carry out a major reorganization intelligently, and to attempt such a reorganization at this time would disrupt its reform efforts by introducing an unnecessary element of uncertainty. By the end of FY 1980, the steering committee will recommend the organizational changes necessary to support EPA's information management reforms.

In the meantime, EPA is taking steps to correct the lack of central capacity for information management. In FY 1980 EPA has allocated an additional 15 work years to MIDSD to strengthen its central systems development function and 6 work years to establish an agencywide information clearinghouse function. For FY 1981 EPA plans to add about 21 additional work years to further strengthen MIDSD's capacity to

manage major systems integration projects. EPA anticipates the need for further increases in future years; however, it does not believe it can manage a faster rate of growth in the short term and still maintain standards of excellence in personnel selection and performance.

Regarding carrying out accepted management practices, EPA stated it is and will continue to be working very hard to spell out sensible processes for planning, budgeting, and managing ADP and other information resources. EPA said it intends to address the full range of information problems, including correction of existing deficiencies, such as redundant data collection, inadequate quality assurance, and the various organizational and system design barriers to integration of its major information systems.

We believe that these initial steps are consistent with our recommendations. It is not essential that EPA immediately establish a central information resource management office at the deputy assistant administrator level. We recognize that a reasonable period of time is needed to work out the administrative, staffing, and other organizational details. However, a central office will not evolve unless EPA commits itself to make this change happen and establishes definite milestones for its creation. We believe that a strong central office at a high agency level, held accountable for information resources management, is the key to the long-term solution of EPA's problems. Eventually, the close attention being given to these matters by the steering committee may wane as ADP deficiencies are corrected and as other priorities surface. It is then that the agency will need a strong management office to carry forward the committee's reforms and maintain an effective system for managing information resources.

CONSULTANT'S COMMENTS AND OUR EVALUATION

Since our report refers to the study by Nolan, Norton & Company, we asked the consulting firm to comment on excerpts from our report where we used information from the study. In the written comments (see app. II), the chairman of the firm stated that we correctly cited the problems his firm found at EPA. However, he also stated that we used the study's findings "to highlight EPA's faults and weaknesses to excess." The chairman pointed out that his firm identified important strengths which could be used as building blocks to overcome problems.

Although our report focuses on EPA's faults and weaknesses, it also emphasizes the opportunity and need for EPA to improve the effectiveness of its information resources management. Further, our report recommends actions to help the agency correct its management and technical deficiencies. We also believe that EPA views our report as a positive effort directed at improving Government operations, as indicated in the agency's written comments.

CHAPTER 3

MANAGEMENT CONTROLS OVER CONTRACTOR DEVELOPMENT OF INFORMATION SYSTEMS NEED STRENGTHENING

The responsibility for ADP system development is dispersed throughout EPA. Due to limited personnel, EPA relies on contractors to develop its automated information systems. Despite the large amount of dollars invested, very few major systems have been completed and delivered to EPA users in the last 2 years. In addition, existing ADP systems are weak in providing EPA management with information for decisionmaking; data quality is also poor.

We found that several independent organizations have expressed concern, over the past several years, about EPA's management of ADP system development. They reported that (1) sufficient qualified staff to develop information systems in-house are lacking, (2) sound project management controls are absent, and (3) technical management skills in system development are weak.

We did not evaluate the contractors' performance. Instead, we concentrated on the direction EPA gave to its contractors. Effective contract management is important due to the complexity of ADP system development and because timely and useful information is vital to EPA in carrying out its mission and program objectives. Although EPA has made efforts to improve its management of system development, we found that existing management controls over ADP contractors are still not effective. We believe that by centralizing ADP system development responsibility, clear accountability will be provided and management controls strengthened.

EPA's USE OF CONTRACTORS IS EXTENSIVE

EPA is dependent on outside contractors to develop computer-based information systems, provide management studies of ADP operations, operate its computer centers, and perform other ADP tasks. In FY 1978 EPA spent about $22 million, or 58 percent of its ADP budget, on contractor services. The two largest contracts, totaling about $13 million, were for the operation of EPA's two data centers which house its large-scale computers. The remaining $9 million was expended for system development, ADP management studies, consulting services, equipment maintenance, training, and other ADP services.

EPA relies almost exclusively on contractors to develop new automated information systems. The range of work a contractor performs during system development includes (1) requirements analysis, (2) feasibility studies, (3) system design, and (4) quality assurance. Quality assurance requires the contractor to evaluate a system developed under another contract and verify that it meets all program requirements. Throughout EPA's various program offices, system development efforts by contractors include:

--The Management Information and Project Costing System, under development to provide the Office of Planning and Evaluation with information for project management costs and staff utilization.

--The Federal Reporting Data System, a mechanized data-gathering and reporting system for the Office of Water Supply to process water quality and enforcement data originating from the 56 States and territories.

--The Chemicals in Commerce Information System, containing information to enable the Office of Toxic Substances to regulate and control the use of chemical substances.

--The Hazardous Waste Data Management System, a notification system being developed for the Office of Solid Waste to identify all persons who generate, transport, dispose, treat, or store hazardous wastes.

--An Aerometric Methods Clearinghouse, the Environmental Monitoring and Support Laboratory's computerized clearinghouse for differing methodologies used in analyzing ambient air quality samples.

EFFECTIVE CONTRACT MANAGEMENT IS CRUCIAL IN PRODUCING TIMELY SYSTEMS OF HIGH QUALITY

System development is difficult and technically complex. At EPA its complexity is increased because contractors are often unfamiliar with EPA's missions and program objectives. Contractor activities must be effectively managed and directed to ensure that quality systems are obtained within cost and schedule targets.

Responsibility for system development is dispersed throughout EPA

Responsibility for managing ADP system development lies with EPA's program offices. For each system development project the program office designates a project officer who prepares the procurement request rationale, develops the statement of work, and obtains funding. In addition, the project officer is to provide technical direction within the scope of work and monitor the contractor's progress. After project completion, the project officer is to evaluate the contractor's performance and inspect all work promptly following delivery.

MIDSD is to provide advice and assistance to requesting offices in determining scope, content, and methods of ADP feasibility studies; requirements analysis reports; system design specifications; and other items. Following the completion of these, MIDSD is to conduct or coordinate review and approval of the ADP technical content of the contract deliverables, such as feasibility studies and system design specifications for new system development. However, MIDSD officials explained that with their limited staff, only a cursory review is possible.

MIDSD also manages a number of competitively placed service contracts for support in systems planning and development. These "umbrella" contracts specify that the contractor shall supply services to undertake specific Directives of Work, including feasibility studies and system design efforts. A Directive of Work (DOW) is a modification to the contract engaging the contractor to perform specific project work for the requesting program office. The DOW outlines the work to be performed, the period of performance, the schedule of deliverables, and estimated costs. Project officers in the program offices must manage their specific projects performed under these umbrella contracts.

System development contracts require management controls to reduce risk

System development contracts are usually awarded on a cost-plus-a-fixed-fee basis under which EPA, in addition to paying a fixed fee, agrees to reimburse all of the contractor's allowable costs up to the amount of the estimated cost set forth in the contract. Cost-plus-a-fixed-fee contracts are used in system development efforts because the level of contractor effort is unknown, or the scope and nature of the

work required cannot be described precisely or its cost estimated accurately. However, since the contractors are assured that they will be reimbursed for their costs, the contract provides minimum incentive for them to effectively manage costs. Therefore, management controls are essential in reducing financial risk to the Government.

STUDIES RAISE CONCERN OVER ADP CONTRACT MANAGEMENT

Several external studies have raised concern over EPA's ADP contract management.

EPA's Coordinated ADP Plan, prepared in 1974 by Index Systems, Inc., reported:

--Many systems developed for EPA have exceeded original budgets and/or have failed to work as specified, indicating EPA's lack of expertise in managing system development projects.

--Program offices which rely on contractors for system development lack the technical expertise necessary to manage such contracts.

--Sound project management controls are absent.

In 1977 the National Research Council suggested EPA lacks sufficient qualified staff and depends on outside contractors to develop and operate its information systems. The Council also stated that EPA may not have enough qualified staff to prepare Request for Proposals' criteria relative to EPA needs and to evaluate bids against these criteria. This problem usually results in the selection of the lowest bidder rather than the one who best meets a well-defined set of needs.

In July 1979 the ADP consulting firm of Nolan, Norton & Company, Inc., completed its assessment of ADP within EPA, as discussed earlier in this report. Nolan reported that EPA's in-house organizational data-processing skills are deficient as indicated by the following:

--EPA is very dependent on outside contractors. The agency's use of ADP contractors is double the Government average and triple the industry average.

--System development is highly diffused. User program offices have no "critical mass" or nucleus of technical skills available within EPA.

