ENVIRONMENTAL MANAGEMENT
OF FEDERAL FACILITIES

by

L. J. Hoover, J. E. Norco,
and R. L. Reisenweber

ARGONNE NATIONAL LABORATORY

CENTER FOR ENVIRONMENTAL STUDIES

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Center for Environmental Studies

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ABSTRACT

In recent years the environment has become a national issue of high priority. The federal government has provided impetus in formulating and implementing necessary national environmental policies. Commensurate with requiring active pursuit of environmental goals by states, communities, industry, and individuals, the federal government must provide strong leadership in attaining environmental cleanup of its own facilities. The federal agencies have generally established a commendable record in achieving this goal; however, changing legislation as well as new, diverse and more rigorous environmental standards mandate increased expenditures for environmental pollution control and utilization of the best available management techniques. This report describes an analysis of alternative approaches for fulfilling these needs.

This report presents three alternative environmental management programs, including identification of (1) roles, (2) environmental information systems, (3) resource requirements, and (4) a comparison of the alternatives. The alternatives place varying degrees of responsibility on the Environmental Protection Agency, state and local pollution control agencies, and the federal facilities.

1.0 SUMMARY

This study is the first step in the rational development of a program, referred to as an environmental management system, to ensure that federal facilities comply with applicable federal, state, and local standards, emission and discharge limitations and implementation schedules. The development of the environmental management system must proceed logically through the various developmental phases, including feasibility analysis, design, testing, and implementation. This study presents the feasibility analysis of alternative environmental strategies, including cost and usefulness.

A number of important environmental issues have developed regarding federal facilities. First, increasing friction between states and federal facilities, exemplified by recent legal actions against federal facilities, has developed regarding compliance with standards, issuance of permits, and procedural requirements. Second, the proliferation of information required from federal facilities by states could lead to wasted resources and unnecessary delays through duplication and fragmentation.

The role of the states, federal agencies and Environmental Protection Agency (EPA) in ensuring compliance of federal facilities is perhaps the issue of prime concern here. Furthermore, the high cost of environmental protection at federal facilities (approximately \$2 billion has been budgeted in the last seven years) and the wide range of environmental problems require the development and application of efficient management tools. Finally, the federal facilities are significant in size, number, and environmental effects, and the federal government as a whole may be the single largest individual polluter. Therefore significant efficiency could be obtained from centralized environmental management by the federal establishment. This study addresses these issues by focusing on the appropriate

division of responsibilities and the information requirements for ensuring compliance of federal facilities.

This study relied on a comprehensive survey of possible participants in the environmental management system, such as federal, state, and local agencies, as the focal point for establishing the function of the environmental management system, including identification of participant roles, information needs, and deficiencies in the existing program. A further review of existing and proposed environmental information systems and data bases provided a feasibility assessment of the opportunity for coordination with and utilization of existing information systems. The determination of the costs of the alternative concepts is based on previous work in this area and recent experience of federal, state, and local agencies.

Environmental Management of Federal Facilities

In order to ensure compliance of federal facilities with environmental standards, certain basic activities must be performed, including (1) review of standardized reports, (2) engineering evaluation, (3) engineering inspection, (4) effluent monitoring, and (5) complaint inspections. In addition to these routine activities, technical advice and assistance should be provided regarding methods and techniques for pollution abatement, prevention, and control. Three alternative concepts are presented below that are distinguished by the division of basic activities among the EPA, the state or local pollution control agency, and the federal facility. Although the three alternatives described are flexible in design, major emphasis has been placed on ensuring compliance of point sources of air and water pollution and solid waste management problems. However, the alternatives could easily be modified to include new source types and media such as noise and pesticides.

The three strategies include:

1. A centralized federal system combining a strong EPA leadership role (including technical review and complaint investigations) with primary federal agency responsibility to identify environmental problems, design and operate pollution control systems, and monitor and report progress (CONCEPT I);
2. A system in which the states assume the principal role of identifying abatement needs, monitoring, inspecting, and enforcing compliance by federal facilities (CONCEPT II); and
3. A third concept in which EPA assumes a major role involving extensive engineering review, assistance to federal facilities, and routine monitoring and inspection of pollution abatement projects (CONCEPT III).

In each concept, it is assumed that the current budgeting process continues (whereby agencies report planned abatement projects under OMB Circulars A-78 and A-81 and EPA assists the OMB in evaluating the agency fiscal plans), and EPA provides needed technical advice and assistance to federal agencies.

Description of the Federal Environmental Information Systems

Information systems are developed for each concept which are designed primarily to assist EPA in performing its role. Other users of the reports generated by the information systems include states, federal agencies, Office of Management and Budget, and the Council on Environmental Quality.

In cases where information regarding federal facilities is presently collected (for instance, the Navy Environmental Protection Data Base, NEDS, STORET), the information system described here would not duplicate presently

performed functions nor serve duplicating roles, but would rely heavily on using these existing demonstrated capabilities. For each of the concepts, the design of the reporting forms and information collection procedures could be accomplished by collaboration of the EPA headquarters with the federal agency headquarters. For each information system, computer terminal or telephone line access would be provided to the computer facility for easy access by all users.

Concept I

The environmental information system developed for storage and retrieval of information for Concept I requires comprehensive manual and automated data processing to achieve its objectives. The data base contains a rather detailed description of each federal facility. Outputs from this data base would be used to (1) notify agencies of standards, required reports, and information, and schedule EPA actions; (2) provide descriptions of the emissions, pollution abatement problems and compliance status to EPA and the states; (3) assess the effectiveness of federal agency programs for the abatement, prevention, and control of pollution; (4) provide guidance in the selection of alternative pollution abatement, prevention, and control techniques by identifying the costs and effectiveness of alternative techniques; (5) assess the overall effectiveness of the federal government environmental program; and (6) identify priorities in pollution abatement at federal facilities.

Concept II

The information system for Concept II analyzes, stores, and retrieves summary information comparable to that presently collected with OMB Circulars A-78 and A-81. For this concept, the automatic data processing system would be rather simple with the data base containing summary information.

Outputs from the data base would be used to assess the progress of federal agency programs and overall federal government environmental programs, and identify pollution abatement priorities.

Concept III

The Concept III information system requires the most sophisticated information storage and retrieval system with many features in common with the information system developed for Concept I. The data base contains a very detailed description of federal facilities (more detailed than the data in Concept I), while the outputs prepared by this information system would be used for the same purposes as those identified for Concept I. However, in addition, the information system would schedule engineering inspections, monitoring, report preparation and review, and other necessary actions.

Program Development and Operational Requirements

The program development and operational manpower requirements associated with the three alternative concepts are presented below. For ease in comparing concepts, the resource requirements of environmental information systems are estimated separately from the alternative environmental management systems which include the more detailed engineering functions. In addition, each of the two categories is further divided into developmental (incurred one time) and operational (incurred annually) requirements. The developmental requirements include system design, required training, and pilot testing, while the operational requirements include the performance of routine activities such as report form preparation and review. The resource requirements are based on a range of pollution source numbers; an analysis of the major pollution sources identified 2,500 sources of air, water, and

solid waste, while 24,000 sources were identified as an upper bound estimate of potential air, water, and solid waste pollution sources.

The developmental and operational costs are summarized in Table 1.1 for the two source estimates. Note that the costs displayed are based on an average of \$20,000/man-year.* These estimates identify the EPA resource requirements for implementing the concepts and do not include other costs incurred by states and federal agencies. Thus, while EPA's costs are minimum for Concept II, the total costs may be higher because of varied information requirements, delays, and other effects. In addition, the capability of each concept to satisfy various criteria is presented below.

The costs to the other agencies could be determined in a pilot study; however, it must be stressed that no matter which concept is adopted, the federal facility must perform certain basic actions regarding problem identification, design and construction of abatement measures, and proper operation and maintenance, which may, in fact, be the principal environmental management costs to these agencies.

Comparison of Alternative Concepts

Regardless of which concept is ultimately developed, it should have the following attributes:

- (a) be applicable to all source types and media
- (b) make maximum utilization of existing information and environmental data systems
- (c) assure adequate participation of federal and state agencies under the legislation and Executive Orders.
- (d) cause minimum alteration of existing institutional arrangements

* Estimate prepared by Office of Federal Activities, Environmental Protection Agency.

Table 1.1 Developmental and Operational Costs of the EMS Concepts
(Based on \$20,000/Man-Yr.)

		COSTS (\$1,000) FOR 2,500 SOURCES			COSTS (\$1,000) FOR 24,000 SOURCES		
		CONCEPT I	CONCEPT II	CONCEPT III	CONCEPT I	CONCEPT II	CONCEPT III
DEVELOPMENT	Information System	57	23	135	83	33	452
	Environmental Management System	43	33	67	43	33	67
	Overhead (20%)	20	11	40	25	13	104
OPERATION	Information System	5	5	20	15	15	70
	Environmental Management System	360	260	700	820	500	1160
	Overhead (20%)	73	53	144	167	103	246
TOTALS	Developmental (One-Time)	120	67	242	151	79	623
	Operational (Annual)	438	318	864	1002	618	1476

- (e) facilitate integration and coordination of all federal agency actions which would provide:
 - (i) enhanced environmental awareness by federal facilities
 - (ii) opportunity for federal agency and government-wide environmental planning and analysis of alternative systems to minimize adverse effects
- (f) be a uniform government-wide approach which provides economic benefits such as
 - (i) singular information and procedural requirements
 - (ii) economy of scale
 - (iii) decreased difficulty in collecting data
 - (iv) speed up of decision-making structure to produce results
- (g) provide for review and comment authority that is independent of federal facility operation
- (h) make efficient and economic use of technical manpower
- (i) incorporate or lead to a multidisciplinary approach which accents the interplay among the components of the environment—air, water, and land
- (j) utilize the existing capabilities of
 - (i) federal agencies in engineering design and inspection
 - (ii) EPA in problem solving, technical assistance, and pollution abatement project review
 - (iii) state agencies in air and water pollution control
- (k) be easy to manage

The modifiers used to define an alternative's capability to satisfy a criterion are:

- Easy (E) - it would be relatively easy to meet the criterion
- Difficult (D) - it would be relatively difficult to meet the criterion
- Impossible (I) - it would be practically impossible to meet the criterion.

Each concept has been evaluated using this set of criteria to determine the capability of each concept to meet the requirements. The result of the evaluation is shown in Table 1.2. Note that Concepts I and III rank very closely, while Concept II ranks lowest.

Table 1.2 Comparison of the Alternative Concepts

CRITERIA*	CONCEPT I	CONCEPT II	CONCEPT III
Applicability to All Source Types	E	D	E
Use of Existing Information	E	D	D
Participation of Federal and State Agencies	E	D	D
Minimum Institutional Alteration	D	I	D
Integration of Federal Agency Actions	E	D	E
Uniform Government-Wide Approach	E	D	E
Independent Review	D	E	D
Economy of Technical Manpower	D	I	D
Multidisciplinary Approach	E	D	E
Utilization of Existing Capabilities	E	D	D
Ease of Management	D	D	D

*E - Easy
D - Difficult
I - Impossible

In conclusion, three alternative concepts for ensuring compliance of federal facilities have been synthesized. Concept II, in which the states assume the principal role, is the minimum cost system but also least satisfies the selection criteria. Concept III, in which EPA assumes the principal role, is the maximum cost system and provides approximately equal attainment of the selection criteria as Concept I; however, Concept I, in which EPA, federal agencies, and states share the major responsibilities, is approximately 50% less costly than Concept III.

2.0 INTRODUCTION

This report presents the first step in the rational development of a program, herein referred to as an environmental management system, to insure that federal facilities comply with applicable federal, state, and local standards, emission and discharge limitations and implementation schedules. The development of the environmental management system must proceed logically through the various developmental phases, including feasibility analysis, design, implementation and testing. In this report the results of the first phase, feasibility analysis, are described in detail.

The need for a feasibility analysis such as described herein is indicated by: (1) the significant number and size of federal facilities; (2) the wide range of environmental problems at federal facilities; (3) the high cost of pollution abatement, prevention, and control programs at federal facilities; (4) existing legislative and environmental programs affecting federal facilities; (5) the proliferation and diversification of information requirements from federal facilities; and, finally, (6) legal actions against federal facilities. The implications of each of these factors is presented below.

(1) The significance of the federal establishment can most easily be indicated by the number and size of federal facilities. The General Services Administration (GSA) in a recent report identified more than 20,000 real property installations owned by the federal government. Of this total approximately 1,800 installations have buildings with over 100,000 square feet of floor space. In a report to the President and to the Congress, the Public Land Law Review Commission documented the size of federal land ownership and its use. Federal land ownership includes nearly one-third of the area of the nation

or approximately 725 million acres which is distributed primarily in the 11 western states of this country with a maximum of 95 per cent federal ownership in the State of Alaska. This Commission clearly identified the value of these lands as a resource of timber, minerals, range, water, fish, and wildlife, and did not overlook its value for outdoor recreation and potential urban development.

(2) Preliminary estimates indicate a minimum of 2,500 major potential sources of pollution, including air, water and solid waste problems, while an upper limit estimate of potential sources of pollution is nearly 24,000. Active pollution abatement projects identified as of June, 1972, under Executive Order 11507, include 3,000 water and 1,000 air pollution abatement projects. A wide range of environmental programs exist at federal facilities, including elimination of open dumps, point source emission control, fuel conversion programs, waste treatment facility improvements, and shipboard, vehicle and aircraft pollution abatement. In addition, such practices as the utilization of federal lands for waste disposal and the granting of mining leases add to the potential for environmental problems.

(3) The costs of these environmental programs have been substantial. Active pollution abatement projects identified under the auspices of Executive Order 11507 require budgeting of over \$1 billion.

(4) The refinement of environmental standards, identification of additional pollutants requiring new standards, and increased emphasis on proper operation, maintenance, and replacement programs for pollution abatement equipment will tend to augment federal pollution abatement needs. Finally, increased environmental awareness by federal agencies should lead in the very near future to more pollution prevention projects with not only equipment needs but also manpower resource requirements.