--Technical direction of contractors is weak. Very few major systems have been completed and delivered to users in the last 2 years, leaving EPA little to show for an estimated $9 million investment during this period. Nolan depicted this situation as a funnel into which EPA pours its system development needs, resources, and opportunities. However, few systems emerge from this funnel, resulting in many lost opportunities.

SYSTEM DEVELOPMENT CONTRACTORS ARE NOT EFFECTIVELY MANAGED

Our review confirms the conclusion drawn by Nolan, Norton & Company, Inc., and the other external organizations that EPA is not effectively managing the activities of ADP contractors. EPA has made efforts to improve these skills by implementing ADP project management workshops, system development standards, and contract management guidelines. However, our evaluation disclosed weaknesses in the selection and training of project officers and in other controls over system development. These weaknesses have resulted in cost overruns, delays in project deliverables, and additional work to implement systems.

We focused our review on evaluating agencywide controls for ADP systems development and contractor management. The controls included (1) requirements for selecting qualified project officers, (2) the clear description of work statements and procedures for approving changes, (3) effective monitoring and evaluation of contractor performance, (4) meaningful and detailed contractor progress reports, and (5) analysis of incurred versus estimated costs. Our work included discussions with various MIDSD and program office staff and an examination of EPA procedures.

We also conducted a limited analysis of system development projects following completion of their feasibility studies. We did not evaluate projects for system design and implementation because the data was not readily available. Although we did not perform a detailed evaluation of system development projects, knowledgeable EPA personnel provided us with examples of projects which went over budgets and missed target dates. They also informed us of projects which required additional work after contractor delivery because the systems either failed to meet user needs or failed to work. These people felt these problems are not uncommon and are caused by poor project management and control.

Training and guidelines are available

EPA realizes the need to improve ADP systems development and contract management. MIDSD's National ADP Institute offers two courses on ADP project management. These courses can provide the project manager with an understanding of and trial-and-error experience in managing the development of computer-based information systems. EPA's ADP manual provides standards for the preparation of documents used in system development and in procuring ADP services from contractors.

In addition, EPA's Procurement and Contracts Management Division has recently published a guide to introduce project officers to some simple guidelines for understanding the contracting process. The guide discusses procurement planning and activity and the project officers' contract management responsibilities. This division has also sponsored project management and procurement seminars. However, attendance at these contract seminars and the National ADP Institute courses is not mandatory.

Need for improving project officer selection and training

EPA has no technical and managerial training or experience requirements for project officers who manage ADP system development contracts. In our discussions we learned that training and experience varied greatly among them--from one with 16 years Government experience in ADP and contract management to one with little or no experience in either of these areas. We also noted EPA has had problems with contracts managed by project officers with little training and experience. We believe that the most effective project officer is one who has had training and experience in both ADP and contract management.

Standards are not consistently followed

Discussions with system development project officers also disclosed inconsistent application of ADP standards and guidelines among system development contracts.

The contract manual requires that the statement of work clearly specify what the contractor is to do for EPA in order to avoid continuing contract problems, such as cost overruns and not satisfying user requirements. In addition, all changes to the statement of work during contract performance must be approved in writing. According to project officers, contract statements of work are too general and not effective

in controlling contractors. Also, the scope of work is sometimes expanded during contract performance based only on conversations with users or the project officer and without written approval.

Monthly contract progress reports discuss technical achievement, potential problems, and financial reporting. However, our discussions with project officers and analysis of system progress reports indicated that these progress reports are often not specific and do not always disclose potential problems, such as delays in meeting deadlines or cost overruns.

Good ADP contract management procedures require that project officers have the information needed to manage the project. We found that MIDSD personnel responsible for the ADP umbrella service contracts do not always have information on the total costs incurred to date, changes in the scope of the individual projects, contract modifications, schedule slippages, or the period of task performance. In addition, despite a contract manual requirement that MIDSD evaluate the contractor upon completion of the entire contract, evaluations by project officers for individual projects under ADP service contracts are not required, although they are sometimes performed. Lack of evaluations increases MIDSD's difficulty in rating the contractor's performance on the entire service contract because the Division is not aware of the contractor's performance on each individual project.

Contract deliverables exceed budgets and target dates

We reviewed completed system development projects to determine the existence and extent of contract cost overruns and missed target dates. Our evaluation disclosed that contract products are not always delivered to EPA in a timely manner or within budget estimates.

The ADP umbrella contract for feasibility studies included 23 projects at the time of our review. Our detailed analysis of 12 of these projects shows that 8 had been modified to extend their delivery schedules due to revisions in scope, temporary suspensions of work, and contractor delays in starting work. Despite these extensions, in 10 out of 12 projects, EPA received draft or final reports as late as 10 months after scheduled delivery dates. Final reports for two of these projects were never delivered because EPA and the contractor agreed to waive them. EPA's contractor files cite the following reasons for delays in contractor performance:

--Lack of timely technical direction by EPA managers.

--Work suspension due to lack of adequate EPA funding.

--EPA delays in scheduling meetings.

--Contractor delays in staffing and starting jobs or staff changes during the project.

--Delays in receiving completed questionnaires from EPA program offices.

--Delays in receiving EPA comments on draft reports.

Discussion with EPA project officers for these delayed projects disclosed little concern over late delivery of reports because they saw no adverse effects resulting from the delays. However, we believe that because EPA is such an information-intensive agency, late delivery of contractor products could affect its decisionmaking; therefore, close management of these projects is necessary.

In addition to these schedule slippages, we found two projects whose actual costs exceeded budgeted costs. Three of the 12 projects we reviewed involved multiphase work requiring several deliverables. Project managers for two of these projects waived subsequent work after receiving deliverables from work performed under the first phase. Our cost analysis of these projects showed that actual costs of first-phase work substantially exceeded original estimates to complete the projects.

CONCLUSIONS

EPA lacks sufficient staff to develop its information systems in-house and therefore relies on contractors to design, program, and implement these systems. EPA's project officers must effectively manage and direct the contractors to ensure the timely delivery of quality systems within cost budgets. However, external studies have reported weak technical direction of contractors and the absence of sound project management controls. Our work has disclosed these same problems.

EPA has established standards for control over ADP system development projects. However, we found these standards are not consistently applied. This inconsistency has contributed to cost overruns on ADP system development contracts, late delivery of ADP studies and data systems, and additional work required to implement systems following

contractor delivery. We believe that better selection and training of project officers would result in a more consistent use of system development standards.

Presently, both MIDSD and the program offices share responsibility for ADP system development. However, MIDSD has only a limited role and serves generally as a technical advisor upon request. We believe that ADP system development and EPA's contractors would be more effectively managed by assigning a stronger role to a central information resources management office. This role would involve ensuring necessary planning, direction, and control over ADP system development. Although we feel this central office should provide direction and assistance to the program offices, these offices should continue to determine their information needs and develop functional requirements. Where the ADP capability exists, these program offices should continue to manage ADP system development projects.

Major benefits to be derived from this increased central office support include (1) a more orderly development of information systems, (2) better coordination of ADP system development efforts among program offices, (3) greater assurance that standards for ADP system development are consistently followed, and (4) more effective project officers.

RECOMMENDATIONS

We recommend that the Administrator of EPA assign to a central information resources management office, or a comparable office, the authority and responsibility for ensuring necessary planning, direction, and control over ADP system development. This office should:

--Review each program office ADP plan and recommend agencywide priorities for system development to the Deputy Assistant Administrators' Steering Committee.

--Track progress of ADP system development projects and report problems to the appropriate program offices and the steering committee for necessary action.

--Strengthen controls over and enforce standards for system development to ensure timely delivery of quality systems within cost budgets. Specifically, ensure that project officers are sufficiently knowledgeable and experienced in ADP and contract management by requiring that all project officers attend EPA's ADP project and contract management or similar

courses; verify that statements of work are detailed; require written approval of all modifications to the statement of work before that work begins; and ensure that the contractor adheres to contract schedules and costs or require written explanation for any deviations.

--Thoroughly review the ADP technical content of contractor deliverables in order for the users and program offices to share in their acceptance.

AGENCY COMMENTS AND OUR EVALUATION

In its written comments, EPA agreed with our analysis in this chapter and with our recommendations. EPA believes, however, that improvements in this area depend to a large extent on the increases in the central information staff which are discussed on pages 25 and 26 of this report.

We recognize the need for additional staff to fully implement all of our recommendations. However, we believe that EPA's present staff can effect many management and technical improvements. For example, controls can be strengthened and standards can be developed and enforced to ensure timely delivery of quality systems products.

CHAPTER 4

NEED TO BETTER DETERMINE FUTURE ADP REQUIREMENTS

Top management needs to take a closer look at how future ADP hardware requirements will be met. The ADP workload forecast, which is basic to EPA's plans, is inadequate. Further, the complexity of EPA's ADP procurement plans through 1985 will significantly affect the National Computer Center's management resources.

The forecasted ADP workload for the 1980s is basic to these plans. During 1977 Informatics, Inc., conducted a workload analysis study 1/ for EPA and estimated the ADP workload for the years 1981, 1985, and 1990. The Informatics study is somewhat dated in that it is nearly 2 years old. Subsequent growth in the use of powerful, general-purpose minicomputers at regional offices and laboratories could reduce the central ADP workload forecast. Also, actions by offices, such as the Office of Toxic Substances, which procured its own computer rather than using one of EPA's major data centers, could reduce the ADP workload for the central computer systems.

Currently, EPA's central ADP requirements are supported by two large data centers--an IBM facility (WCC) in Washington, D.C., and a Univac facility (NCC) within the North Carolina Research Triangle Park. To meet future ADP requirements, EPA's long-range plan is to replace the resources provided by both centers around 1985. In the interim, EPA plans to upgrade the Univac system and consolidate both centers by relocating the WCC resources at NCC. More specifically, (1) the computer power of the NCC facility will nearly double, (2) the computer power of the WCC facility will experience a similar increase, (3) WCC resources will be recompeted (replaced through competitive bids) and co-located with NCC resources, which also entails changes to the telecommunications network, (4) the facilities management contract will be re-awarded after competition and expanded to include the additional computer resources from the consolidation, and (5) NCC management will be intensely involved with the planning, execution, and management of an unprecedented major ADP system acquisition under the Office of Management and Budget Circular A-109.

1/"Environmental Protection Agency 1981-1990 ADP Requirements Study," Dec. 14, 1977.

These near-concurrent activities will place considerable strain on NCC's management resources.

EPA has issued a Request for Proposals to obtain additional hardware for NCC. In terms of the existing NCC computer system configuration, the upgrade will nearly double computer capacity. Moreover, the new equipment will be able to function as an independent computer system. In essence, the NCC Univac upgrade represents an additional large-scale computer system.

JUSTIFICATION FOR THE NCC UNIVAC INTERIM UPGRADE IS WEAK

NCC management has consistently turned to equipment upgrades to provide reliable and timely processing during prime shift hours. To justify the current interim upgrade, EPA has primarily relied on an ADP workload projection extrapolated from the 1977 Informatics study. This justification is inadequate because:

--According to an internal NCC study, data center management stated that "the current system is satisfying present user needs in a manner never thought possible." Interim upgrades should be avoided except in those cases where new responsibilities have arisen which a user agency could not have reasonably predicted.

--Due to delays in the development and implementation of major data systems, workload growth predicted by the Informatics study did not materialize.

--Based on the Nolan study's observations of EPA's data system development process, it is reasonable to expect that EPA may experience further delays in implementing new data systems.

--Based on (1) low third shift utilization, (2) significant system idle time, and (3) a lack of any data reported on weekend processing, the NCC Univac system appears to have substantial usable capacity available for additional workload.

--Approximately $0.5 million of ADP's FY 1980 technical support funds has been earmarked for systems improvements that have the potential for reducing EPA's overall timesharing (central ADP workload) requirements. Systems improvements include: the

refinement of existing data systems, the development of software for the minicomputers which are becoming more widely used within EPA, and communications improvements between computers and data management systems.

--The 1977 Informatics study did not consider ADP requirements that are being met within EPA by computer resources (for example, minicomputers and the Office of Toxic Substances' large computer) other than the data centers.

--EPA's ADP planning and budgeting process has several weaknesses, as discussed in the next chapter. One of these is the lack of current, user-based forecasts for ADP workload requirements.

--EPA has not taken adequate steps to manage user workload and improve utilization of existing central computer resources.

While EPA has no assurance that projected ADP workload growth will materialize, it is in the process of making procurement commitments. We recognize the need for flexibility and planning leadtime in acquiring ADP hardware; however, before EPA procures the hardware, further action is needed. More specifically, EPA needs to better utilize its existing Univac resources through computer performance management (CPM) techniques.

A CPM review is needed

EPA has not done a comprehensive computer performance evaluation on the NCC Univac system since 1976. Since that time, the system and workload have gone through significant changes. Before EPA spends funds on the NCC Univac upgrade, it should conduct a CPM review to determine whether the planned upgrade is needed. This evaluation should determine whether the capability of the existing system can be improved sufficiently to avoid or delay the interim upgrade until the total system replacement planned for the mid-1980s. We recognize that data center management has established some elements of a CPM program, as reflected in (1) NCC monthly status reports, (2) monthly management review and analysis reports for both data centers, and (3) weekly system performance review reports for NCC. However, the current effort needs to be expanded to include the user community's share of the responsibility to make optimum use of existing resources.

In addition to technical improvements derived from a computer performance evaluation, management should assure that the user community is efficiently and effectively utilizing NCC's ADP resources. Below are some steps EPA needs to consider:

--Identify user workload that could be shifted from prime shift to nonprime shifts and weekends.

--Identify user applications that could be processed in batch mode rather than demand (interactive) mode.

--Identify user applications that could be processed less frequently, or even dropped from the present workload.

--Identify the minimum level of service that the user community can accept; perhaps the current service level standards could be relaxed.

--Identify user applications that demand large amounts of machine resources and examine these applications for design and coding inefficiencies that can be improved.

--Evaluate reducing the maximum allowable number of demand (interactive) users on line at any one time, thereby reducing the need for high demand mode processing during prime shift.

--Identify planned and existing user workload requirements that could be processed on non-EPA computer systems.

--Identify existing user workload that could be shifted to the powerful, general-purpose minicomputers at EPA's field locations.

Collectively, the above actions could provide definitive data to make an informed decision to procure only needed ADP resources. Further, EPA will have the assurance that existing ADP resources are fully utilized. In view of EPA's plans to replace central ADP resources in the mid-1980s, avoiding expenditures on interim additional hardware becomes even more significant.

REPLACEMENT STRATEGY FOR WCC RESOURCES IS QUESTIONABLE

EPA is currently planning to replace WCC resources during FY 1981 and has been granted a Delegation of Procurement Authority by the General Services Administration. Like the NCC upgrade, this procurement is an interim measure to continue central ADP services until the total resources replacement planned for the mid-1980s. During our review we found that EPA has committed itself to a procurement strategy without having performed an adequate analysis and evaluation of alternative strategies coupled with an analysis of costs and benefits. More specifically, EPA has committed itself to the strategy of

--locating WCC resources at NCC;

--making the operation of WCC resources Government-owned/contractor-operated, which is a change from the current contractor-owned-and-operated arrangement;

--expanding the facilities management contract at NCC to include operation of WCC resources; and

--designing the second floor of the current NCC building expansion to specifically accomodate a dual IBM 3033 (or equivalent) computer complex.

NCC management told us that they anticipate many benefits from the above procurement strategy. Among the benefits are cost savings. However, there was no cost analysis for the strategy. Based on OMB Circular No. A-76, a cost analysis of various alternatives to continue providing WCC resources should have been done before commitment to the above strategy. Furthermore, the cost analysis should embrace the concepts of full costing and total life-cycle costing.

We were told that the workload analysis contained in the 1977 Informatics study is justification for sizing the WCC resource replacement at dual IBM 3033s or equivalent. This sizing represents a very large increase in computer processing capability over the current WCC resources. Steps for improving performance applicable to the NCC interim upgrade also apply to the WCC resource replacement. Specifically, EPA should also conduct a CPM review of its WCC operation.

THE 1980s ACQUISITION--NEED FOR GOOD PLANNING AND STRONG MANAGEMENT CONTROLS

Because of the long-term impact on EPA, special top management attention is needed to plan, direct, and control the 1980s acquisition. No agency has acquired a major ADP system under OMB Circular A-109. Consequently, Federal agencies may look to EPA as a model.

The system acquisition process envisioned under A-109 is the sequence of acquisition activities starting from the agency's reconciliation of its mission needs with its capabilities, priorities, and resources and extending through the introduction of a system into operational use. In essence, there are four distinct phases under A-109: (1) determination of mission needs, (2) exploration of alternative system design concepts, (3) competitive demonstration of system design concepts, and (4) full-scale development and implementation. EPA has completed the first phase and will formally begin the second when it issues a Request for Proposals for system design concepts.

GSA has granted EPA a Delegation of Procurement Authority for the agency's 1980s acquisition. According to the acquisition plan, all of EPA's primary ADP requirements--hardware, general-purpose utility software, telecommunications network, and support personnel--will be included in one mission-oriented Request for Proposals. Consistent with A-109, EPA will competitively select multiple ADP systems' architects who will participate in a Government-funded acquisition process.

Increased close top management and steering committee attention will be needed to assure that:

--The acquisition plan is responsive to organization and program changes that can affect overall ADP requirements.

--The resources necessary to support the acquisition are made available when and where needed.

--The acquisition program participants within EPA continue making the necessary commitment to successfully carry out their responsibility.

--The interim actions of EPA's ADP user community are conducive to facilitating a smooth transition to the new ADP system.