(5) The information requirements placed upon federal agencies as a result of environmental programs and legislation represents no small burden. In particular, the operating report requirements for air pollution related issues, as specified by the states, run the gamut from simple to sophisticated. In some cases, very detailed monitoring and sampling programs are required with regular submittal of operating reports. The diversification of information requirements appears to be a particular problem in such federal agencies as the Department of Defense where mobility is not only commonplace but also frequently required. Furthermore, the individual federal agencies are developing various information systems, including a unified agency wide system such as the Naval Environmental Protection Data Base and a computerized water treatment facility information system for the Forest Service. Before development of a myriad of information systems, serious consideration must be given to the benefits and costs of a uniform information system.

(6) Finally, there have been several instances of actual or contemplated legal action by state and local agencies against federal facilities for failure to apply for permits or to register certain discharges. A suit was filed against a Naval facility in California for failure to obtain operating permits. Virginia and Alabama have raised the issue of federal facility registration of discharges and application for construction permits.

All of the preceding factors indicate the need for proceeding in a systematic manner with the opportunity for assessment, evaluation, and direction at each step in the analysis of an environmental management system for federal facilities. In addition to consideration of three alternative environmental management systems in this report, the deficiencies in the existing program are identified. Furthermore, a proposed program for system design and implementation is presented.

2.1 Study Approach

It is the intent of this study to be the first phase in the development of an environmental management system which enables the federal government in the design, operation and maintenance of its facilities to provide leadership in the nationwide effort to protect and enhance the quality of our air, water, and land resources through timely compliance with environmental quality standards and full cooperation with state and local governments. The objective of the environmental management programs described herein are to insure that federal facilities comply with federal, state, and local standards, emission and discharge limitations and implementation schedules.

The purpose of this study is to determine the feasibility of developing a comprehensive environmental management program for federal facilities, relying upon existing capabilities and data bases wherever possible. Furthermore, this feasibility study will assess the need, usefulness, and cost of alternative environmental management programs for: (1) reporting effluent, operational and management data to federal agencies, and state and local pollution control agencies; (2) meeting environmental legislative requirements; and (3) assessing pollution prevention and abatement programs at federal facilities.

Some of the more specific aims of the study include identification of:

- (1) Operating procedures (responsibilities, roles, agency actions);
- (2) Methods of providing the necessary information, in particular, description of a federal environmental information system, including a description of input and output reports, information flow, and automated information storage and retrieval;

(3) Resource requirements;

(4) Implementation tasks required to develop the system.

The environmental management program described herein could be used in two alternative modes: either as an environmental planning device or as a compliance control device. In an environmental planning mode, the environmental management system should identify certain environmental consequences of present and future federal department activities. In the planning mode, aggregated data (such as pollutant source and budgetary data on a state, regional, or federal agency basis) would be needed to indicate problem areas in an annual review process with federal agencies. The environmental management system in the compliance control mode provides a framework for assuring compliance of federal facilities with environmental standards. While the ultimate goal is an environmental management system which is both comprehensive and applicable to all federal facilities, this feasibility study has emphasized the compliance of point sources of air, water, and solid waste pollution. Thus, initial emphasis has been placed on the operational requirements for water and air pollution control, and identifying solid waste problems for purposes of implementing incinerator and sanitary landfill guidelines at federal facilities. The specific environmental standards considered in this study are:

(1) Federal, state, interstate, and local air quality standards, emission limitations, and implementation schedules adopted in accordance with the provisions of the Clean Air Act, as amended;

(2) Federal, state, interstate, and local water quality standards, discharge limitations, and implementation schedules adopted in accordance with the provisions of the Federal Water Pollution Control Act, as amended; and

- (3) Guidelines for solid waste recovery, collection, separation, and disposal systems issued by the EPA Administrator pursuant to the Solid Waste Disposal Act, as amended.

The required effort for this feasibility study can be conveniently divided into three task areas as shown in Fig. 2.1. The investigation proceeds logically through the various developmental phases including: problem definition, concept formulation and feasibility assessment.

The problem definition phase identifies the function of the environmental management system including participants, information needs, existing information and deficiencies in the existing program. The functions or aims of the environmental management system will be determined from a survey of possible participants and an environmental characterization of federal facilities. In addition, the use, availability, and adequacy of existing information and data bases are assessed in this phase of the study. The two most important outputs of this phase of the study are:

- (1) An identification of existing deficiencies in the present environmental management program; and
- (2) Identification of the elements of the environmental management system including the necessary actions and responsibilities.

In the concept formulation phase, alternative environmental management system concepts are prepared in a form that permits changes to be incorporated as the study progresses. The alternatives, specified in user oriented terms, describe: (1) what is to be done, that is, the required operating procedure; and (2) alternative federal environmental information systems which are useful methods of providing the required information. The review of existing and proposed environmental information systems and data bases at the federal, state, and local levels will be used to evaluate the

FLOW DIAGRAM FOR ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) STUDY

feasibility of coordination with, and utilization of existing information systems.

In the feasibility assessment phase, more detailed specifications of the environmental management systems are prepared including:

- (1) Description of resource requirements such as manpower, information requirements and training;
- (2) Implementation tasks including design, development and testing steps for phasing the environmental management system into full operation.
- (3) Identification of benefits including possible positive and negative effects of alternative environmental management systems.

2.2 Definition of Relevant Terms

The description of a comprehensive management tool as presented in this report requires proper and adequate understanding of all terms. In this section, some of the more important terms are identified and defined.

"Federal agencies" refers to the departments, agencies, establishments, and instrumentalities of the Executive Branch.

"State, interstate, and local agencies" means any of the following:

- (1) A single state agency designated by the Governor of that state as the official state pollution control agency responsible for enforcing state and local laws relating to abatement of environmental pollution;
- (2) An agency established by two or more states and having substantial powers or duties pertaining to the prevention and control of pollution;

- (3) A city, county, or other local government health authority, or, in the case of any city, county, or other local government in which there is an agency other than the health authority charged with responsibility for enforcing ordinances or laws relating to the prevention and control of pollution, such other agency;
- (4) An agency of two or more municipalities located in the same state or in different states and having substantial powers or duties pertaining to the prevention and control of pollution.

The term "federal facilities" means the buildings, installations, structures, land, public works, and equipment, owned by or constructed or manufactured for the purpose of leasing to the Federal Government.

An Environmental Management System (EMS) is a system of people, equipment, procedures, documents and communications which collects, validates, evaluates and operates on environmental information regarding federal activities. The information includes engineering, planning, budgeting, accounting, control and operating data useful for environmental management purposes. The objective of the EMS is to insure federal facilities achieve applicable environmental standards. Furthermore, the EMS is a strategy for federal facility compliance with applicable standards which provides for cooperation between federal, state, interstate, and local agencies in the prevention, control and abatement of environmental pollution and information as necessary to determine compliance and establish compliance schedules.

The Federal Environmental Information System (FEIS) is a system of people, equipment, procedures, documents and communications that collects, stores, retrieves and displays data. The FEIS provides information on which decisions can be based concerning prevention, abatement and control of environmental pollution at federal facilities.

2.3 Report Layout

The following section proceeds from a historical perspective to a description of the present program for prevention, abatement, and control of pollution from federal facilities, and finally, a description of alternative environmental management systems. Section 3 is a description of environmental programs and legislation applicable to federal facilities. In Section 4, a description of federal facilities by number, size, and geographic distribution is presented. A summary of the number of sources by pollutant category (air, water, and solid waste problems) is developed for use in estimating the resource requirements. The existing program for the prevention, control, and abatement of pollution from federal facilities is described in Section 5, along with an identification of deficiencies and an assessment of the need for change. Alternative environmental management systems and information systems are detailed in Sections 6 and 7. Finally, the program development requirements including resource requirements and implementation tasks are presented in Section 8.

2.4 Acknowledgments

The Center for Environmental Studies of Argonne National Laboratory has performed this feasibility study for the Office of Federal Activities of the Environmental Protection Agency. The authors particularly wish to thank the Director of this office, Sheldon Meyers, for his guidance and direction. The staff of the Office of Federal Activities provided much needed assistance. In particular, William Holmberg, LCDR Robert Bartlett, and Rebecca Hanmer provided continual and valuable assistance throughout the duration of this project. This study required numerous contacts with individuals within the Environmental Protection Agency, in other federal agencies, and with state and local agencies. The list of these contacts is presented in Appendix A; the contributions of all are gratefully acknowledged and appreciated.

3.0 SOME RELEVANT ENVIRONMENTAL PROGRAMS AND LEGISLATION

The federal government has established a leadership role in the prevention, abatement and control of pollution through a comprehensive series of environmental programs and legislation. In particular, the Environmental Protection Agency integrates environmental management activities into a coordinated and comprehensive program. In fulfilling its mandate to define environmental quality standards and to provide leadership and assistance to state and local governments in establishing programs designed to achieve and enforce these standards, the EPA administers major environmental legislation and programs in the areas of air and water pollution, solid waste management, pesticides, radiation hazards, and noise abatement. The focus of this legislation is rather broad including a wide range of environmental programs, specifically, guideline development, standard setting, surveillance, monitoring and enforcement activities.

While the legislation represents a comprehensive effort to clean up the environment, the President and the Congress have also made a substantial effort to clean up the federal government's installations and to insure that federal activities achieve environmental standards. This effort includes legislation, Presidential Executive Orders (E.O.), and Office of Management and Budget Circulars. These programs can be divided quite naturally into three categories including:

- . Environmental Impact Statements
- . Control of Pollution from Federal Facilities
- . Environmental Controls in Federal Agreements (contracts, grants, loans, leases, licenses, permits, etc.)

A compilation of these programs is shown in Table 3.1 in which the appropriate legislative sections are indicated. Of prime concern in this study are the programs relating to the control of pollution from federal facilities, which provide a mechanism for the federal government to establish a leadership role in the control of pollution from federal facilities.

The development of these various programs has a rather lengthy and revealing history. One of the earliest orders, Executive Order 10014, signed on November 3, 1948, directs federal agencies to cooperate with state and local authorities in preventing pollution of surface and underground waters. Along a similar line, Executive Order 10779, signed on August 20, 1958, directs federal agencies to cooperate with state and local authorities to prevent the pollution of the atmosphere.

Using Executive Order 10014 as a basis, Executive Order 11258, signed on November 19, 1965, provides for:

- (1) Control of pollution in accordance with plans to be submitted to the Bureau of the Budget;
- (2) Compliance with pollution control standards, namely, secondary treatment;
- (3) Reduction of pollution caused by water resource projects and operations supported by federal grants to the lowest practical level;
- (4) Continuing review and surveillance of all activities to assure pollution control standards are met;
- (5) Provision of technical advice by the Secretary of Health, Education and Welfare to assist heads of other agencies in connection with this order;

Table 3.1 Federal Programs to Control Environmental Pollution
from Federal Government Activities

Program	
Environmental Impact Statements	<p>National Environmental Policy Act</p> <p>CEQ Guidelines for Federal Agencies under NEPA</p> <p>Clean Air Act</p> <p>Section 309</p> <p>Department of Transportation Act</p> <p>Section 4(f)</p> <p>Executive Order 11514</p> <p>OMB Circular #72-6</p> <p>OMB Circular #A-95</p>
Federal Facilities	<p>Clean Air Act</p> <p>Section 118</p> <p>Federal Water Pollution Control Act</p> <p>Section 313</p> <p>Solid Waste Disposal Act</p> <p>Section 211(a)</p> <p>Executive Order 11507</p> <p>OMB Circular #A-78</p> <p>OMB Circular #A-81</p>
Federal Agreements	<p>Clean Air Acts</p> <p>Section 306</p> <p>Federal Water Pollution Control Act</p> <p>Section 21(b)</p> <p>Solid Waste Disposal Act</p> <p>Section 211(b)</p> <p>The Airport and Airways Development Act</p> <p>Executive Order 11574</p> <p>Executive Order 11602</p> <p>State Certification of Activities Requiring a Federal License or Agreement</p>

- (6) The head of each agency assures compliance with Section 11 of the Federal Water Pollution Control Act as amended;
- (7) Water pollution control needs are considered in the initial stages of planning for each new installation or project.

Executive Order 11288, signed on July 7, 1966, simply specifies the Department of Interior as this implementing agency for water pollution control activities.

As an event which marked a turning point in federal programs, Executive Order 11282, signed on May 20, 1966, requires the heads of the various departments and establishments of the executive branch to provide leadership in the nationwide effort to improve the quality of our air through the prevention, control and abatement of air pollution from federal government activities in the United States. This Executive Order identifies the following goals:

- (1) Emissions to the atmosphere from federal facilities are minimized;
- (2) New federal facilities are to be constructed to meet the objectives described by the Department of Health, Education and Welfare;
- (3) The Secretary of the Department of Health, Education and Welfare in administering the Clean Air Act as amended provides technical advice to the heads of other departments in connection with this Executive Order;

- (4). The head of each department and agency insures compliance with Section 107(A) of the Clean Air Act as amended which declares that it is the intent of Congress that federal departments and agencies shall to the extent practicable and consistent with the interest of the United States and within available appropriations cooperate with the Department of Health, Education and Welfare and any air pollution control agency.

In Executive Order 11507, signed February 4, 1970, a program to insure the prevention, control, and abatement of air and water pollution from federal facilities is established. This Executive Order is much more comprehensive than its predecessors by specifying a basic policy that the federal government in the design, operation and maintenance of its facilities shall provide leadership in the nationwide effort to protect and enhance the quality of the air and water resources. Furthermore, OMB Circulars A-78 and A-81 provide procedures to carry out the air and water pollution control provisions of Section 5 of the Executive Order. These Circulars established agency responsibilities, required communications, applicable standards, and reporting requirements. In addition, proposed project reports and status reports were identified. The identification of the problems and their solution is left up to the individual agencies with technical assistance provided by the Environmental Protection Agency. Because this Executive Order is the culmination of federal programs to control pollution from federal facilities, a more detailed description is presented in Section 5, along with a discussion of the implementing Circulars A-78 and A-81.