Acquisition plan must be responsive to changes

It appears that EPA will require about 7 to 8 years to acquire a major ADP system under the A-109 process. EPA accomplished the first phase with the 1977 Informatics study. The second phase has yet to begin because EPA has not issued a Request for Proposals to solicit alternative system design concepts. The acquisition program manager indicated that it will be about 1985 when the final phase is begun.

The lengthy time frame for this acquisition, and an outdated study of its information needs to meet agency mission requirements, underscore the need for a flexible, responsive acquisition plan. Top management should pay special attention to integrating organizational, programmatic, and mission changes with subsequent acquisition effort.

Adequate resources must be provided to support the 1980s acquisition

In view of the 1980s ADP system's total life-cycle costs, estimated at about one-half billion dollars, top management must assure that enough staff resources are available to support the acquisition program. The resources should be focused at EPA's Research Triangle Park, North Carolina, activity where the acquisition team is located. Further, onsite resources which we believe will be critical to the acquisition include expertise in ADP hardware, software, and telecommunications; contracts administration; legal counsel; and administrative support.

Full responsibility rests with the acquisition program team

Top management should assure that the acquisition team members continue making the necessary commitment to successfully carry out their responsibilities. Much of the work in support of the 1980s acquisition is being and will be performed by outside contractors. Technical direction for these contractors is provided by acquisition program team members. As pointed out by the Nolan study, contractors can be used effectively as long as they receive skilled technical direction from the client.

Coordination of interim ADP user activity needed to assure efficient transition to future system

Top management should assure that the interim activities of the ADP user community will facilitate the transition to

the future system. A most critical activity will be the conversion of EPA's software (that is, computer-based information systems). The 1977 Informatics study concluded that even if both WCC and NCC conversions were targeted for compatible hardware, the total effort would represent the largest ADP undertaking in EPA history. To reduce eventual conversion impact, users should strictly adhere to data system documentation and software design and program coding standards. Currently, there is no central enforcement mechanism to assure adherence to these standards.

CONCLUSIONS

Top management needs to better determine EPA's future ADP requirements and how they should be met. The ADP workload forecast, basic to EPA's ADP procurement plans, is inadequate and will affect both short-range and long-range agency plans.

The short-range ADP procurement plans include both the NCC interim upgrade and the WCC replacement. Prior to these short-range actions, a CPM review of both NCC and WCC operations is needed. In addition, a formal cost/benefit analysis of alternative procurement strategies is needed for the WCC interim replacement.

The long-range ADP procurement plans for the 1980s acquisition include the replacement of EPA's entire ADP network. Continuing top management and steering committee involvement will be needed to ensure a successful acquisition and implementation.

RECOMMENDATIONS

We recommend that the Administrator of EPA:

--Reassess the 1980s ADP requirements and ensure that ADP workload projections are kept current.

--Establish a permanent computer performance management program for present and future ADP operations. In addition, conduct a CPM review prior to the NCC interim upgrade procurement and the WCC replacement procurement.

--Perform a formal cost/benefit analysis of alternative procurement strategies to assure that the Government incurs the lowest total life-cycle cost in replacing WCC resources.

--Assure that top management and the steering committee devote to the 1980s major ADP system acquisition the special attention needed to efficiently and effectively meet future ADP requirements.

AGENCY COMMENTS AND OUR EVALUATION

EPA agreed with our recommendations and expressed its intention to make appropriate reforms. EPA has delegated the recently formed Steering Committee for Monitoring and Information Management to review the 1980s acquisition plan and to maintain a continuing involvement as it is carried through. To address questions of capacity before the 1980s acquisition, the steering committee has agreed to a zero-based review of current utilization. Further, EPA plans to establish a more formal computer performance management program and to conduct a review of software applications processed on the data centers' computers.

In respect to upgrading data center equipment before the 1980s acquisition, EPA commented that we had confused procurement strategies with firm plans for expansion. During our review we were aware that EPA's documented strategy was to phase in additional Univac equipment over a 3-year period. However, that strategy called for the additional large-scale computer capability (central processing unit, memory, and minimal peripherals) in one step, with subsequent mass storage additions (primarily disk subsystems) to be phased in as required. Further, we were aware that EPA had provided for flexibility in its strategy through equipment leasing and a 30-day cancellation provision. However, during our review, we concluded through discussions with data center management that EPA had committed itself to the upgrade without considering additional information to be derived from a comprehensive computer performance management review.

EPA commented it did not feel that its recent use of the 1977 Informatics requirements study for developing procurement strategies was inappropriate. We agree that it is appropriate and should be used, but we also believe that additional variables should be included in updating the requirements analysis. We discussed those additional factors on pages 38 to 40.

EPA commented that while it recognized the attractiveness of computer performance management, it felt that (1) there was a current shortage of trained personnel to perform this activity and (2) CPM is not widely characteristic of the data-processing industry at this time. We contend that

CPM is a comprehensive administrative program for data-processing organizations to improve the performance of the entire ADP function, not just the computer operations. On the other hand, computer performance evaluation, a subset of CPM, is a process whereby the performance of the computer system (hardware and software) is optimized. Computer performance evaluation is unmistakably a highly technical but valuable part of an overall CPM program. Because CPM encompasses the total organization, it clearly transcends technical computer operation. We believe EPA is over-emphasizing the technical aspects of CPM; further, we believe that EPA currently has the managerial capability to implement the CPM program. For additional guidance on the application of this program, we suggest EPA refer to GSA's "Management Guidance for Developing and Installing an ADP Performance Management Program," November 1978.

CHAPTER 5

EPA NEEDS TO IMPROVE COST ACCOUNTING AND COST CONTROL FOR CENTRAL COMPUTER SERVICES

Present cost-accounting procedures for central ADP resources do not provide adequate cost data for decisionmaking to all levels of ADP management. EPA has also substantially understated the cost of providing central computer resources to its user community.

Furthermore, the chargeback system 1/ is not an effective management tool in influencing decisions of EPA's central computer resource users. Because of the way EPA establishes ADP timesharing budgets (suballowances), users are not held accountable for their utilization of these resources and, consequently, are generally unconcerned about their costs. EPA has long recognized this deficiency in its ADP financial procedures but has not resolved the matter.

NEED FOR GOOD ADP COST ACCOUNTING

Consistent with GAO's Federal Government Accounting Pamphlet Number 4, "Guidelines for Accounting for Automatic Data Processing Costs," management needs to know the full cost of providing ADP services to the organization. In other words, all significant elements of costs directly related to acquiring computers and associated assets and to performing data-processing functions should be collected and accounted for in ways useful for management, budgeting, and external reporting. This includes the costs of (1) procuring, developing, converting, and maintaining computer software, (2) acquiring equipment and related assets, (3) operating and managing in-house data-processing facilities, and (4) purchasing computer time and maintenance services from external sources. ADP-related costs should be identified consistently throughout a department or agency. Accounting for depreciation of ADP assets--software, hardware, and facilities--is required to obtain full reimbursement of costs

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1/"Chargeback system" refers to the billing mechanism by which the costs of computer services are charged back to the users of these services.

and is important for management, users, and others who need to know the full cost of ADP services.

In addition to the above guideline, "Management Guidelines for Cost Accounting and Cost Control for Automatic Data Processing Activities and Systems," prepared by GAO, states that one of the most important approaches basic to the issues surrounding ADP cost accounting and cost control is the system-life-cycle cost method. The expected life cycle of critical system components influences an expected overall system life cycle, recognizing that there will be changes in requirements, technology, and priorities. Cost-accounting and cost-control methodology are required to measure efforts and accomplishments throughout the total expected system life cycle. Additional guidance that addresses the total system-life-cycle approach can be found in: (1) Federal Information Processing Standards Publication (FIPS Pub) 38, "Guidelines for Documentation of Computer Programs and Automated Data Systems," (2) FIPS Pub 49, "Guideline on Computer Performance Management: An Introduction," and (3) OMB Circular A-109, "Major System Acquisitions."

NEED FOR AN EFFECTIVE CHARGEBACK SYSTEM

An effective chargeback system is beneficial to both user and data center management. Implementing a chargeback system can aid management in several ways. First, when the users know the cost of a service, they can perform a cost/benefit analysis and can determine whether the value received from a service is worth the cost. As a result, users become more cost conscious, which may result in more effective and efficient usage of computer services. Second, the ADP manager is aware of each user's cost of operations and is in a position to concentrate on those high cost and demand areas warranting attention. Last, top management can benefit from the cost information in making sound ADP investment decisions in the ADP planning process.

The overall purpose of the chargeback system is to assign ADP service costs to users. The effectiveness of the chargeback system in influencing user decisions depends on establishing user accountability. In other words, the user must accept responsibility for computer resource utilization. Once accountability is established, users tend to cut down on wasteful uses of computer time and to restructure their legitimate workload to minimize costs.