In addition to these executive orders, the Clean Air Act, Water Pollution Control Act and Solid Waste Disposal Act all require compliance of federal facilities. Specifically, Section 118 of the Clean Air Act and Section 313 of the Water Pollution Control Act have similar provisions requiring any federal facility to comply with federal, state, interstate and local requirements regarding control and abatement of air and water pollution to the same extent that any person is subject to such requirements. The President may exempt any emission source from compliance if he determines it to be in the paramount interest of the United States to do so. Furthermore, under the provisions of Section 211(a) of the Solid Waste Disposal Act, all solid waste disposal practices by federal agencies must comply with the guidelines recommended under Section 3254c of the Act.

4.0 FEDERAL FACILITIES DESCRIPTION

In order to identify information requirements and generate a list of relevant federal facilities for consideration in the environmental management system, a rather summary description of federal facilities has been generated from existing information sources. This description includes estimates of the size and scale of the federal establishment and the mix of different types of facilities. From this description a determination of the manpower requirements, equipment needs and expenditures for the environmental management system can be made. Furthermore, this description proved useful in identifying the type of environmental information needed. In this section the results are summarized; however, details are presented in Appendix B.

The federal facilities were characterized by type, number and size. The type of facilities were classified under the main headings of sources with air, water, or solid waste problems. The facilities were classified by agency and included such diverse items as campgrounds, research labs, defense bases, hospitals, arsenals, reservoirs, airports, parks, penitentiaries, post offices, missile sites, a zoo, and steam power plants. The information was also categorized by real property in the United States, and air, water, and solid waste pollution abatement projects.

4.1 Summary of Real Property Owned by the Federal Government in the United States

The total real property owned by the Federal Government is reported annually by the General Services Administration in the Inventory Report on Real Property Owned by the United States Throughout the World. In this report, the installation provides the basis for analysis. An installation is defined as consisting of land, buildings, other structures and facilities, or a combination thereof. Installations vary in size and type, and include, for example,

national forests, national parks, hydroelectric projects, offices, warehouses, unimproved sites, etc. The real property as compiled by the General Service Administration was analyzed by Federal Sources Branch of the Division of Compliance, Office of Air Programs, Environmental Protection Agency. They distributed the real property by states in size categories based on total floor area. From their reports of June 1971 there are:

20551	total installations
10000	installations over 1500 square feet
1775	installations over 100000 square feet

Installations under 1500 square feet include facilities such as navigational aids, undeveloped building sites, telephone lines, etc., and probably do not present any pollution potential.

The installations of significant magnitude, over 100,000 square feet, probably represent the greatest potential pollution threat. California, New York, and Texas have the greatest number of installations in this category. California has greater than 200 installations; three states have 75-100 installations; five states have 50-75 installations; seventeen states have 25-50 installations; and twenty four states have 0-25 installations.

Moreover, a simple count of all installations shows that California, Texas, and New York have the greatest number of installations in all categories. The distribution of real property throughout the various EPA regions is shown in Table 4.1. Region V of the EPA with headquarters in Chicago and encompassing the Great Lakes States has the greatest number of installations or total property. The Philadelphia Region, Region III has the greatest number over 100,000 square feet and Region IV with headquarters in Atlanta has the greatest number over 1,500 square feet. Region I in New England with regional offices in Boston and Region VII with Kansas City headquarters have the fewest number of installations.

TABLE 4.1 Distribution of Real Property Owned by
the Federal Government by EPA Region

<u>Region</u>	<u>All Property</u>	<u>Over 1500 Sq. Ft.</u>	<u>Over 100,000 Sq. Ft.</u>
Region I	1177	719	103
Region II	1270	707	130
Region III	1889	1165	294
Region IV	2482	1537	252
Region V	2725	1536	209
Region VI	2286	1175	179
Region VII	1378	628	97
Region VIII	2455	821	115
Region IX	2004	1023	272
Region X	2546	686	128

RegionStates

I	Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont.
II	New York, New Jersey, Puerto Rico, Virgin Islands.
III	Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, West Virginia.
IV	Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee.
V	Illinois, Indiana, Minnesota, Michigan, Ohio, Wisconsin.
VI	Arkansas, Louisiana, New Mexico, Oklahoma, Texas.
VII	Iowa, Kansas, Missouri, Nebraska.
VIII	Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming.
IX	Arizona, California, Hawaii, Johnston Island, Nevada, Guam American Samoa.
X	Alaska, Idaho, Oregon, Washington.

4.2 Estimation of the Number of Polluting Sources

Any attempt to estimate the number of federal facilities to be included in a federal environmental management program is hampered by the lack of detailed data on the number, type and size of federal facilities and the scarcity of environmental information about federal facilities. The estimate presented in this section is based on the small amount of existing data and contacts made with federal agencies to obtain more current, accurate data. In this section, two estimates of the number of polluting sources are prepared. One is an upper bound estimate which attempts to include all sources with a pollution potential. The other includes only major sources of pollution. Both the criteria for selecting sources and the method of estimation are described in this section.

The Fifteenth Report by the Committee on Government Operations entitled Disposal of Sewage and Industrial Wastes by Federal Installations, summarizes federal agency wastewater disposal practices as of December 1960. This report also describes the most recent and detailed inventory of disposal practices at federal facilities. Installation wastes were classified as waterborne, which includes sewage and industrial wastes, and nonwaterborne, which includes privies or ground discharge in isolated areas. The inventory, performed by the Government Accounting Office revealed that there were 17,799 waterborne waste discharges and 4,857 nonwaterborne waste discharges. Of the total of 22,656 discharges, 8,156 were connected to public sewers. Thus, approximately 9700 waterborne waste discharges were identified. In preparing the upper bound estimate of potential pollution sources, the 9700 waterborne waste discharges was used. The 8,156 discharges connected to public sewers were not included as they represented no clear pollution potential and the 4,857 nonwaterborne waste were not included as these principally are privies. The majority of which represent no problem or have since been cleaned up.

The Fifteenth Report by the Committee on Government Operations also identified all the installations meeting the following size criteria:

Does the installation discharge to surface waters or the ground (not into public sewers) either untreated sewage or untreated industrial wastes (excluding cooling water) at a rate of 3,000 or more gallons per day, or nonwaterborne wastes of 200 or more persons per day; or has it received a notification from a government agency that a pollution condition exists?

This report identifies 1,003 installations which met the criteria. The Department of Defense owned the greatest number with 588 installations or 58% of the total. The Departments of Defense, Agriculture and Interior constituted approximately 90% of the total. The geographic distribution of these installations is shown in Table 4.2.

Four regions, Region IV, VI, IX, and X have greater than 100 installations; two regions, Region III and VIII, have approximately 70 installations and four regions, Region I, II, V, and VII have less than 40 installations. In addition, the status of pollution abatement at these 1,003 installations was assessed. Of the total, 59 installations were in the preliminary engineering design phase of a pollution abatement project; 11 installations had pollution abatement projects under construction; 92 installations were connected to a public sewer, and 537 had adequate treatment. In making the estimate of the major sources of pollution, the 1,003 major water installations were considered.

Although these 1,003 installations constituted only 5 percent of the total number of discharge points, they generated a large majority of all wastes discharged by federal installations, as shown by the December 1960 inventory, namely: 99 percent of the untreated sewage discharged to surface waters; 70 per cent of all waterborne sewage discharged to the ground; 58 per cent of the

TABLE 4.2 Distribution of Water Pollution Abatement Facilities by Agency and EPA Region

Agency Region	Agriculture	Air Force	Army	Commerce	Corps of Engineers	FAA	GSA	HEW	Interior	Justice	Navy	Smithsonian Institution	TVA	Treasury	VA	Total
1	3	6	3	0	0	0	2	0	8	0	6	0	0	1	0	29
2	2	3	10	0	0	0	1	1	2	0	7	0	0	2	0	28
3	2	4	12	1	8	1	5	0	5	0	25	1	2	1	2	79
4	7	17	57	0	16	0	2	1	22	0	13	0	5	5	1	146
5	10	4	5	0	7	0	2	0	6	0	3	0	0	0	0	37
6	6	16	40	0	49	1	0	1	12	2	1	0	0	0	2	129
7	0	2	8	0	7	0	1	0	6	0	1	0	0	1	1	27
8	6	4	7	0	14	0	0	2	28	0	0	0	0	0	0	61
9	44	9	14	2	6	0	1	0	11	0	41	0	0	1	0	129
10	42	6	4	0	9	13	0	2	16	1	8	0	0	3	0	104
Total	122	71	157	3	116	15	14	7	126	3	105	1	7	14	6	

non-waterborne sewage generated; 94 percent of all cooling water and 90 per cent of all other industrial wastes (excluding fish hatchery flow through water) discharged to surface waters; and 62 per cent of all industrial wastes discharged to the ground.

The National Air Pollution Control Administration, Federal Facilities Branch, Division of Abatement prepared reports on air pollution from federal facilities in the first 34 air quality control regions. The reports presented the status of the federal facilities in the regions regarding implementation of the objectives prescribed by the Clean Air Act and Executive Order 11507. A quantitative evaluation of emissions, data on fuel burning and refuse disposal and abatement plans were included. It was found that there were 2,581 installations owned by the federal government within the first thirty four air quality regions. By identifying the number of sources with fuel burning (excluding gas) and on site refuse disposal in the first 34 air quality control regions and then extrapolating to the present 234 air quality control regions, an estimate of 8,000 installations with air pollution problems was identified. This number was used in the upper bound estimate of potential pollution problems.

In estimating the major sources or point sources, the installations which emitted 100 tons/year or more of sulfur oxides, nitrogen oxides, hydrocarbons, carbon monoxide or particulates were considered. In the first 34 air quality control regions, 141 major sources can be identified. Of these sources, the Department of Defense had jurisdiction over 100 of these installations or 71% of the total. Extrapolation to the 234 air quality control regions gave a total of 920 major sources of air pollution for use in the major source estimate.

Estimates of solid waste disposal on federal lands are hampered by the complete lack of published data. Solid waste disposal on federal lands

occurs primarily on Department of Agriculture land (Forest Service) and Department of Interior land (National Park Service and Bureau of Land Management). A survey of personnel in these agencies indicates approximately 6,000 solid waste disposal sites including authorized and unauthorized disposal. This number was used in the upper bound estimate of potential pollution sources. This survey also revealed a total of 600 authorized sites excluding numerous Forest Service and Bureau of Land Management sites to be closed in the near future. These disposal sites were estimated to range in size from 30 to 80 acres. A survey of Regional EPA personnel indicated that this number was probably low; however, it was used in the estimate of major sources of pollution.

An analyses of the pollution abatement projects identified under Executive Order 11507 and OMB Circular A-78 and A-81 showed that there are 4,000 active pollution abatement projects. These projects are divided into various phases such as preliminary plans, design, construction, deferred, etc. Of the projects, approximately 3,000 are water related and 1,000 are air related and they require a capital outlay of approximately one billion dollars.

4.3 Summary of Source Estimates

The description of the federal facilities which was generated gives an idea of the size and scale of the federal establishment. It will be used to generate manpower requirements and expenditure requirements for the environmental management system. In order to formulate a list of relevant federal facilities, an upper bound estimate of potential pollution sources and a major source estimate were generated. The upper bound included all potential pollution problems and it was found there were:

- a) 9,700 waterborne waste discharges
- b) 8,000 potential air pollution facilities
- c) 6,000 solid waste disposal sites

The sources comprising the major source estimate were (1) water sources with 3,000 or more gallons per day of waterborne wastes and a population of 200 persons/day for nonwaterborne wastes, (2) all air pollution sources with emission of 100 tons/year of sulfur oxides, nitrogen oxides, hydrocarbons, carbon monoxide or particulates and (3) all authorized solid waste disposal sites. The major sources were categorized as:

- a) 1,000 water pollution potential sources
- b) 920 air pollution potential sources
- c) 600 solid waste sites.

These estimates identify individual pollution sources. In many cases several sources may be confined to a given installation, such as a DOD base. However, each individual source must be considered separately in estimating resource requirements.

5.0 THE EXISTING PROGRAM OF ABATEMENT, PREVENTION AND
CONTROL OF POLLUTION FROM FEDERAL FACILITIES

5.1 Executive Order 11507

Pollution abatement at federal facilities is currently handled under the provisions of Executive Order 11507 of February 4, 1970. This order follows a chain of Executive Orders dating back several years and also refers to other parallel environmental legislation such as the Clean Air Act and the Water Pollution Control Act. (See Section 3 for a more detailed description of pertinent legislation). The Order deals with the prevention, control and abatement of air and water pollution at federal facilities. It establishes the policy: "It is the intent of this Order that the federal government in the design, operation and maintenance of its facilities shall provide leadership in the nationwide effort to protect and enhance the quality of our air and water resources."

The Executive Order specifies quite clearly that the individual federal agencies are responsible for identification, design and construction of pollution abatement projects with the assistance of the Department of Health, Education and Welfare. This situation has of course changed considerably with the development of the national environmental protection program and the creation of the Environmental Protection Agency, which now provides the required coordination. The Executive Order has been directed towards eliminating existing and highly visible pollution programs under a fairly tight time constraint (the Order calls for pollutant abatement projects to be completed or underway no later than December 31, 1972). Through two circulars provided by the Office of Management and Budget (OMB), the Executive Order provides a mechanism

for funding of pollution abatement projects at federal facilities. It is therefore a responsive system in that it is concerned primarily with abating existing problems. There is, in general, a lack of coordinated planning with the exception that the EPA provides review of all abatement projects and attempts to rank them according to various criteria that do not reflect in many cases the actual quantitative determination of compliance with applicable standards.

The overall impact of Executive Order 11507 has certainly been in a direction consistent with the intent, that is, to reduce pollution at federal facilities. However, the question of how effective the overall program has been is less clear. It is estimated that approximately two billion dollars has been spent or is earmarked for programs to control pollution at federal facilities since 1966. With existing information it is impossible to estimate for example, how many tons of air pollutants or equivalent gallons of untreated sewage have been abated per unit cost. A more comprehensive, centrally maintained, data base would provide the needed information to manage the overall federal facility environmental program and to allow the assessment of effectiveness. In addition, it could provide a national perspective and a more objective priority setting procedure.