Sound ADP cost-accounting and cost-control procedures are fundamental to effective ADP planning and budgeting.

EPA has realized that its ADP planning and budgeting procedures are weak. During our survey, we noted that the agency has retained a consultant to develop an ADP planning and budgeting system. In June 1979 the consultant reported 1/ on the first phase of the project.

CONSULTANT'S VIEWS

The consultant reported several weaknesses in EPA's current ADP environment. These weaknesses in the way of doing ADP business detract from the agency's ability to effectively manage current ADP resources and to adequately plan for meeting future ADP requirements. To improve ADP planning, budgeting, and control, the consultant identified certain actions that EPA should take.

Lack of full costing for central computer services

The consultant pointed out that the total cost of ADP services is critical in decisionmaking to evaluate alternative methods for accomplishing a task. Total costs for ADP services provided in-house can be compared with outside suppliers' costs to determine whether new equipment would save enough to justify additional capital expenditures. EPA has not continually developed the full costs that are incurred to provide central computer services to users. NCC does not account for such cost categories as (1) EPA support personnel, (2) site lease or maintenance, (3) utilities, and (4) depreciation of Government-owned equipment. Not accounted for at WCC are such costs as (1) EPA management and services and (2) depreciation of Government-owned terminals.

Lack of user concern for central computer service chargebacks

The consultant's study suggests several reasons why some users appear to be unconcerned about central computer service costs. However, the reasons are all related to the way EPA determines the user timesharing budgets.

Users themselves define the aggregate timesharing budget amount, but MIDSD funds and allocates budget amounts, called suballowances, to the users. Since chargebacks are

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1/"ADP Planning and Budgeting System Requirements Specifications," June 20, 1979.

funded and allocated by MIDSD, and not by the users out of their program funds, users' perceived accountability and responsibility for the chargebacks are somewhat lessened. The users' suballowances are controlled primarily at the assistant administrator level, with little information available on suballowances below this level. Currently, users do not have the tools or incentive to analyze the factors involved in chargeback variations.

This ADP timesharing budgeting process reduces user involvement in preparing timesharing budgets and in controlling their ADP usage. In other words, if users are not directly involved in their own budget preparation and are not responsible for identifying differences between actual and budgeted levels, they may not assume responsibility for keeping chargebacks within budgeted levels.

A revolving fund is suggested to support the ADP planning and budgeting process

A revolving fund is an accounting device used to facilitate the financing of a continuing cycle of business. GAO has previously reported on the use of revolving funds in the Federal Government. 1/ In essence, the fund is self-financing through the sale of goods or services.

The principal emphasis of revolving funds within the Government is to adequately account for businesslike operations. Such operations are ongoing in nature and provide measurable goods or services which can be priced for sale to customers, including those customers external to the providing agency. The Office of Management and Budget is involved in revolving fund budgets to the extent that portions of estimated reimbursements plus approved appropriations can be reserved. The Congress would be involved since revolving funds are legislatively created, at which time certain restrictions might be imposed on the use of reimbursements or net income.

The consultant noted that the revolving fund is appropriate for EPA's ADP operations due to the benefits of user responsibility and cost-based charges. Furthermore, user responsibility is a critical element in the Nolan study's strategic ADP plans.

1/"Revolving Funds: Full Disclosure Needed for Better Congressional Control" (PAD-77-25, Aug. 30, 1977).

Consultant's conclusions

The consultant identified three areas requiring future EPA policy decisions and efforts critical to an effective ADP planning and budgeting system:

--Defining and managing user-oriented transaction units where appropriate.

--Charging ADP services directly to user budgets.

--Management support of the ADP planning and budgeting system.

The ability of the system to utilize user-oriented transaction units for billing and workload projection requires that (1) the units be defined and (2) methods of routinely accumulating this data be installed. To directly charge users the full cost of ADP services, all centrally supplied ADP service costs should be funded through the use of a revolving fund. In addition to enhancing the agency's capability to impose user responsibility, the revolving fund method facilitates employing full-costing techniques. EPA management support of the planning and budgeting system is an important agency action to assure successful implementation of the new ADP budget and planning process.

FULL COSTING--THE NEED TO RECOGNIZE TOTAL DATA CENTER COSTS

Referring to the consultant's views in the previous section, it was noted that NCC does not account for certain costs. Because the consultant did not quantify these costs, we applied the full-costing approach to NCC operations and found that EPA has substantially understated the costs of providing central computer services to its user community. Furthermore, the total service costs are not assigned by the chargeback system to the users. The effect is twofold: (1) central ADP managers do not have adequate cost data on which to base decisions for supplying services and (2) user management does not have adequate cost data on which to base decisions for the economical and effective use of ADP resources.

Full costing improves the quality of data for making sound management decisions. The decisionmaking process, in which budgeting and planning play a major role, can be significantly affected by the quality of data. Accordingly, plans and budgets, which require financial expression as a common denominator of management control, need accurate cost data to provide a proper basis for management decisionmaking.

Substantial ADP-related costs not recognized at EPA's computer centers

Not all costs for providing timesharing services are included in the chargeback cost pool; also, one type of cost is not properly allocated between EPA's two data-processing centers. We estimated the costs of operating NCC during FY 1979 to be about $2 million greater than the NCC chargeback cost pool.

All the significant elements of costs incurred in accomplishing ADP-related activities need to be identified. In addition to those incurred by a data-processing organization, costs should be included for

--any ADP work performed by other organizations;

--items that are paid centrally, such as utilities, space rental, and central ADP office overhead;

--unfunded costs, such as depreciation and certain employee benefits; and

--items funded from appropriations or allotments other than those used to finance regular data-processing operations.

Organizational boundaries and differences in financing methods should not prevent reasonable compilation of all ADP-related expenses.

An examination of the FY 1979 budgets for the two centers shows that both omit certain costs of doing business; also, there is a distortion in the way telecommunications costs are allocated. The WCC costs omit any portion of EPA management and services that support the availability of the center for the user community. In addition to EPA management and services costs, NCC costs omit building lease and maintenance, utilities, and depreciation on a substantial amount of Government-owned Univac equipment and software.

Because of these cost omissions, the true costs of central ADP services are not being reflected by the chargeback system, and full costs are not being recovered from non-EPA users of these services.

Data center management told us that virtually all of EPA's telecommunications costs are borne by the WCC budget because the WCC contractor, COMNET, provides the network. However, this network also supports NCC users. The effect

of this policy is that WCC users are forced to bear a substantial telecommunication cost subsidy to NCC users.

EPA also did not include any portion of the FY 1979 ADP technical support budget that directly supports the data centers. These funds are administered by the MIDSD headquarters staff, in contrast to the computer center funds that are administered by data center management. The total technical support budget was about $1.7 million for FY 1979.

To approximate the cost to operate NCC, we performed a limited cost analysis. In so doing, we applied the concept of full costing to the extent that actual or estimated cost data was available. The following table shows the results of our full costing analysis.

Full Costing Analysis
for NCC Operations
FY 1979 (note a)

	(000 omitted)
From NCC budget:	
Computer hardware rental and maintenance	$2,232
Facilities management contract	3,290
Telecommunications	99
Other	165
Total	$5,786
GAO estimate of costs not included in chargeback system:	
Building rental and maintenance	$ 83
NCC personnel	532
Electric power	60
Depreciation of Government-owned equipment	936
Reallocated COMNET telecommunications	398
	$2,009
Total	$7,795

a/For this analysis, estimated allocations of the ADP technical support budget, MIDSD headquarters personnel costs, and Office of Administration overhead at NCC were not available.

The above table shows that the actual cost of providing NCC services to the user community is estimated to be substantially higher than that stated by EPA. More specifically, the actual cost estimate is more than $2 million (35 percent) higher than budgeted for FY 1979.

CURRENT CHARGEBACK SYSTEM IS INEFFECTIVE

Data center management told us that the chargeback system is not as effective a management tool as it could be. The reasons cited were a lack of user accountability and responsibility for central computer services. Moreover, our work showed that EPA has been aware of the user accountability/responsibility issue for many years.

Chargeback system lacks key ingredient--user responsibility

EPA has long recognized its problem in assigning responsibility for use of ADP resources to the user community. In June 1974 the Office of Administration issued Policy and Procedures Memorandum No. 11 on the management of ADP funds. This memorandum stated that existing procedures had not placed the opportunity or responsibility for budgeting for ADP funds with the actual users. Further, accountability for use of ADP resources had not been assigned to the computer system users.

Later in 1974, EPA retained a consulting firm, Index Systems, Inc., to perform an ADP planning study and prepare a coordinated, agencywide 5-year ADP plan. The study suggested that budgetary policies tended to encourage wasteful uses of computing resources by not forcing examination of the relative values of competing demands for limited ADP resources. Moreover, since users' computer expenses were paid for from a specially budgeted ADP fund, program managers had applied expensive computer resources in situations which were not cost effective.