5.2 Existing Information/OMB Circulars A-78 and A-81

The forms designated by OMB to be used for funding requests through Executive Order 11507 are the Circulars A-78 for air pollution and A-81 for water pollution. The two circulars are, however, quite similar. Each of these circulars consists of an Exhibit 1 which is a proposed project report and Exhibit 2 a status report. Figures 5.1 and 5.2 are sample exhibits from an A-78 Circular. In practice, a complete

Fig. 5.1 AIR POLLUTION PROPOSED PROJECT REPORTEXHIBIT 1
Circular No. A-78
Revised

AGENCY: Department of Government

Project No.: 101
Date prepared: 6-30-69
Date revised: 6-30-701. *Facility*

GSA Inventory Control No.: 20201

Name: Regional Laboratory
Address: Boston, Suffolk, Massachusetts
(City, county, State)2. *Source of pollution, type(s) of pollution, and amount(s)*Power plant, particulate matter from combustion of coal, 2 lb./10⁶ BTU.3. *Description of existing control being provided*

Mechanical collectors

4. *Proposed remedial measures*

Convert boilers from coal to gas

5. *Proposed measures are necessary to meet*

a. Air Quality standards and Implementation plans

- (1) State _____
- (2) Region _____
- (3) Actual standard or exact citation _____

b. Secretary's regulations: 42 CFR section 76.4a(8)

c. Other (explain):

6. *Performance specification (if different from item 5 above)*

Same

7. *Costs of pollution control measures (in thousands of dollars)*

Total costs: \$100 for conversion

Cost by fiscal years and appropriation account:

1970: \$10 for design—Design account

1970: \$90 for construction—O&M account

8. *Estimated additional operating and maintenance costs, if available*

None. Savings expected.

9. *Other relevant information*

Fig. 5.2 AIR POLLUTION STATUS REPORT

EXHIBIT 2
Circular No. A-78
Revised

AGENCY: Department of Government

Agency contact: Roger L. Smith
Telephone: 395-9019

Page 1 of 1
Quarterly Reporting Date:
June 30, 1970

PROJECT NO.	PROJECT NAME AND LOCATION	PROJECT COSTS (\$1000's)							PRESENT COST ESTIMATE	STATUS
		Amount in President's Budget or Agency Plan (and amount appropriated or funded)								
		1968	1969	1970	1971	1972	1973	Post 1973		
3	SECTION A (Completed Projects) Office Building #7, Portland, Me.		112 (100)						100	COMPL 10-69
2	Training School, Boonton, N.J.		58 (0)	58 (58)#					0	
	Total, Sect. A		170 (100)	58 (58)					100	DEFER 9-71. Cost increase, additional funds now being reprogrammed to project. PP 7-71. Not scheduled for 1972 because technology still being tested at San Francisco facility. OTHER. Appropriate technology under study for this special problem. Extension request pending at BOB.
1	SECTION B (Active Projects) District Office, Buffalo, N.Y.			80 (80)					105	
4a	Research Laboratory, Cleveland, Ohio (incinerator)				27				27	
4b	Research Laboratory, Cleveland, Ohio (heating plant)					85			85	
5	Firefighting school, Boston, Mass.						500		500	
6	Smelting plant, Houston, Tex.							1,000	1,000	
	Total, Sect. B			80 (80)	27	85	500	1,000	1,717	

#Funds not used.

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set of exhibits is submitted to OMB at the initial implementation of Executive Order 11507; thereafter, Exhibit 2 is updated and submitted quarterly and Exhibit 1 is submitted only for new projects or for major revisions of prior submissions.

The information flow under the current system is shown schematically in Figure 5.3. In general, the individual project definition and details are prepared at the federal facility level. These reports are then consolidated at the headquarters level of the federal agency where the annual reports are prepared. These are then forwarded to the Office of Management and Budget for review and copies are sent to the EPA for consulting purposes. Finally, information copies are forwarded to each of the EPA regional offices.

The technical information is provided on the Exhibit 1 form which describes, in general terms, the type of facility, the nature of the pollution, remedial measures, the appropriate standard or measures to be met and the cost of the project. This information is quite brief and inadequate, in most cases, for the determination of compliance with actual emission or effluent standards.

In its role as a consultant to the federal agencies and the Office of Management and Budget, the EPA reviews the reports and in turn, submits its findings and recommendations to OMB for use in preparing agency budget submissions to the Congress for the next fiscal year. When received, each report is reviewed at headquarters for completeness and consistency. In addition, engineers in the EPA regional offices review each project. Guided by judgments and a set of evaluation criteria, reviewing engineers examine each project proposal to determine whether (1) all needs are identified, (2) the proposed improvements are adequate,

Fig. 5.3 INFORMATION FLOW UNDER EXECUTIVE ORDER 11507

and (3) the proposed funding and implementation schedule is timely when measured against state and local pollution clean up programs.

5.3 The Interim Management Information System for Federal Facilities

In parallel with the Argonne study, the Office of Federal Activities (Bartlett 1972) has prepared a computerized interim management information system consisting primarily of data keypunched from the A-78 and A-81 Circulars and additional data derived from the regional offices. The information, at least in the early stages, will be restricted to that contained in the Exhibit 2 form. This system is being implemented to satisfy the shortrun requirements of the Office of Federal Activities. The basic goals of the interim system are:

- 1) To implement the computerized data system consisting of Exhibit 2 by September 30, 1972.
- 2) To utilize the system within OFA to review federal agencies' budgets requests for fiscal years 1974.
- 3) To prepare a proposal to OMB for inclusion of the automated system into future revisions of the A-78 and A-81 reporting requirements.
- 4) To provide flexibility to include analyses and information requirements based upon recommendations brought forth by the Argonne study.

5.4 The Need for Change in the Pollution Control System

A critical review of the current federal facility pollution abatement system considering the rapidly changing environmental scene has identified deficiencies which should be considered in the future environmental management of federal facilities. These deficiencies are described below.

Operation and Maintenance

As mentioned, the current executive order has placed emphasis on abating existing pollution problems. Typical abatement projects include: upgrading sewage treatment plants, installation of pollution control equipment, conversion of fuels, etc. While most of the major projects have been completed or funded as required, there will undoubtedly be a residual flow of funding requests in the future. However, continued protection of the environment depends on the satisfactory operation and maintenance of the large scale projects that have been completed. It is quite critical for example that a modern sewage treatment plant be properly maintained and operated for continued effectiveness. It is therefore necessary that the Federal Facility Program shift in emphasis to some degree, towards the operation and maintenance and continued prevention of pollution abatement as well as maintaining the aspects of the existing project-oriented program.

Environmental Planning

Consequences of future construction and development of federal facilities particularly on the vast quantities of federal lands in the West need to become an integral part of the overall environmental management system. As stated above, the emphasis in the current executive order has been in abating existing pollution sources and attention must now be devoted as well to the impact of future use of federal property. It is important that environmental considerations be factored into the federal government planning process at an early stage. This will allow for the development and evaluation of alternatives to reduce or prevent excessive environmental impacts.

Compliance Evaluation

The current executive order through Exhibits 1 and 2 of the OMB circulars provides data to the EPA for establishing priorities. However, this is largely subjective and is aimed at eliminating the high visibility sources first. If compliance with the wide range of federal, state and local emission and effluent standards and limitations is to be achieved, additional data and reporting requirements will be necessary. This would facilitate a more quantitative analysis and evaluation of pollution abatement and prevention projects.

Unified Procedures and Information Requirements

The major responsibility for abatement projects lies with the individual agencies. Each agency has approached its environmental programs in a different way and it is difficult to make effective comparisons on a regional or inter-regional basis. A common denominator of procedures and information should be developed which would allow the operation and evaluation of the environmental management program from a national perspective.

Response to Changing Environmental Requirements

The rapid progression of environmental programs which has evolved over the past few years will undoubtedly continue. Environmental legislation has required accelerated programs in areas where little incentive previously existed. The Clean Air Act and the Water Pollution Control Act have had tremendous implications with regard to expenditures for pollution abatement. In addition, several new areas which will pose additional constraints are on the horizon (these include aircraft emissions, solid waste management, hazardous materials, noise abatement and a wide range of new air and water pollutants). It is important therefore that

the next generation of executive orders or other environmental legislation pertaining to federal facilities include flexibility to allow for issuance of revised guidelines, procedures, standards, and measurements. In essence, the future environmental management system should be based on the concept of providing the appropriate authority from which guidelines, standardized procedures and data requirements may be issued by EPA to other federal agencies on an as-needed basis.

Projects Eliminated

In order to have an effective and comprehensive environmental program, all projects requiring attention must be identified. Individual agencies utilize a chain of command approach in identifying the abatement projects: The facility engineer identifies the projects requiring funding, and these are then reviewed by local and intermediate commanders/managers before submittal to agency headquarters. It is up to the discretion of the reviewers which projects are to be included and, as a result, projects may be eliminated. Thus, not all projects are being identified under the current federal facility pollution abatement system.

6.0 ENVIRONMENTAL MANAGEMENT OF FEDERAL FACILITIES

The broad range of environmental conditions at federal facilities and the short and long range costs of implementing environmental standards require that latest and best management tools and techniques be applied to insure compliance of federal facilities with environmental standards.

Attempts to improve environmental conditions at federal facilities could be enhanced by a management system which provides reliable and standardized data, inspections, monitoring and other engineering techniques. In addition, suitable mechanisms for disseminating information to applicable parties which results in (1) cooperation and communication among EPA, federal agencies, and state, local and interstate agencies; and (2) enhanced understanding of the relationship between federal facilities and their environmental effects could be useful in the prevention, control, and abatement of pollution from federal facilities. Finally, a comprehensive, unified environmental management system could assist federal agencies in meeting the requirements of applicable environmental programs and legislation such as E.O. 11507, OMB Circulars A-78 and A-81, Clean Air Act, Federal Water Pollution Control Act, and the Solid Waste Disposal Act.

Some of the more general objectives of an environmental management system are to:

- (1) Provide a government-wide strategy for the prevention, control and abatement of environmental pollution from federal facilities; in particular, insure federal facility compliance with federal, state, and local standards, emission and discharge limitations and implementation schedules;

- (2) Provide a framework for coordination and cooperation among the Environmental Protection Agency, federal agencies, and state, interstate and local agencies;
- (3) Enable the federal government in the design, operation and maintenance of its facilities to provide leadership in the nationwide effort to protect and enhance the quality of our air, water, and land resources through timely compliance with environmental quality standards and in full cooperation with state and local governments; and
- (4) Provide knowledgeable allocation of EPA efforts and federal resources toward abatement, control, and prevention of environmental pollution from federal facilities.

6.1 The Elements of the Environmental Management System

The environmental management system should be operable in two alternative modes, either as a compliance control or an environmental planning device. In an environmental planning mode, the environmental management system would identify certain environmental consequences of present and future federal agency activities. In particular, aggregated data (such as pollutant source projections or estimates and budgetary data on a state, regional, or federal agency basis) would be used in a possible annual review process with federal agencies. In a compliance control mode, the environmental management system would provide a framework for insuring compliance of federal facilities with applicable environmental standards. Although the environmental management systems described in this report are by design rather flexible, major emphasis has been placed on the compliance control mode.

In order to insure compliance of federal facilities with environmental standards, the environmental management system must provide for (1) dissemination and interpretation of regulations; (2) identification of situations in which pollution abatement projects are needed; (3) evaluation of pollution abatement projects and schedules; (4) monitoring of the progress of pollution abatement projects; (5) detection of violation of standards; and (6) response to complaints.

The operating procedures which are utilized in an environmental management system provide a description of the information flow, responsibilities, roles and agency actions. Regardless of which environmental management system is chosen, the operating procedures are comprised of a few basic techniques for insuring compliance which are:

- (1) Reporting Form Review which provides a summary review of environmental programs and identifies problems. The reporting forms keep track of pollution sources, control devices, emissions, effluent data, and compliance and fiscal data;
- (2) Engineering Evaluation which provides an evaluation of plans to install a pollution abatement project;
- (3) Engineering Inspection which provides a routine inspection to insure the accuracy of reporting forms, proper operation and maintenance, etc.;
- (4) Effluent Monitoring which includes direct effluent and emission tests; and
- (5) Complaint Inspections in response to specific complaints about a facility.

In addition to these basic scheduled or routine activities, technical advice and assistance is provided regarding methods and techniques for pollution abatement, prevention and control in the design, construction, operation and maintenance of federal facilities. Furthermore, for each concept, it is assumed that EPA would continue its present role of assisting the Office of Management and Budget (OMB) and the federal agencies in the decision-making process for funding of pollution abatement projects. The environmental systems presented in the next section are described in terms of these basic activities (see Section 8 for a more detailed discussion of these activities).

6.2 Alternative Environmental Management Systems

In this section the operating procedures and information requirements of three alternative environmental management system concepts are presented. The federal environmental information system, including information storage and retrieval and required reports are described in Section 7. Although the three alternative environmental management system concepts described are certainly not exhaustive, they do represent the broad range of possibilities and can be used to indicate the nature and type of programs that should be developed. Though all the programs presented represent some change from present practices, one of the alternatives is fairly representative of the present program, while the other concepts represent a major departure from present practices.