In spite of the 1974 memorandum, and the findings reported by Index Systems, Inc., EPA has yet to resolve the problem of assigning user responsibility for ADP resources.

Users tend to treat central computer services as free resources

We interviewed data center management personnel and data center users and found indications that users are generally unconcerned about service costs and that the data centers

are generally perceived as free resources. For example, contractors were not given unique account codes so that their usage could be monitored. Users were not changing their passwords to help protect their accounts from unauthorized use. The system cutoff feature was not being used to prevent users from exceeding predetermined account budget limits. The value of EPA-supplied ADP services was not identified in a contract that involved extensive computer use although non-ADP expenses were specified in great detail. Moreover, during the performance of this contract, the contractor ran up timesharing charges that alone exceeded the total contract amount.

CONCLUSIONS

EPA has been aware of its long-standing problems associated with ADP services costs but has done little to correct them. EPA has substantially understated the costs of providing central computer services to its user community. Moreover, full costs for the services are not assigned by the chargeback system to the users. Present cost-accounting procedures for central ADP services do not give ADP management at all levels sound cost data for decisionmaking. As a result, EPA is not adequately controlling ADP resources.

EPA has retained a consultant to develop an ADP planning and budgeting system. For this new system to be effective, we believe that EPA's ADP cost-accounting and cost-control procedures need to be strengthened.

The current chargeback system is not an effective management tool in influencing user decisions. Users have not been held accountable for their use of EPA's central computer services and, consequently, are generally unconcerned about the costs of these services. EPA has long recognized this deficiency in its ADP financial procedures but has not resolved the matter. Until users are made to realize that EPA's central computer services are not free, the present chargeback system will continue to be ineffective.

RECOMMENDATIONS

We recommend that the Administrator of EPA:

--Ensure that ADP cost-accounting procedures reflect the principles of full costing and total system-life-cycle costing.

--Require that full costs for central ADP services be assigned by the chargeback system to the users.

--Require users to pay for these services directly from their program funds, enabling users to more realistically determine their ADP budgets and to accept full responsibility and accountability for their central ADP usage.

--Initiate actions to implement a revolving fund, with limits as to amounts and duration, to finance the central computer services' operations.

--Determine the final requirements of an ADP planning and budgeting system that will adequately support EPA's ADP activities and continue with the design and implementation of the system.

AGENCY COMMENTS AND OUR EVALUATION

EPA agreed with our recommendations and is moving to implement them. Specifically, EPA said it is pursuing the revolving fund with the Office of Management and Budget and intends to require users to pay for ADP services directly from their program funds.

EPA said it is initiating action on our recommendation regarding ADP full costing and total system-life-cycle costing but limited its comment to the National Computer Center. These accounting principles should apply not only to data centers but also to feasibility studies for, and budgetary review of, EPA's general-purpose minicomputer installations. Further, one of the most costly ADP components, applications software, needs to be included in the full-costing and life-cycle-costing procedures.

EPA questioned the practicality of its consultant's recommendation that user transaction units can be successfully applied to the user budgeting problem. We should point out that the consultant's recommendation is consistent with GAO's Federal Government Accounting Pamphlet Number 4, "Guidelines for Accounting for Automatic Data Processing Costs," 1978. This publication provides general guidance which should be applied whenever possible. Thus, in this context it appears that the consultant's recommendation of "definition and management of user-oriented transaction units where appropriate" is reasonable.

EPA commented that it does not agree entirely with the report language, which suggests that a direct-charge system

will, by itself, have a major impact on user awareness of computer costs. Our report discusses the direct-charge system as a part of the total solution. However, we believe that a direct-charge system is a fundamental prerequisite to solving the user awareness problem.

CHAPTER 6

INTERNAL AUDITORS SHOULD ACTIVELY PARTICIPATE IN REVIEWING MANAGEMENT OF ADP RESOURCES

Internal auditing is an independent appraisal function established within an organization to examine and evaluate the organization's activities. The objective of internal auditing is to assist organization members to effectively discharge their responsibilities. To this end, internal auditing furnishes them with analyses, appraisals, recommendations, counsel, and information pertinent to the organization's mission and program objectives.

The Environmental Protection Agency's Office of Audit (currently the Office of the Inspector General), however, has not adequately assisted in mission and program areas specifically related to information resources. EPA operates approximately 160 computer systems (hardware) and uses over 50 major computer applications systems (software). The Office of Audit has done little to help management assure that these resources are effectively and efficiently acquired, used, and managed. We believe EPA should significantly increase in-house ADP audit capability to maximize its operational effectiveness.

A recent independent review performed by the National Research Council, National Academy of Sciences, on EPA's data-processing and information-handling systems concluded:

> "We were disappointed to see that so few resources were committed to auditing data to assess or ensure the quality and timeliness of data being stored and retrieved. Such auditing should be an integral part of the design and operation of a monitoring program * * *."

To further support this need for increased ADP auditing capability, the Congress has placed special emphasis on internal auditing for effective control and accountability of all funds and assets.

CURRENT AUDITING ACTIVITY IS INADEQUATE

To optimize results, the Office of the Inspector General needs to conduct comprehensive ADP management audits. An expanded scope of ADP audits would contrast with the previous Office of Audit's work, which concentrated on outside

contractors, construction grants, and contract audits. ADP audits at EPA have been limited to financial-type audits of contractors in the areas of pricing, cost, lease, and leasehold improvement evaluations. Reasons for this inadequate ADP auditing effort stem from (1) lack of top management support and (2) lack of sufficient technical ADP capability.

In 1978 the passage of the Inspector General Act established EPA's Office of the Inspector General. An Inspector General has recently been appointed and is currently serving in this capacity. The creation of this new office provides EPA with the opportunity to review and evaluate its ADP audit effort in relation to its other general audit functions.

At the time of our review, the Office of the Inspector General's FY 1980 work plan indicated the Office would spend 85 percent of its resources to review grants and other external activites. The remaining 15 percent of its resources were to be expended for in-house audits, of which a fraction had been designated for ADP activities. Such resource allocations indicate a continuing small amount of effort directed toward ADP auditing. We realize that construction and contract grants represent the major portion of EPA's budget and accordingly should be allocated a large percentage of internal audit resources. However, EPA should also recognize that decisions based on ADP systems information can have significant economic impact. In our opinion, limited ADP audit efforts cannot assure management that ADP resources will be effectively and efficiently acquired, used, and managed to help EPA achieve its overall mission and program objectives.

During our review the Office of the Inspector General became more aware of EPA's deficiency in ADP management audits and engaged an outside contractor with ADP capability to review equipment acquisitions at the Washington Computer Center. We believe the hiring of this outside contractor is a major step forward in auditing ADP resources. But we emphasize the need for the Office of the Inspector General to develop its own in-house audit capability to conduct ADP audits and to effectively manage outside contractors hired to augment its ADP audit resources. In-house ADP audit capability would help assure a continuing high standard in ADP auditing.

HOW THE OFFICE OF THE INSPECTOR GENERAL CAN IMPROVE ADP MANAGEMENT

EPA's internal audit function could greatly serve management by reviewing, appraising, and reporting on the effectiveness of ADP resources affecting mission, management policies, plans, and procedures. The internal auditors should review the entire system of management controls over ADP resources to determine the effectiveness of information resources in accomplishing EPA's mission.

What is ADP management auditing?

A necessary function of EPA's top management is to establish and prescribe ADP policies, plans, and procedures for carrying out programs and activities in pursuit of EPA's overall mission. The Office of the Inspector General can provide the independent approach needed for improving operations and identifying opportunities for increased effectiveness, efficiency, and economy.

The scope of management auditing which focuses on ADP activities should encompass reviews in such areas as

--ADP strategy and objectives;

--ADP long-range planning process;

--effective performance of all information resources, including hardware and software; and

--application of good management practices in acquiring, managing, and using data-processing and associated resources.

These ADP management audit areas should be integral parts of the province of the internal auditor. Examples of management audit areas where benefits could be derived through the use of internal auditing are addressed below.

Audits of applications system design and development

Most ADP application systems require considerable time, money, and effort to design and develop. Interactions among managers, users, designers, programers, and ADP auditors are vital to the success of this effort. EPA auditors can contribute to the development of better controlled systems by reviewing work performed during this development phase. This audit involvement assures a system's review early in

the development stage, before a large investment of capital and staff resources is made.

ADP audit standards promulgated by GAO in March 1979 as a supplement to its "Standards for Audit of Government Organizations, Programs, Activities & Functions" require internal auditors to actively participate in reviewing the design and development of new data-processing systems or applications, and significant modifications thereto, as a normal part of the audit function.

The Nolan, Norton & Company study of EPA's ADP activities noted that very few major systems have been delivered in the last 2 years, and EPA has little to show for its investment of $9 million during this period. The study stated that users' needs were not met, opportunities were lost, and resources were wasted in developing new ADP application systems.

We believe that the Office of the Inspector General could make a valuable contribution by conducting continuous reviews and audits of ADP application systems under development and in operation.

Audits of equipment acquisition

The Office of the Inspector General should conduct ADP acquisition reviews during one or more of the following three phases in the acquisition cycle:

--Before the final acquisition decision is made.

--Before the acquired equipment, system, or service is operational.

--After the acquired items are operational.

Through interim procurements EPA plans to acquire additional computer capability at the Washington Computer Center and the National Computer Center. The internal auditors should be involved in these procurements and should address such issues as (1) the adequacy of equipment specifications, (2) capability to process the required workload, (3) the adequacy of the justification, and (4) performance measurements of ADP services to user organizations.

Audits of computer applications

The heavy demand for large volumes of information needed to carry out agency programs and the advantages of computer technology have required EPA's program offices to automate its systems. The resulting investment in ADP equipment and information systems necessitates effective control over these computer applications.

Under GAO's audit standards, the internal auditors are required to

--review general controls in data processing systems to determine that controls have been designed according to management direction and legal requirements and that such controls are operating effectively to provide reliability of, and security over, the data being processed and

--review application controls of installed computerized applications to assess their reliability in processing data in a timely, accurate, and complete manner.

These management controls relate, in part, to the reliability of information generated and the resultant management decisions which depend on effective automated systems.

Internal auditors should review computer application systems to assess the extent to which

--accurate and timely data are entered into the computer and data files are kept updated;

--adequate manual and automated controls exist over the input and processing of data;

--the user receives timely, accurate, and useful output; and

--documentation is adequate for all aspects of the applications systems under development and in operation.

Our previous reports expressed concern with EPA's application systems' reliability (that is, data quality). 1/ The

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1/"Improvements Needed in Controlling Major Air Pollution Sources" (CED-78-165, Jan. 2, 1979) and "Better Data Collection and Planning Is Needed to Justify Advanced Waste Treatment Construction" (CED-77-12, Dec. 21, 1976).

Nolan, Norton & Company study of EPA's ADP systems stated, "Data quality is an identified problem." In our opinion, EPA's application systems' reliability problems can be minimized with continuous evaluation by the Office of the Inspector General.

Audits of information systems and ADP facilities security

Since the area of computer security is very comprehensive, it should be considered from a total system perspective. Security involves all controls necessary to ensure (1) the accuracy and reliability of the data maintained on or generated by an ADP system, (2) appropriate protection of hardware, software, and data from all significant anticipated threats or hazards, and (3) the economy and efficiency of computer operations.

MIDSD is responsible for an ADP security program involving policy, procedures, and audits. MIDSD hires contractors to conduct the security audits. Two consecutive ADP security audits of EPA's WCC facility have identified major weaknesses which could lead to losses of equipment, facilities, and data. However, EPA has not taken sufficient action to correct these problems.

Currently, MIDSD acts as both manager and auditor for the central ADP facilities. Generally accepted auditing standards require an audit and review function to report to an office separate from the organization under review. The audit function should

--be independent of EPA's security planning and policy-setting process and

--report directly to the Administrator or Deputy Administrator.

Consequently, we believe that the audit and review function for ADP security should be vested in the Office of the Inspector General.

CONCLUSIONS

EPA continues to rely heavily on ADP technology to achieve its program objectives. The accuracy and reliability of EPA's computer-based systems are essential since timely and useful information serves as the basis for decisions having significant health and socioeconomic consequences.

In the past, EPA's Office of Audit has not performed the necessary ADP management audits to assure effective application of information resources. ADP auditing was neglected because top management did not support the ADP audit function and qualified staff was lacking. Internal auditors can provide a highly valuable service to management by reviewing, appraising, and reporting on the effectiveness of ADP resources affecting mission, management policies, plans, and procedures. The recent establishment of the Office of the Inspector General provides the opportunity to increase EPA's ADP audit capability. Realignment of staff is one method that should be considered. The use of outside contractors with ADP audit experience should also be helpful in planning and executing ADP management audits. However, it is imperative that EPA's ADP auditors acquire some capability in-house to manage these contracts.

ADP auditing at EPA should be broad in scope and should encompass areas such as (1) system design and development, (2) equipment acquisition, (3) applications systems, and (4) security of ADP facilities.

RECOMMENDATIONS

We recommend that the Administrator of EPA:

--Direct the Office of the Inspector General to increase its ADP audit capability to more effectively carry out its auditing mission and responsibility.

--Direct the Office of the Inspector General to continue augmenting its ADP audit capability with outside contractors.

--Direct the Office of the Inspector General to plan and perform management audits of EPA's ADP policies, plans, and procedures, including: (1) system design and development, (2) equipment acquisition, (3) applications systems, and (4) security in ADP facilities.

AGENCY COMMENTS

In its written comments, EPA agreed with our recommendations to increase its ADP audit capability. EPA stated that it has long recognized the need for increased audit emphasis on EPA's ADP functions and, consistent with resource constraints, will be devoting more time to this area.

APPENDIX I

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

JAN 02 1980

OFFICE OF
PLANNING AND MANAGEMENT

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

Dear Mr. Eschwege:

EPA very much appreciates the effort and skill displayed by the General Accounting Office team during its recent study of EPA data processing. The review has resulted in a draft report, "The Environmental Protection Agency Needs Better Management of its Information Resources to Improve Program Effectiveness," to which this letter responds. As you will see, we are offering comments on many of your findings and recommendations which we believe will provide an appropriate context for your report and, in some instances, clarify the findings of your staff. However, I wish to emphasize that we agree with the central thrust of the draft report and we are especially pleased at the ability and insight of your staff and their willingness to engage with us on these important issues.

Our reactions to your recommendations follow in this letter, on a chapter by chapter basis. These reactions and comments are based on a review by the newly-established Steering Committee for Monitoring and Information Management, which is discussed below.

"EPA Needs Strong Central Direction and Leadership To Improve Its Management of Information Resources," Chapter 2.

EPA agrees with two principal GAO findings in this area:

1) that our top management has not sufficiently involved itself with information management.

   To remedy this problem, the Administrator established a Steering Committee on Monitoring and Information Management reporting directly to the Administrator with far-reaching responsibilities for recommending policy, reviewing budget proposals, and monitoring performance by the Agency's major information system and data processing resources. The Steering Committee is chaired by Dr. Richard Dowd, Science Advisor to the Administrator, and is composed of Deputy

Assistant Administrators and Deputy Regional Administrators, the most senior career officials of EPA. In addition, we have assigned a staff of our most senior information specialists and analysts to serve as a temporary secretariat for the Steering Committee. Over the next year, we will replace this temporary secretariat with permanent staff, initially set at five persons. The chartering memorandum for the Steering Committee, a copy of which I have enclosed, clearly and decisively assigns to the Committee an active, controlling role in all aspects of information management throughout EPA, including a central role in reviewing all monitoring and ADP plans and budgets. To illustrate, the Steering Committee is presently directing a review and re-ranking of ADP expenditures planned for FY 80 in order to absorb a Congressional reduction in our ADP Timeshare budget.

2) that central capacity for information management is lacking.

We are taking steps in both FY 80 and FY 81 to correct this situation. In FY 80, we have allocated an additional 15 work years to the Management Information and Data Systems Division (MIDSD) to strengthen our central systems development function, and six workyears to establish an Agencywide information clearinghouse function. In FY 81, we plan to again increase the MIDSD staff by about the same amount as in FY 80, to continue strengthening our capacity to manage major systems integration projects. While these increases are not sufficient to fully correct EPA's excessive reliance on contractor personnel, we do not believe we can manage a faster rate of growth and still maintain standards of excellence in personnel selection and performance. We therefore anticipate the need for further increases in the future.

The draft report expresses reservations about the adequacy of our "action plan" set forth in the Monitoring and Information Policy Memorandum, in particular, that the Steering Committee is focused on "new data collection activities" rather than on correcting deficiencies in existing programs. While I can understand why your staff had these concerns during the period of their field work -- the Steering Committee and related reforms had barely begun -- I believe there is now ample evidence of our intent to address the full range of problems, specifically including correction of existing deficiencies. For example, we are now in the process of establishing a separate, zero-based review of all information budgets and plans as part of our regular budget cycle. In addition, the Steering Committee has directed the MIDSD staff to prepare policies mandating in-depth review of the need for and performance of all major EPA systems

APPENDIX I

every three to five years as a condition for continued funding. It is my understanding that we have kept your staff informed of these developments and I believe it would be appropriate to reflect them in your report.

We also agree in principle that the information management function in EPA should be consolidated and elevated organizationally by creating a new Deputy Assistant Administrator or some similar office. However, for several reasons, we do not agree that this should be the first step in the reform process.