The three alternative concepts are summarized in Table 6.1 which shows the responsibilities for the basic activities that need to be performed in order to insure compliance of federal facilities with the applicable environmental standards. In Table 6.2, the positive and negative effects of the

Table 6.1 Environmental Management System Responsibilities

ALTERNATIVE	Concept I	Concept II	Concept III
ACTIVITY			
REPORTING FORM REVIEW	EPA, State	State	EPA, State
ENGINEERING INSPECTION	FF	State	EPA
ENGINEERING EVALUATION	FF	State	EPA
EFFLUENT MONITORING	FF	State	EPA
COMPLAINT INSPECTION	EPA, State	State	EPA, State
TECHNICAL ADVICE	EPA	EPA	EPA

TABLE 6.2 Positive and Negative Effects of the Environmental Management Systems

	Positive Effects	Negative Effects
Concept I	<ul style="list-style-type: none"> (1) Applicability to all source types and media. (2) Integration and coordination of all federal agency actions provide <ul style="list-style-type: none"> (i) Enhanced environmental awareness by federal facilities (ii) Opportunity for agency and government-wide environmental planning, quality of life assessment, etc. (3) Uniform government-wide approach provides economic benefits including <ul style="list-style-type: none"> (i) Decreased difficulty in collecting data (ii) Speedup of the bureaucratic structure to produce results (iii) Economy of scale. (4) Multidisciplinary approach which accents the interplay among the components of the environment - air, water, and land. 	<p>Low level of state agency involvement and complete integration of EPA and federal facility actions could cause state agencies to lose confidence in EPA credibility.</p>

TABLE 6.2 Positive and Negative Effects (Contd.)

	Positive Effects	Negative Effects
Concept I	<p>(5) Utilization of existing capabilities of</p> <ul style="list-style-type: none"> (i) Federal agencies in engineering design and inspection (ii) EPA in problem solving, technical assistance, and pollution abatement project review. 	
Concept II	<ul style="list-style-type: none"> (1) Utilization of existing capabilities of state agencies in air and water pollution abatement. (2) Administrative independence of state agencies from federal agencies creates active pursuit of non-compliant facilities. 	<ul style="list-style-type: none"> (1) Applicability to <ul style="list-style-type: none"> Air - existing stationary sources Water - all source types Air Pollutants (Set I and Set II) (2) Non-uniform approach with <ul style="list-style-type: none"> (i) Increased data collection costs (ii) Historical difficulty in data collection by states (iii) Multiple attack of federal agencies by states with varying information and procedural requirements (iv) Enforcement orientation and no environmental planning.

TABLE 6.2 Positive and Negative Effects (Contd.)

	Positive Effects	Negative Effects
Concept III	<ul style="list-style-type: none"> (1) Applicability to all source types and media. (2) Integration of all federal agency actions provides <ul style="list-style-type: none"> (i) Opportunity for agency and government-wide environmental planning, quality of life assessment, etc. (3) Uniform government-wide approach provides economic benefits including <ul style="list-style-type: none"> (i) Speedup of bureaucratic structure to produce results (ii) Economy of scale. (4) Multidisciplinary approach which accents the interplay among the components of the environment - air, water, and land. (5) Utilization of existing capabilities of EPA in problem identification. 	<ul style="list-style-type: none"> (1) Low level of state agency involvement could cause state agencies to lose confidence in EPA credibility. (2) Previous EPA experience did not emphasize detailed engineering design evaluation. (3) Lack of regular involvement of federal facility personnel in environmental matters could lead to a decreased environmental awareness and more operation and maintenance problems.

alternative environmental systems are briefly summarized. In the attached table and the accompanying figures "federal facility" (FF) refers to both the installation itself and the key organizational level responsible for planning and programming pollution abatement measures and other environmental actions (regional offices, individual facility area offices, etc.); "state" refers to the applicable state, interstate, or local pollution control agency.

Concept I is based upon the assumption that federal facilities have the engineering capabilities to design, operate, and manage federal facilities to achieve environmental standards. The principal difficulty is assumed to be non-familiarity with standards and identification and solution of specific unresolved problems. With this concept, the federal facility has responsibility for engineering inspections, engineering evaluation and effluent monitoring. The prime responsibilities of EPA are to review summary reports, perform complaint inspections and provide technical assistance on an as-needed basis. This concept is fairly representative of the present situation, except for increased responsibility by the federal facility and enhanced communication resulting from the summary reports filed by the federal facility.

An action flow diagram depicting the operating procedures is shown in Fig. 6.1. The environmental management system can be conveniently divided into three phases (compliance program design, funding and construction, and operation and maintenance) which are depicted by the color scheme shown in this figure. The performance of the basic activities is shown in this figure by the indication of the agency and the action. A double box indicates that the agencies cooperate in performing the activity. Note again that although provision of technical assistance is not specifically shown, it pervades the various phases of the environmental management system.

FIG. 6.1

FLOW DIAGRAM FOR CONCEPT I

As noted in this figure, EPA receives and reviews summary reports which are prepared by the federal facility in carrying out its responsibilities (see Section 7 for a discussion of the individual reports). EPA forwards these reports to the appropriate state agency for review and comment. In this concept, the operations of the facility will be subject to periodic inspections and monitoring by the federal agency with EPA assisting the federal agency in the design and implementation of its inspection and monitoring systems. Inspection and monitoring reports prepared by the federal facility would summarize the environmental conditions and any problems identified. These reports would be provided to EPA and the states along with a summary periodic report which indicates any environmental changes such as source modification or new pollution abatement projects. The reports prepared by the federal facility would identify and resolve specific problems which require solution and would assist EPA and the states in reviewing the facility compliance program. Specifically, these reports could also be used to (1) review compliance programs, (2) review operation and maintenance practices, (3) identify the need for and provide technical advice and assistance, (4) identify needed personnel, training and environmental skills, and (5) assist the federal agencies in funding requests to the Office of Management and Budget.

Furthermore, the EPA and the states have the responsibility for complaint inspections with this concept. In fact, the EPA has the prime responsibility for complaint inspections; however, the state agency would be invited on all complaint inspections by the EPA and the state could also initiate a complaint inspection if the need arose for one. As a result of the reporting form review, the EPA and the state would have the responsibility to serve notice to all facilities for failure to meet environmental standards and emission

limitations for compliance programs.

Because the environmental considerations are extensively internalized within the federal facility in this concept, the EPA environmental information requirements are not substantial. The following information requirements can be identified (see Appendix C for a more detailed description):

- (1) Identification data including facility description, environmental contact and location;
- (2) General description of pollutant sources and control equipment including type, size, and efficiency;
- (3) Emissions and effluent data; and
- (4) Compliance and fiscal data such as compliance status, date of compliance, remedial measures, project status and schedule, applicable standards and project costs.

The principal positive and negative effects of Concept I are detailed in Table 6.2. In summary, the principal positive effects are (1) the broad applicability to all source types, and media (air, water and solid waste); (2) the integration and coordination of all federal government actions, which lead to the opportunity for agency and government-wide environmental planning and enhanced environmental awareness by federal facilities, develop a true leadership role by the federal government in the nationwide effort to protect and enhance the quality of our environment; and (3) the uniform, government approach results in various economic benefits, including reduced difficulty in data collection, economy of scale, etc. As a multidisciplinary approach, the interplay among the various components of the environment would be accented and integrated solutions to problems would be developed, rather than one-time solutions which neglect environmental spill-over effects. Finally, this concept

utilizes both the existing, demonstrated capabilities of EPA in problem solving, providing technical assistance and review of pollution abatement projects and the capabilities of the federal agencies in engineering design and engineering inspections. The principal negative effect of this alternative is that the low level of state agency involvement and the complete integration of EPA and federal facility actions could cause state agencies to lose confidence in EPA credibility.

Concept II is based on the assumption that the federal facilities do not have the engineering capability for design and evaluation of pollution abatement projects, nor the capability for environmentally sound operation and maintenance. The principal difficulties are assumed to be nonfamiliarity with standards, interpretation of regulations, identification and solution of problems and proper design of pollution abatement projects. In this scheme, the states have complete responsibility for all activities which need to be completed in the environmental management system. This concept is representative of what would develop if the states determined compliance of federal facilities. The operating procedures are depicted in Fig. 6.2. Since the states would have responsibility for engineering inspections, engineering evaluation, effluent monitoring, and compliance inspections, they would perform detailed engineering evaluations of pollution abatement projects, and the operations of the federal facilities would be subjected to regular inspection and monitoring by the state agency.

Initially, the state agency would notify the facility of changing and new environmental standards and interpret regulations for the individual facilities in order to insure proper pollution equipment design. Then the state agency would assist the federal facility in the identification, design, development and implementation of pollution abatement projects. The federal facility would have

FIG. 6.2

FLOW DIAGRAM FOR CONCEPT II

responsibility for sending detailed operating reports as specified to the states which would be used to do detailed evaluation of operation and maintenance programs. With this concept, the primary responsibilities of EPA are to assist the federal agencies in obtaining needed funding for pollution abatement projects, and to provide needed technical assistance and advice. In this case, EPA depends on the federal facility to seek technical advice. In order to perform its function in this concept, the rather summary information requirements of EPA which are nearly identical to those presently collected through OMB Circulars A-78 and A-81 include:

- (1) Identification data such as facility description, environmental contact, and location;
- (2) Summary descriptions of pollution source and control equipment; such as type and efficiency;
- (3) Emission and effluent data; and
- (4) Compliance and fiscal data such as compliance status, date of compliance, remedial measures, project status, schedule, applicable standards, and project costs.

The principal positive and negative effects of Concept II are detailed in Table 6.2. Specifically, this concept relies on (1) the existing capabilities of the state agencies in air and water pollution abatement and (2) the administrative independence of state agencies from federal agencies which creates active pursuit of non-compliant facilities. On the negative side, the limited applicability of this concept to only existing stationary sources of air pollution and all water pollution sources eliminates the opportunity for a uniform, government-wide approach. Thus not only would federal agencies be required to meet the varying requirements of states for information and reports, but the EPA would

have responsibility for some source types and media and the states would have responsibility for the other source types and media, possibly leading to overlapping requirements, increased costs and delays.

Concept III is essentially identical to Concept II, except that the major activities are performed by EPA rather than the state agency. This concept is also based on the assumption that the federal facilities do not have the engineering capability for the design and evaluation of pollution abatement projects, nor environmentally sound operation and maintenance; in fact, the principal difficulties are assumed to be nonfamiliarity with standards, interpretation of regulations, identification and solution of problems, and proper design of pollution abatement projects. With this concept, EPA takes a much more aggressive role in insuring compliance of federal facilities. The operating procedures, depicted in Fig. 6.3 and summarized in Table 6.1, show the EPA performs engineering inspections, engineering evaluation, and effluent monitoring. In addition, the EPA has prime responsibility for complaint inspection; however, the state agency would be invited on all complaint inspections by the EPA, and the state could also initiate a complaint inspection. Initially, the EPA would notify the federal facility of the appropriate environmental standards and interpret the regulations for the individual facilities in order to insure proper pollution abatement project design. Then the EPA, using the detailed engineering plans as a basis, would assist the federal facility in the identification, design, development, and implementation of pollution abatement projects. The federal facility would forward rather detailed operating reports to EPA for evaluation of operation and maintenance programs. In addition, inspection and monitoring reports prepared by the EPA would be rather detailed. Both the EPA and the state agency would review all reports with information

FIG 6.3

FLOW DIAGRAM FOR CONCEPT III

flowing to the EPA and then forwarded to the state agency for evaluation.

The reports prepared within this concept would be used to (1) assess compliance, (2) evaluate operation and maintenance programs, (3) evaluate pollution abatement project design, (4) identify problems, and (5) assist the federal agencies in funding requests to the Office of Management and Budget.

In order to accomplish the objectives of EPA in this concept, the rather detailed information requirements include:

- (1) Identification data describing federal facilities, environmental contact and location;
- (2) Detailed description of pollution sources including type, size, and operating characteristics;
- (3) Detailed description of pollution control equipment including type, size, efficiency, physical description, etc.;
- (4) Emission and effluent data;
- (5) Detailed description of operation and maintenance programs;
- (6) Detailed engineering design and construction plans for pollution abatement projects; and
- (7) Compliance and fiscal data such as compliance, status, date of compliance, remedial measures, project status and schedule, applicable standards, and project costs.

The principal positive and negative effects of Concept III are shown in Table 6.2. The principal difference between this concept and Concept I is the more aggressive role of EPA (i.e., EPA performs engineering inspections, engineering evaluations and effluent monitoring in Concept III); however, the resulting lack of regular involvement of federal facility personnel in environmental matters could lead to a decreased environmental awareness and thus more

operation and maintenance problems. Furthermore, previous EPA experience did not emphasize the detailed engineering design evaluations required with this concept. Finally, this concept could cause the state agencies to lose confidence in EPA credibility because of the low level of involvement of state agencies.

7.0 DESCRIPTION OF THE FEDERAL ENVIRONMENTAL INFORMATION SYSTEMS

In order to provide for the efficient retrieval, analysis, and display of the large amount of data produced and collected by the environmental management systems, an automated information storage and retrieval system will be required. A computerized information system would be used for some of the data in order to facilitate certain information requests, to analyze certain data (i.e., predict emissions from source descriptions, compare emissions with standards), and finally, to schedule certain activities such as inspections and reporting form preparation. While the environmental information systems described in this section consider only certain types of sources of air, water, and solid waste pollution, the systems design is intended to be easily expandable to additional source types and other media such as categorical waste.

The federal environmental information systems (FEIS) provide a service to the EPA, federal agencies owning and operating facilities, and other federal agencies with overview capabilities such as the OMB and CEQ. The information systems are designed to meet the requirements of the roles specified for EPA in each of the environmental management systems. One information concept is provided for each environmental management concept. In this section, the information systems are described, including input, output, and information flows. The input forms are based on existing data gathered by states as a result of the Clean Air Act, permits obtained under water quality legislation, and existing files maintained by the region. The approval for the design of the forms and information collection procedures will be developed at federal agency headquarters in collaboration with EPA headquarters. Subsequently, the information flow is from the federal facility

to the EPA with full agency cognizance and approval. In Appendix D, a more detailed description of the information storage and retrieval is presented, including data files and required programming. The information systems described here would not duplicate presently performed functions nor serve duplicating roles, but would rely on the existing demonstrated capabilities described in Section 7.3

7.1 Alternative Concepts

Concept I

The environmental information system which is developed for the storage and retrieval of information for Concept I requires comprehensive manual and automated data processing to achieve its objectives. The information is collected, processed, stored, and retrieved by various agencies. The federal facilities have prime responsibility for generating information which is sent to the EPA regional offices, while the EPA regions process the information which includes items such as keypunching, verifying, indexing, sorting, and updating of the information.

Figure 7.1 presents an overview of the information system. Regional data files and a headquarters or central data file exists to serve the various users. Regional data files contain detailed data for use by states, the EPA, and federal facilities. The headquarters data file contains summary information for use by EPA headquarters, federal agencies, OMB, and CEQ. Thus, while there are regional data files for certain users and a headquarters file for other users, all data is stored in one data base at a computer facility for easy access by all users. The EPA regional offices have access to a remote IBM 370/155 via teleprocessing terminals, telephone lines, etc. The information system described here relies on this large computer facility for storage of both regional data and the headquarters data.

(RDF - Regional Data File)

Fig. 7.1 Environmental Information System Network

The regional data file contains a rather detailed description of each facility such as (1) facility description, environmental contact, and location; (2) a general description of pollution sources and control equipment; (3) emissions and effluent data; and (4) compliance and fiscal data. Outputs from this data base would be used to (1) notify facilities of standards and required reports, information and actions, and (2) provide descriptions of the emissions, pollution abatement problems and compliance status of federal facilities to the state agency, the federal facility, and the EPA in order to identify problems, facility construction needs, review facility compliance, and (3) schedule EPA activities such as report preparation and review, identify missing reports, and other necessary actions.

The headquarters information includes rather summary data such as (1) facility description and location; (2) a summary description of pollutant sources and control equipment; (3) emissions and effluent data; and (4) compliance and fiscal data. Outputs from this data would be used to (1) assess the effectiveness of federal agency programs for the abatement, prevention, and control of pollution; (2) provide guidance in the selection of alternative pollution abatement, prevention, and control techniques by identifying the costs and effectiveness of alternative techniques; (3) assess the overall effectiveness of the federal government environmental program; and (4) identify priorities in pollution abatement at federal facilities.

Concept II

The federal environmental information system developed for Concept II analyzes, stores, and retrieves summary information comparable to the information presently being collected with OMB Circulars A-78 and A-81. For this concept, the automatic data processing system would be rather simple. One

data base would be developed to which all users would have access. Information would flow from the federal facilities to the regional EPA offices.

The regional EPA would forward data to EPA headquarters where the information would be keypunched, verified, indexed, sorted, and updated. The data base would contain rather summary information such as (1) facility description, environmental contact, and location; (2) summary description of pollution sources and control equipment (type and efficiency); (3) emissions and effluent data; and (4) compliance and fiscal data. Outputs from the data base would be used to assess the effectiveness of federal agency programs and overall federal government environmental programs, and identify pollution abatement priorities.

Concept III

The federal environmental information system developed for Concept III requires the most sophisticated information storage and retrieval system. Information is generated both by the EPA and federal facility, but the EPA regional offices process information, including keypunching, verifying, etc. This information system has many features in common with the information system developed for Concept I. The information system is shown conceptually in Fig. 7.1. As in Concept I, both the regional data file and the headquarters data file exist at one location on a centralized computer; however, the EPA regional offices have terminal or telephone line access to the regional and headquarters file. The regional data file contains the very detailed description of federal facilities (more detailed than the data in Concept I) and the headquarters data file contains summary information (identical to that in the Concept I headquarters data file). The outputs prepared by this information system would be used for the same purposes as those identified for Concept I. However, in addition, the information system

would schedule engineering inspections, monitoring, report preparation and review, and other necessary actions. In regard to this scheduling of activities, consideration should be given to using the Enforcement Management System being developed by the Office of Air Programs, Environmental Protection Agency. The Enforcement Management System provides a methodology for controlling enforcement activities which can utilize either automated or manual data processing.

7.2 Description of Information Flow, Input, and Output

An overview of the federal environmental information systems is presented in the preceding section. In this section, the information flow is described, including the generation of input and utilization of output. In particular, the agencies responsible for generating specific input reports and agencies receiving various outputs are identified. Not all information is computerized; only the information sufficient to prepare the specified outputs is prepared for computer processing. However, this generally represents the majority of the information requirements identified in Appendix C.

The potential input and output reports are identified first. Note that not all the input and output reports are needed for each concept; the information flow description details the utilization of the specific input and output reports.

7.2.1 Input Forms

The Registration Form includes identification, activity, compliance, and fiscal data. The identification data consists of facility description, environmental contact, and the location of the facility. The activity data indicates the source type such as fuel combustion, incineration, waste treatment or solid waste. The compliance and fiscal data includes the schedule of

completion of abatement projects and the cost and status of the projects. The registration form is used in a reconnaissance survey to gather general environmental information, identify potential problem facilities, and identify facilities for follow up.

The Compliance Program Form is collected one time and includes water, air, and solid waste pollutant source data, operation and maintenance data, and compliance and fiscal data. Pollutant source data includes a rather detailed description of the sources, treatment facilities, waste characteristics, emissions, and control equipment; the compliance and fiscal data includes the project schedule, project cost and status; and the operation and maintenance data consists of operator certification, inspection and monitoring programs, etc. The compliance program form is used to assess compliance, determine needs for pollution abatement projects, and identify and solve pollution problems.

The Periodic Report is an annual report which includes only changes and omissions in data previously submitted on the registration form and the compliance program form. It is used to update the registration and the compliance program forms.

The Inspection and Monitoring Form, filled out biennially or less, assesses the accuracy of registration and compliance program data and the adequacy of the operation and maintenance program. This form is used to ensure accuracy in reporting, identify unknown problems, make recommendations, assess compliance with environmental standards, and evaluate operation and maintenance programs.

The Complaint Inspection Form is filled out as needed. The content includes the type and date of complaint, possible sources of problems, duration of problems and subsequent action needed. This form would be used to identify and make recommendations for alleviating problems.

Engineering Plans are collected one time and contain detailed engineering design and construction plans. These plans are used for an engineering evaluation of pollution abatement projects.

7.2.2 Output Reports

The Facility Summary Report, issued annually or as needed, includes facility identification data, summary description of pollution sources and control equipment, and compliance and fiscal data. This report could be used to identify the environmental status of federal facilities, the required pollution abatement funds, the effectiveness of federal agency environmental programs, and assess priorities in pollution abatement programs.

The Facility Management Report is issued annually or as needed. The report gives qualitative and quantitative environmental trends at federal facilities and a summary description of compliance and fiscal data. This report could be used to identify national priorities in pollution abatement, assess the overall effectiveness of the federal government environmental program, and describe the nationwide effort to achieve environmental standards. This report would be of primary use to OMB and the Council on Environmental Quality.

The Pollution Abatement Report, an annual report, describes pollution abatement techniques, operation and maintenance programs, and inspection and monitoring programs at federal facilities. The data also includes the identification of usefulness, effectiveness and cost of the programs. This

report would be used to provide guidance in the selection and evaluation of alternative pollution abatement, prevention, and control techniques. Thus, this report would be used by the EPA in providing technical assistance, by the federal agencies in designing projects, and by the OMB in performing fiscal evaluations.

The Facility Notification Report is generated one time and identifies the frequency and content of required reports, the applicable standards and any required actions. The required programs to be carried on at the federal facilities are described such as operation and maintenance programs, inspection and monitoring programs, and operator certification. The report assists federal facilities in report preparation, pollution abatement project planning, and creates awareness of required reports, programs, and standards.

The Facility Status Report is issued one time and thereafter only following subsequent status changes. This report describes the compliance program, including pollution abatement problems, emissions and effluent data, and compliance status. Also included is an historical record of actions at a facility such as inspections, monitoring, and complaints. The report would be used to review facility compliance and to identify problems and facility construction needs.

The Facility Action Report, issued as needed, is a record of actions needed at a facility, including engineering inspections, effluent monitoring, etc. This report would be used to schedule the inspections, monitoring, report preparation and review, and other needed actions.

7.2.3 Information Flow

The information flow for Concept I is shown in Fig. 7.2. With this concept, the federal facility generates the registration form, the compliance program form, the periodic report, and the inspection and monitoring form, while the EPA and the states prepare the complaint inspection form. Figure 7.2 shows the flow of information from the regional EPA offices to the EPA headquarters. Output reports generated by the headquarters data file include the facility summary report, the management report and the pollution abatement report; while the output reports generated by the regional data file include the facility notification report and the facility status report.

The information flow for Concept II is shown in Fig. 7.3. With this concept, the federal environmental information system is rather simple; the federal facility prepares only the registration form and the periodic report. Outputs from this concept are the facility summary report and the management report.

As shown in Fig. 7.4, the information flow for Concept III is rather complicated. The distinction between Concept III and Concept I is that the EPA prepares the inspection and monitoring forms in Concept III. In addition, the facility notification report is generated in this concept which is used to schedule activities such as inspections, reporting form preparation, etc.

Fig. 7.2

INFORMATION FLOW FOR CONCEPT I

Fig. 7.3 INFORMATION FLOW FOR CONCEPT II

Fig. 7.4 INFORMATION FLOW FOR CONCEPT III

7.3 Compatibility with Existing Information Systems

A large amount of information is presently being collected and stored regarding the abatement of pollution at federal facilities. In particular, the regional EPA offices have had a long historical background regarding water programs stemming from the Public Health Service to the Federal Water Quality Administration and on to the EPA. As a result, there is a great amount of data in manual files regarding the abatement of water pollution, including waste treatment facility descriptions and waste discharge data. The air and solid waste programs have a much briefer historical background than the water program and the information available regarding air and solid waste problems at federal facilities is rather sparse. However, information systems described in this section would utilize the existing manual files as a source of data.

Numerous environmental information systems exist or are being developed by the federal government. A list of these information systems is presented in Appendix E. The Department of the Navy, in particular, has initiated the development of the Navy Environmental Protection Data Base which will interface with all levels of the Naval command to provide timely support of the field activities, including ships, aircraft and shore activities. This program will include identification of Navy generated environmental pollutants and cataloging of monitoring, field analysis, and data handling procedures.

Furthermore, the Forest Service, Department of Agriculture, has developed an automated information storage and retrieval system for its wastewater treatment facilities. This information system contains rather detailed data, including a description of waste treatment facility type and discharge data. Detailed information systems such as these, maintained by federal agencies, could serve a valuable role by providing in centralized locations much

needed data to the federal environmental information system and thus reducing data collection and analysis costs. Furthermore, these systems can satisfy the needs of the federal agencies for very detailed environmental data.

In addition to the above information systems, two EPA information systems, NEDS and STORET should be considered for potential use in maintaining federal facility data.

STORET, an acronym for STOrage and REtrieval, is the central computer-oriented segment of the National Water Quality Surveillance and Information System for storing and retrieving data and information on water related subjects. The system presently contains data primarily from geographic areas which have been the subject of a water quality study or enforcement action. The data consists of information which establishes a cause and effect relationship of water pollution. EPA is also encouraging the use of the system by state, other federal agencies, and local agencies with missions relating to environmental protection, water pollution control, or water research.

Access to the system is almost completely via a telecommunications network which utilizes primarily voice-quality telephone lines. A high speed computer permits accessing of data by many users simultaneously, making it responsive to the needs of a nationwide network of users. Data are stored on high-speed random-access devices, making it possible to respond to over 1000 information requests daily. Responses to information requests are relayed from the computer to the requesting office via high-speed telecommunications lines, and printed at a computer terminal, providing written answers to questions within minutes.

The National Emissions Data System (NEDS), being developed by the Office of Air Programs of the Environmental Protection Agency, is an automated

data processing system for the storage and retrieval of all point and area sources of air pollution. The NEDS System is presently in a development stage. However, in its final version NEDS is intended to be used for the storage and retrieval of all point and area sources of air pollution identified by the states in their summary reports to the EPA. Contracts have been let to compile inventories of the sources from existing information.

The NEDS data will be stored in a centralized computer facility. Requests for data from NEDS will come directly to a NEDS information contact by mail or telephone, or to the computer by terminal from states, regional EPA offices, research centers, or EPA headquarters.

The information to be collected and stored in NEDS is shown in Fig. 7.5. In addition to the fixed format data cards identified in this figure, a variable input form, as shown in Fig. 7.6, has been developed for which the user identifies the data format and content. Thus, any type of data could be stored in NEDS. An application of this concept is shown in Fig. 7.7 for hazardous materials.

The federal environmental information systems described in this section are designed as NEDS compatible systems. That is, the systems are compatible with the NEDS data input and system structure; however, the federal environmental information systems do not rely on NEDS data or system capability. In this way, the final development options for the federal environmental information systems are in no way narrowed as (1) data could be obtained from NEDS, (2) data could be stored in NEDS, or (3) data could be stored in NEDS and the system capability of NEDS could be used for summary and analysis.