In the first place, we are reluctant to pursue organizational solutions that are not based on a thorough understanding of the decision processes and work activities that are affected. We are, and over the next year, will be, working very hard to spell out sensible processes for planning, budgeting and managing ADP and other information resources. At the same time, we are developing policies and initiating a series of actions to correct existing deficiencies such as redundant data collection, inadequate quality assurance, and the various organizational and systems design barriers to integration of our major information systems. In my judgment, we do not yet know enough to carry out a major reorganization intelligently, and to attempt such a reorganization at this time would disrupt our reform efforts by introducing an unnecessary element of uncertainty. Instead, the Steering Committee will, by the end of FY 80, recommend the organizational changes necessary to support the Agency's information management reforms.

"Management Controls Over Contractor Development of Information Systems Need Strengthening," Chapter 3.

We agree with the analysis presented in this chapter, and with the recommendations you have made. We point out, however, that improvements in this area depend to a large extent on the increases in the central information management staff which were discussed in connection with Chapter 2.

"Need to Better Determine Future ADP Requirements," Chapter 4.

We address your conclusions and recommendations in three areas:

1) We need better top management review of data center capacity planning.

   We agree. The Administrator has asked the Steering Committee to review the 1980's acquisition plan, and to maintain a

continuing involvement as it is carried through. To address questions of capacity in the period before the 1980's acquisition, the Steering Committee has agreed to a zero based review of current utilization. FY 81 resources have been requested to establish a more formal computer performance management program, to concentrate on review of applications running on the data centers. This latter effort will begin in FY 80 using available resources, although a full review will hinge on our obtaining the needed additional resources in FY 81.

As part of this effort, we are seeking advice from outside experts in both the public and private sectors who are not already associated with our acquisition efforts.

2) Upgrades to the data center equipment before the 1980's acquisition have not adequately been justified.

GAO has confused procurement strategies with firm plans for expansion. The procurements give us options for ordering equipment, as opposed to commitments for buying it. The Univac upgrade was initiated to continue the flexibility EPA had under the original equipment contract which expired last year. The center could be doubled under the limits of the replacement contract. Although a doubling may be necessary, no budget authority or firm need exists at this time. The minimum order would increase the equivalent purchase value of the installed equipment by roughly 25%. The equipment will be leased, not purchased; it could be returned to the vendor on 30 days notice. Our current plans are to accept delivery of this modest addition in capacity late in FY 80, assuming that the on-going review of FY 80 Timeshare expenditures document the need for such an addition. At the IBM site, the situation is similar.

3) Our needs projections are innacurate.

GAO has criticized EPA for relying on the "somewhat dated" Informatics requirements study completed in December 1977. While we realize the Informatics projection must be updated, and have budgeted FY 80 money to do that, we do not feel our recent use of the study for developing procurement strategies was inappropriate.

Moreover, actual use of the centers since the study has closely followed the Informatics projection. In FY 78, the Univac workload was slightly below the projected growth curve, due to the delay in implementation of new systems. In

FY 79, these new systems were implemented and our use did match our projection. The IBM workload is slightly above the projection in both years.

GAO quotes NCC management as stating that "the current system is satisfying present user needs in a manner never thought possible." Yet the comment was taken from a report on machine stability, not on capacity. Users rate turnaround time of processing was their greatest problem at NCC.

GAO states that "the Informatics study did not consider ADP requirements that are being met within EPA by [minicomputers]." Yet regional offices and laboratories were either installing or planning minicomputers when the projections were made. And Informatics included only a minimal workload from the then newly created Office of Pesticides and Toxic Substances. OPTS and other users involved in carrying out EPA's mandate under the Toxic Substances Control Act are rapidly becoming major users of the data centers.

EPA recognizes the attractiveness of computer performance management, yet it notes a current shortage of trained personnel to perform this activity. Despite a national recruitment, the facilities management contractor has not been able to staff these positions with experienced personnel. GAO is recommending a strategy which, while promising, is not widely characteristic of the data processing industry at this time.

In summary, while we agree with the general thrust of the draft report recommendations, we believe there is a need to clarify the disussion of our current practices and to include some indication of the fact that the recommendation on computer performance management goes beyond common ADP management practices. However, I wish to underline our essential agreement and our intention to make the recommended reforms.

"EPA Needs To Improve Cost Accounting and Cost Control for Central Computer Services," Chapter 5.

We agree with the recommendations in principle and are moving to implement them. However, EPA questions the wisdom of GAO's including such a detailed reporting of the Arthur Young & Company study which has completed a requirements analysis phase, but not yet its design phase. Until EPA receives the study's concluding report, it cannot comment finally. But EPA considers naive the consultant recommendation which GAO quotes without comment: that user transaction units can be successfully applied

to the user budgeting problem.

1) Account and charge back for the full costs.

EPA has already moved to identify the full costs at the NCC and will notify users of the true cost of their activity during the current fiscal year. In addition, we are examining the feasibility of presenting our Timeshare budget on a "full cost" basis in future years. For non-EPA users who are now being undercharged, EPA will also examine the feasibility of rewriting its interagency agreements to reflect true costs. It is important to understand, however, that the benefits of full cost accounting and billing hinge in large measure on the creation of a revolving fund, which is discussed below.

2) Require users to pay for services directly from program funds, and initiate a revolving fund to finance services.

EPA believes that these two recommendations, made separately by GAO, must really be implemented together. EPA is pursuing the revolving fund idea with OMB, and if mutual discussions warrant it, the Congress will be asked to include such a fund in the FY 82 appropriation bill. In the event that a revolving fund is established, users would be required to pay for ADP services directly from program funds. However, we do not agree entirely with the draft report language that suggests this direct charge system will, by itself, have a major impact on user program awareness of the requirements of sound information resource management. The amounts spent by most programs will be only a small portion of their total budgets and therefore may not cause program mangers to involve themselves in the ADP budget process and control their ADP usage, more than they do with the current, supposedly less "real" limits to their ADP suballowances. Thus, we feel keenly that a revolving fund with a direct charge system is only a part, and perhaps a small part, of the answer. The key will be the rigor of the information resource planning and budgeting review process that is developed and will be operated by the Steering Committee. This process, coupled with tighter management of new systems development and regular reviews of the need for and performance of major systems will, in our judgment, be our principal tools for effectively managing our information resources.

"Internal Auditors Should Actively Participate in Improving Management of ADP Resources," Chapter 6

We agree with the recommendations. EPA has long recognized the

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need for increased audit emphasis on EPA's ADP functions and, consistent with resource constraints, are devoting more time to this area.

The draft report should specify that the EPA audit group devotes 85% of its total resources (in-house plus contract) to auditing grants and other external activities, and devotes 15% of the total to internal audits. The total resource is $3.7 million in contracted State and CPA services, and, because approximately 90% ($4 billion) of EPA's total budget is devoted to the wastewater treatment construction grant program, we believe this allocation of resources is appropriate.

On the other hand, EPA will devote over 26% of its in-house reosurces in FY 80 to internal and management audits. Sixty-five percent of those audits, or 17% of the total in-house resources, will be expended on ADP or ADP-related audits.

Yours sincerely,

William Drayton, Jr.
Assistant Administrator for
Planning and Management

Enclosure

APPENDIX II

Nolan, Norton & Company
INC
One Forbes Road, Lexington, Massachusetts 02173 (617) 862-8820

October 26, 1979

Mr. Henry Eschwege
Director, CED - Room 6806
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Eschwege:

We have reviewed parts of your draft report entitled "The Environmental Protection Agency Needs Better Management of its Information Resources to Improve Program Effectiveness" which references our recently-completed study of ADP at EPA. The intent of our study was to develop a "baseline" assessment of ADP strengths and weaknesses within EPA and to use the results of this assessment to build and recommend to EPA, a feasible and responsive long-range ADP plan.

Although you correctly cite the problems we found at EPA in your report, you appear to be using them to highlight EPA's faults and weaknesses to excess. Our study conveyed a more balanced picture -- one which has significant strengths. Our studies take pains to stress an organization's strengths as building blocks to be used as well as its weaknesses, as problems to be overcome.

The material that you sent to me included only excerpts from your report where our report was referenced. Therefore, without an opportunity to review the context within which your report uses our findings, we are concerned that the balanced view of both strengths and weaknesses has been lost. Among the important strengths that we identified within EPA include:

- Extensive automated support of EPA functions
- Many application systems highly regarded by their users
- Solid expertise in use of minicomputer systems
- An effectively-managed computer utility

Thank you for the opportunity to review the way the GAO report has used our work. We both share the same objective with the EPA of searching for ways to improve the use of the computer in carrying out the important mission of the EPA.

Sincerely,

Dick Nolan

Richard L. Nolan
Chairman

RLN/rmf
cc: Edward Hanley, R.C. Stringer, Morris Yaguda

(061030)

* U.S. GOVERNMENT PRINTING OFFICE: 1980- 620-386/86

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