**FIG. 7.5 NATIONAL EMISSIONS DATA SYSTEM (NEDS)
ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF AIR PROGRAMS**

**POINT SOURCE
Input Form**

State			County			AQCR			Plant ID Number			
1	2	3	4	5	6	7	8	9	10	11	12	13

Name of Person Completing Form _____ Date _____

City			Utm Zone	Year of Record	Establishment Name and Address																														Contact - Personal										OWN	Action	cd																			
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

Point ID	Year of Record	UTM COORDINATES						STACK DATA										Plume Height If no stack-ft.	Action	cd																																														
		SIC		IPP	Horizontal km		Vertical km	Height (ft)		Diam (ft)		Temp (°F)		Flow Rate (ft ³ /min)																																																				
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

Boiler Design						CONTROL EQUIPMENT										ESTIMATED CONTROL EFFICIENCY (%)										Action	cd																																					
Year of Record	Capacity 10 ⁶ BTU/hr		Primary Part.	Secondary Part.	Primary SO ₂	Secondary SO ₂	Primary NO _x	Secondary NO _x	Primary HC	Secondary HC	Primary CO	Secondary CO	Part.	SO ₂	NO _x	HC	CO																																															
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

Year of Record	% ANNUAL THRUPUT					NORMAL OPERATING		EMISSION ESTIMATES (tons/year)										ESTIMATION				Action	cd																																									
	Dec-Feb	Mar-May	June-Aug	Sept-Nov	Id	Wk	Wk	Particulate	SO ₂	NO _x	HC	CO	SO ₂	NO _x	HC	CO	Method	% Space Heat																																														
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

Year of Record	ALLOWABLE EMISSIONS (tons/year)										Comp. Stat.	COMPLIANCE SCHEDULE		COMPLIANCE STATUS UPDATE			ECAP	CONTROL REGULATIONS			Action	cd																																										
	Particulate		SO ₂		NO _x		HC		CO			Year	Month	Year	Month	Day		Reg 1	Reg 2	Reg 3																																												
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

Year of Record	SCC				Fuel Process Solid Waste Operating Rate	Maximum Design Rate	Sulfur Content %	Ash Content %	Heat Content 10 ⁶ BTU/scc	Comments	Source Confid.	Action	cd																																																			
	I	II	III	IV																																																												
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

FIG. 7.6

NATIONAL EMISSIONS DATA SYSTEM (NEDS)
ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF AIR PROGRAMS

VARIABLE DATA INPUT FORM

DATE _____

NAME OF PERSON
COMPLETING FORM _____

IDENTIFICATION																												IDENTIFICATION																																																			
STATE		COUNTY			AQCR			PLANT ID NUMBER			POINT ID		YEAR OF RECORD									ACTION	CARD SEQUENCE NUMBER	CARD NUMBER																																																							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

**TRACE MATERIALS/HAZARDOUS POLLUTANT
INPUT FORM**

DATE _____

NAME OF PERSON COMPLETING FORM _____

[illegible][illegible][illegible][illegible]

Although a long history of experience exists with STORET by state, federal and local agencies, the development of a NEDS compatible system is encouraged because (1) the NEDS air pollution data is comparable to that needed for Concepts I and II; (2) the NEDS variable format permits easy inclusion of additional source types and media such as sources of water and solid waste pollution; (3) NEDS provides an integrated complete file for each point source, while STORET, a file-oriented system, could require merging of various files to obtain complete information on sources; and (4) NEDS offers the advantages of a computer system owned and operated by EPA, while STORET is maintained on a rented computer system which is available on an as-needed basis.

8.0 PROGRAM DEVELOPMENT AND OPERATION REQUIREMENTS

The ultimate decision of the type of system to be implemented for the environmental management of federal facilities will depend on its expected effectiveness and costs. In this section, the EPA resources required in terms of manpower, supporting activities and information storage requirements will be estimated for the alternative systems. For purposes of simplicity, the resource estimates are divided into two major categories: (1) the cost for each of three levels of information systems and (2) the cost for the three alternative environmental management concepts. It is difficult to completely separate the two functions; however, an attempt is made here in the event that comparisons are desirable for an information system only or for evaluating combinations of information systems and alternative environmental management concepts. An important factor that lends itself to this approach is that the information system costs are largely one-time costs (design and development), whereas the environmental management system costs include considerable operational costs as well. While only the EPA resource requirements are identified here, the resources and effort required of the federal agencies could be identified in a pilot study.

The manpower requirements presented in this section are considered to be on a professional level, in disciplines such as water and air pollution specialists, civil and sanitary engineers, and computer scientists. In order for a team of this nature to work effectively, a corresponding level of administrative, secretarial, and other support activities is required. In general, these other supporting activities can be estimated as a fraction of total technical manpower required. For purposes of estimation, it can be assumed that costs for these other activities add 20% to the professional manpower costs incurred.

8.1 Information Systems

The development of an information system for environmental information related to federal activities is composed of first, the developmental costs, which include (1) design of the system including the forms and identification of computer software; (2) the development of procedures; (3) the development of the computer programs which will be used to edit, analyze and generate reports; (4) testing and debugging of the system; and (5) initial data collection.

It is extremely valuable in the design and implementation of a new information system to perform a pilot test (data collection, processing, procedures, etc.) conducted on a manageable subset of the total data base. It is suggested that a federal facility information system be tested on a state or possibly regional scale before full implementation.

Once the information system has been designed and the procedures and computer programs have been written and debugged and the system has been field tested, it will require a certain level of manpower to operate the system, collect and update the information and prepare the reports on a periodic basis. The total cost is then the sum of developmental and operational components.

The major factors in the estimation of costs for the alternative information systems will be estimates of the number of facilities and the information requirements associated with each alternative. For the purposes of estimating costs, the approach here is to compare the cost based on an upper bound, which is the expected maximum number of federal facilities which should be included in the system, and a lower bound

which consists of only the major sources of air, water and solid waste pollution. From Section 4, we have the following estimates:

Maximum

- (a) 9700 water pollution discharges
- (b) 8000 air pollution sources
- (c) 6000 solid waste sources and sites

23700

Minimum

- (a) 1000 water pollution discharges
- (b) 920 air pollution sources
- (c) 600 solid waste sources and sites

2520

These estimates are individual pollution sources. In many cases several sources may be confined to a given installation, such as a DOD base. However, each information source will be considered separately for purposes of this analysis.

Based on the above estimates and the extent and detail of data for each concept given in Appendix C , manpower requirements were prepared and are presented in Tables 8.1-8.3. For purposes of comparison, the resource requirements will be derived in terms of manpower. No attempt will be made to translate manpower levels into dollar costs. This, hopefully, can be easily converted using existing federal rates.

Information Storage Requirements

Implementation of the information system even at a minimum level such as Concept II must be handled by computer. As the detail of information and the number of sources increases, the split between manual and computerized information will become more significant. It is expected that a considerable quantity of data will be handled manually in the regional offices under any one of the three information system

Table 8.1

Information System Manpower Requirements (Man-Months)Concept I*

	Minimum**	Maximum***
Developmental		
Design, develop, and implement computer systems	12	12
Identify data sources, develop survey procedures, train, and prepare forms	8	8
Pilot test system on small area, including data collection	6	6
Organize and consolidate total data base	8	24
	<u>34</u>	<u>50</u>
Operational (per year)		
Data updating	2	8
Reports preparation	1	1
	<u>3</u>	<u>9</u>

* See Appendix C for data content of Concept I system.

** Major sources only - approximately 2500.

*** Upper estimate of potential point sources - approximately 24,000.

Table 8.2
Information System Manpower Requirements (Man-Months)

Concept II*

	Minimum**	Maximum***
Developmental		
Design, develop, and implement computer systems	4	4
Identify data sources, develop survey procedures, train, and prepare forms	2	2
Pilot test system on small area, including data collection	6	6
Organize and consolidate total data base	<u>2</u>	<u>8</u>
	14	20
Operational (per year)		
Data updating	2	8
Reports preparation	<u>1</u>	<u>1</u>
	3	9

* See Appendix C for data content of Concept II system.

** Major sources only - approximately 2500.

*** Upper estimate of potential point sources - approximately 24,000.

Table 8.3
Information System Manpower Requirements (Man-Months)

<u>Concept III*</u>		
	Minimum**	Maximum***
Developmental		
Design, develop, and implement computer systems	10	10
Identify data sources, develop survey procedures, train, and prepare forms	5	5
Pilot test system on small area, including data collection	6	6
Collect, keypunch, and process	60	250
Operational (per year)	81	271
Data updating	10	40
Reports preparation	2	2
	12	42

* See Appendix C for data content of Concept III system.

** Major sources only - approximately 2,500.

*** Upper estimate of potential point sources - approximately 24,000.

concepts. This section will concern itself with the information storage requirements for the computerized portion of the system which will be handled through a centrally operated computer facility, such as the existing NIH or contractor operated facility.

It is not expected that a federal environmental information system will require additional hardware. Utilization can be made of the existing terminals in the various EPA regional and headquarters' offices.

The basic information collected from the field or from reports collected from federal facilities will be keypunched on standard 80-column computer cards. This common denominator of information storage will be used as a basis for comparison of the three levels of information systems. The estimates presented here represent a modest density of information on a standard 80-column card. These estimates, however, can be reduced or expanded, depending upon the efficiency of packing and the use of codes identifying certain pieces of information. For example, codes could be used to identify control equipment types, water treatment schemes, solid waste characteristics, etc. Once this data has been keypunched and edited, it will then be transferred into a more efficient mode of storage, such as disc or magnetic tape.

It is not anticipated that all the information will be utilized in the computer core at any one time. The data files can be partitioned by region, state, agency, etc., and analyzed on a file-by-file basis. This will reduce the amount of core storage required at any given time. Table 8.4 presents the information storage requirements based on data identified in Appendix C for each of the three alternative concepts.

It is important to note here that the total number of cards per source refers to the individual major pollution sources. There may be,

Table 8.4

Information Storage Requirements(number of 80 column cards)

<u>Data Type</u>		<u>Concept</u>		
		<u>I</u>	<u>II</u>	<u>III</u>
Facility Identification		2	2	2
Pollutant Source				
	Air or Water or Solid Waste or Categorical	1	1	3
Operation and Maintenance		1	-	1
Fiscal and Compliance		1	1	1
Total (per source)		5	4	7
Grand	Minimum (2500 sources)	12,500	10,000	17,500
Total	Maximum (24,000 sources)	120,000	96,000	168,000

however, several individual sources at a given installation. The amount of data could be reduced by aggregating to a facility basis; therefore, these estimates are considered conservative. In addition, the maximum storage requirements given are probably high estimates, since the amount of information available for many of the small sources is quite limited.

8.2 Manpower Requirements for the Design and Development of Alternative Environmental Management Systems

As with the information systems, logical system design, preparation of procedures, forms, and testing will be required for an environmental management system. Section 6 provides a description of each of the environmental management systems. In this section, the tasks for designing and implementing each of these systems have been presented and their manpower requirements estimated. A brief description of each of the task areas in the design and development phase follows:

System Design

The system design involves the logical and systematic layout of all the components of the system and their interactions. The design must follow the basic definition of objectives of the system and should consider the resources and constraints related to final implementation. The outputs of the systems design phase are: a clear understanding of the detailed responsibilities of the participating agencies, the flow of information, and measures of the costs and effectiveness of proposed alternatives.

Design of Forms and Report Formats

All three of the alternative concepts involve some form of reporting to a certain degree. Each of the detailed reporting functions as set forth in Figs. 6.1, 6.2, and 6.3 requires a form, report, or other reporting mechanism. Each of these mechanisms must be clearly identified in terms of data

content, layout, and source of information. This task involves the design of these forms and guidelines for the preparation of the various reports.

Preparation of Guidelines for Engineering Functions

This task area applies to the design of a Concept III system that involves the detailed inspections, evaluations, monitoring, and complaint investigations. These guidelines set forth the methods used in inspections, including how to perform walk-through inspections, how to prepare an evaluation and determine acceptable engineering practices, what types of monitoring should be conducted for specific problem areas, and how to proceed with complaint investigations.

Prepare Report Evaluation Procedures

This task involves the delineation of the various considerations given in the evaluation of inspection, monitoring, or evaluation reports or registration data forms submitted by the federal facility. A set of procedures will be written at the headquarters level to perform this task.

Prepare Environmental Management System Operation Manual

The overall system operation should be documented for ease of training and continued smooth operation. The manual will describe the overall purpose and operating procedures involved in the total EMS system.

Training

Once the system has been designed and the various forms, report evaluation procedures, etc., are prepared, the engineers responsible for implementing the system must become familiar with it. This task involves conducting a training program to familiarize engineers with the overall system and its components.

Pilot Test

Finally, the EMS concept must be applied and field tested with federal facilities under actual working conditions with real-world data and reports. This will involve making inspections, engineering evaluations, report evaluations, and, in general, testing every phase of the overall system. The pilot test will involve the utilization of all the forms, the operations manual, and procedures on a limited number of sources by 2 or 3 men in an EPA regional office. Through the pilot test, the final debugging and fine tuning of the system can be accomplished before complete implementation.

Based on the above brief task area designations for the design and development of an environmental management system, Table 8.5 was prepared with estimates of the resource requirements to complete this phase. These are not to be considered hard and fast numbers but estimates for purposes of comparison with the other costs of the overall system preparation.

8.3 Manpower Requirements for the Operation of Alternative Environmental Management Systems

As with the information systems, the environmental management systems include both developmental and operational costs; however, for the environmental management systems, a comparatively higher level of effort is required in the operational stages than for the developmental. This is due to the relatively high level of manpower required for the continuing surveillance of sources, including such activities as: inspections, engineering evaluations, source monitoring, etc. The resource requirements presented in this section are necessary over and above the requirements of the information system. Descriptions of the various environmental management system functions and their manpower requirement estimates follow.

Table 8.5

Design and Development Manpower Requirements
for Environmental Management Systems (Man-Months)

	Concept		
	I	II	III
System Design	6	4	8
Design Forms and Report Formats	4	2	6
Prepare Guidelines for conducting inspections evaluations monitoring complaint investigations	-	-	6
Prepare Report Evaluation Procedures	4	6	2
Prepare EMS Operations Manuals	4	2	6
Training	3	2	5
Pilot Test	<u>5</u>	<u>4</u>	<u>7</u>
Total	26	20	40

Concept I System

Under the Concept I system where the federal facilities have the primary responsibility for the detailed engineering functions of the management system, the EPA regional offices supply manpower for the review of the reports, forms and data from the federal facilities and, in addition, should maintain a constant level of technical assistance and advice. There should also be a sustained level of manpower required for complaint investigations. The manpower requirements for the various functions included in the Concept I environmental management system are given in Table 8.6. The bases for these estimates are as follows:

- 1) Review periodic reports - It is assumed that the periodic reports are reviewed annually for each source and 3 reports can be reviewed per man-day.
- 2) Review inspection/monitoring forms - The inspection/monitoring forms are reviewed once every two years for each source and they can be performed at a rate of 2 installations per man-day.
- 3) Complaint investigations - It is assumed that major complaint investigations that require inspections, detailed review of reports, etc., would be required at a frequency of 10 per region per year = 100. A complaint investigation requires, on the average, 2 man-days. More routine or simple requests are handled under technical assistance.
- 4) Technical assistance, advice, and consulting - It is extremely important that the EPA regional offices provide a constant level of technical assistance and advice to the various federal facilities. This is a major role of the Federal Activities' function and requires a significant level of manpower. It is assumed that 1 man-year per region is required for this function.

Table 8.6

Environmental Management System Operational
Manpower Requirements (Man-Years Per Year)
Concept I

Review Periodic Reports	4 minimum 15 maximum
Review Inspection/Monitoring Forms	3 minimum 15 maximum
Complaint Investigations	2
Technical Assistance	10
	<hr/>
	18 Minimum
	41 Maximum

Concept II

Under this concept, the major responsibilities for the detailed functions rest with the state and local agencies; EPA regional offices will be responsible for review of periodic reports and providing technical assistance. The manpower levels required for Concept II are given in Table 8.7.

Concept III

Under the Concept III system, the EPA regional engineers will be responsible for conducting the detailed functions of an environmental management system. The total manpower required depends on the frequency and the total number of sources involved. The tasks involved and their manpower estimates follow.

Inspections

The actual tasks involved in site inspections require coordination (setting up the inspection, including state and local agency representatives), conducting the inspection which in most cases will be a walk-through inspection, and, finally, the inspection is followed up with a report including the observations of the inspecting engineer and other members of the inspecting team as well as recommendations for remedial measures if necessary. Manpower estimates for inspections under Concept III are based on the following factors:

1) Inspection frequency

Major sources - once every year

Minor sources - once every 4 years

2) Inspection and Report Preparation requires

Major sources - 2 man-days

Minor sources - 1 man-day

Table 8.7

Environmental Management System Operational
Manpower Requirements (Man-Years Per Year)
Concept II

Review Periodic Reports	3 minimum
	15 maximum
Technical Assistance	<u>10</u>
	13 Minimum
	25 Maximum

Engineering Evaluations

The evaluation of a proposed modification or new facility construction is an extremely important step in the overall environmental management system. It is important to include the appropriate design and control in the preconstruction phase. The EPA engineers would review the plans and expected operating characteristics in terms of probable environmental impact. This evaluation would include an estimate of emissions or effluent quantities and their impact on the local air or water quality. An evaluation report would be prepared, including recommendations or modifications of the plans or approval for construction of facilities. Factors used in estimating engineering evaluation manpower requirements include:

- 1) Number of evaluations - 50* projects per year
per region = 500
- 2) Evaluation requires - 2 man-days per project

Monitoring

On occasion it will be desirable to perform, as part of an annual inspection or as a result of a complaint, source monitoring of a particular facility. This monitoring analysis could range from grab samples to elaborate continuous monitoring of stacks or effluents. It is assumed that regional monitoring teams will be available through surveillance divisions for stack or effluent analysis. The manpower estimates therefore represent an added demand on this function. The monitoring of a facility would include the setting up of test equipment, actual installation of equipment if desirable, and conduct of the test which may include several samples, laboratory analysis, and

*This is an estimated rate of new large projects over the next several years.

report preparation indicating results and recommended actions. The monitoring manpower for Concept III is based upon:

- 1) Performing 10 special monitoring studies per region per year = 100
- 2) Each test requires approximately 6 man-days

Complaint Investigations

Complaint investigations will be required in cases where there are congressional inquiries, complaints from the press, citizen groups, or state and local agencies. It is important that the overall system include the capability of rapid response to such complaints especially where a high degree of visibility is involved. The complaint investigation would probably involve a site visit, consultation with federal agency representatives and a report explaining the problems involved and their resolution. The assumptions underlying the manpower requirements for the complaint investigations are:

- 1) Assumed frequency of major complaints, 10 per region per year = 100.
- 2) Complaint investigation requires 2 man-days.

The manpower requirements for the Concept III environmental management system are given in Table 8.8.

8.4 Summary of Program Development and Operation Requirements

A summary of the development and operation requirements of the alternative environmental management concepts is shown in Table 8.9. The man-year estimates presented in this table show that the EPA manpower requirements are minimal for Concept I and a maximum for Concept III. However, the choice of which concept to implement must also be based on the capability of each concept to achieve the criteria as shown in Section 1.0.

Table 8.8

Environmental Management System Operational
Manpower Requirements (Man-Years Per Year)
Concept III

Inspections	22 minimum 45 maximum
Engineering Evaluations	4.5
Monitoring	2.5
Complaint Investigations	1
Technical Assistance	<u>5</u> 35 Minimum 58 Maximum

Table 8.9 Developmental and Operational Requirements of the EMS Concepts

CATEGORY		MAN-YRS. FOR 2,500 SOURCES			MAN-YRS. FOR 24,000 SOURCES		
		CONCEPT I	CONCEPT II	CONCEPT III	CONCEPT I	CONCEPT II	CONCEPT III
DEVELOPMENTAL	INFORMATION SYSTEM	2.3	1.2	6.8	4.2	1.7	22.6
	ENVIRONMENTAL MANAGEMENT SYSTEM	2.2	1.7	3.3	2.2	1.7	3.3
	OVERHEAD (20%)	1.0	.6	2.0	1.3	.7	5.2
OPERATIONAL	INFORMATION SYSTEM	.25	.25	1.0	.75	.75	3.5
	ENVIRONMENTAL MANAGEMENT SYSTEM	18.0	13.0	35.0	41.0	25.0	58.0
	OVERHEAD (20%)	3.7	2.7	7.2	8.4	5.2	12.3
TOTALS	DEVELOPMENTAL (ONE-TIME)	6.0	3.5	12.1	7.7	4.1	31.1
	OPERATIONAL (ANNUAL)	22.0	16.0	43.2	50.2	31.0	73.8

Appendix A

Personal Contacts Completed

CONTACT COMPLETED

CONTACT	ORGANIZATION
Jim Meek	EPA (OWP)
Bill Fox	EPA (OWP)
Bud Thiem	EPA (OWP)
John Yardly	EPA (OAP)
Bob DuPrey	EPA (OAP)
Jack Farmer	EPA (OAP)
John Talty	EPA (OSWMP)
Ron Dreer	EPA (Data Systems Branch)
Sue Falkson	EPA (Data Systems Branch)
Paul Kassey	EPA (Data Systems Branch)
Edwin Johnson	EPA (Office of Categorical Programs)
Linda Wastler	EPA (OWP)
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Jerry Temchin	EPA (RAPP)
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CONTACT COMPLETED - Continued

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Commander Joseph D'Emidio	Navy
Mr. Husband	Navy
Woody Horton	EPA (Management Information Systems Division)
Neil Haley	EPA (Management Information Systems Division)
Jack Prudin	EPA (Management Information Systems Division)
Kermit Day	EPA (Data Systems Branch)
Elgin Fry	EPA (Data Systems Branch)
Peg Hall	EPA (Data Systems Branch)
Val Grey	EPA (OSWMP)
John Connolly	EPA (OSWMP)
Paul Fuschini	EPA (OSWMP)
Matthew Bills	EPA (Office of Research & Monitoring)
Wayne Block	EPA (Office of Research & Monitoring)
Bill Price	Computer Service Corporation
Dr. Hill	Federal Power Commission
Colonel Herbert Bell	Air Force
Mr. Harvey Segal	Air Force
Al Colley	U.S. Forest Service

CONTACT COMPLETED - Continued

CONTACT	ORGANIZATION
Frank Hammond	U.S. Forest Service
Edgar Estep	GSA
Steve Hurley	Navy
Chuck Hayen	Navy
Dr. C. Grant Ash	Corps of Engineers
Tom Whitman	Corps of Engineers
Commander Cliff Street	Corps of Engineers
Ken Brow	HEW
Mr. Artillia	HEW
Mr. Indritz	House Committee on Government Operations
Mike James	EPA (Office of Enforcement and General Counsel)
William Price	Computer Science Corporation
Joseph Canny	Dept. of Transportation
Ltjg. D. H. Williams	U.S. Coast Guard
Charles James	Dept. of Transportation
George Cunny	Army
Robert Powell	Post Office Service
Bruce Blanchard	Dept. of Interior
Mr. Baker	National Water Commission

CONTACTS COMPLETED - Continued

CONTACT	ORGANIZATION
Don Maughan	Water Resources Counsel
Mr. Tanney	Dept. of Labor
Mr. Biallas	Dept. of Justice
Mr. O'Donoghue	Dept. of Justice
James M. Kearns	U.S. Marines
Mr. Brodie	Dept. of State
Ray Johnson	Bureau of Sport Fisheries & Wildlife
Ed Miller	General Electric
Art Farmer	Veterans Administration
Don Schumacher	Urban Mass Transit Administration
Mr. DeSista	Corp. of Engineers--RAPP Program
Franz Gimmmler	Urban Mass Transit Administration
Mr. Thompson	FAA
Lcdr. Taylor	U.S. Coast Guard
Ltjg. Bill Trost	U.S. Coast Guard
Lcdr. Bockman	U.S. Coast Guard
Mr. Morse	National Oceanic and Atmospheric Administration
Mr. Hull	National Oceanic and Atmospheric Administration
Dr. T. C. Byerly	Department of Agriculture

CONTACTS COMPLETED - Continued

CONTACT	ORGANIZATION
Jack Farmer	EPA (OAP)
Lloyd Hedgepath	EPA (OAP)
James Hammerle	EPA (OAP)
Mr. Weaver	EPA Radiation
Mr. Logsdon	EPA Radiation
Dydney Galler	Dept. of Commerce
John Talty	EPA (SWMP)
Clyde Dial	EPA (SWMP)
Bob Clark	NERC (Cincinnati)
George Huffman	NERC (Cincinnati)
Don Walgren	EPA Region V
Richard Brown	Bureau of Land Management
Herb Stewart	U.S. Geological Survey
Robert Jones	Bureau of Land Management
Lindsay Norman	Bureau of Mines
Mr. McCarthy	GSA
Al Jones	Bureau of Reclamation
Woody Seaman	Bureau of Reclamation
Maurice Langley	Bureau of Reclamation

CONTACT COMPLETED - Continued

CONTACT	ORGANIZATION
R. J. Pickering	U.S. Geological Survey
Herb Pennington and Arthur Shoen	Atomic Energy Commission
Col. Dickson	Reserves (Inventory)
Capt. Cahil	Reserves (Inventory)
Jerry Anderson	Bureau of Outdoor Recreation
Rex Wells	Federal Highway Administration
Tom Lewis	IBM
Gerald Gaffney	NASA
Steve Verikios	Office of Saline Water
James Miller	Dept. of Housing and Urban Development
Andrew Bullis	Dept. of Housing and Urban Development
Ed Miller	General Electric
Ed McSweeney	EPA Region I
Harold Ike	EPA Region II
Lee A. Genell	EPA Region III
Robert Koke	EPA Region VII
Irving Terzich	EPA Region IX
Wayne Blockard	EPA Region IX

CONTACT COMPLETED - Continued

CONTACT	ORGANIZATION
Don Anderson	EPA Region IX
Bill Helphingstein	EPA Region IX
Harold Geren	EPA Region X
Bill Newell	EPA Region X
Ben Eusebio	EPA Region X
Lester Blaschke	EPA Region X
Milton Feldstein	Bay Area Air Pollution Control District
Tom Brennan	Bay Area Air Pollution Control District
Tom Wilkes	Los Angeles County Air Pollution Control District
Richard Harris	California Regional Water Quality Control Board Los Angeles Region
David Wagner	Charles County Community College
Ellis Teer	Russel and Axon Consulting Engineers Incorporated
	Chicago Department of Environmental Control
	Cook County Air Pollution Control Bureau
	Illinois Environmental Protection Agency
	St. Louis County Health Department
	Kentucky Air Pollution Control Commission

Appendix B

Description of Federal Facilities

TOTAL REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT

<u>STATE</u>	<u>REAL PROPERTY</u>		
	<u>Total Property Over 100,000 ft.²</u>	<u>Total Property Over 1,500 ft.²</u>	<u>Total Real Property</u>
Alabama	32	176	315
Alaska	17	56	755
Arizona	33	187	328
Arkansas	13	133	287
California	214	699	1315
Colorado	30	168	393
Connecticut	14	106	178
Delaware	7	37	94
District of Columbia	60	114	168
Florida	54	288	591
Georgia	37	223	401
Hawaii	9	48	159
Idaho	16	107	300
Illinois	50	338	571
Indiana	28	191	318
Iowa	16	151	245
Kansas	21	162	268
Kentucky	24	167	290
Louisiana	25	166	325
Maine	20	164	282
Maryland	59	190	311
Massachusetts	45	275	425
Michigan	39	290	586
Minnesota	26	191	338
Mississippi	23	147	242
Missouri	43	202	569

TOTAL REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT - Continued

<u>STATE</u>	<u>REAL PROPERTY</u>		
	<u>Total Property Over 100,000 ft.²</u>	<u>Total Property Over 1,500 ft.²</u>	<u>Total Real Property</u>
Montana	24	167	554
Nebraska	17	113	296
Nevada	16	289	202
New Hampshire	6	58	90
New Jersey	38	208	342
New Mexico	27	159	313
New York	92	499	928
North Carolina	33	214	391
North Dakota	17	132	598
Ohio	49	342	568
Oklahoma	27	189	328
Oregon	32	212	700
Pennsylvania	65	411	635
Rhode Island	14	65	100
South Carolina	20	128	228
South Dakota	16	123	394
Tennessee	29	194	363
Texas	87	528	1033
Utah	20	131	242
Vermont	4	51	102
Virginia	83	297	478
Washington	63	311	791
West Virginia	20	116	203
Wisconsin	17	184	344
Wyoming	8	100	274
TOTAL	1,175	10,001	20,551

REAL PROPERTY OWNED BY THE FEDERAL GOVERNMENT BY REGIONS

<u>Region</u>	<u>All Property</u>	<u>Over 1500 Sq. Ft.</u>	<u>Over 100,000 Sq. Ft.</u>
Region 1	1177	719	103
Region 2	1270	707	130
Region 3	1889	1165	294
Region 4	2821	1537	252
Region 5	2725	1536	209
Region 6	2286	1175	179
Region 7	1378	628	97
Region 8	2455	821	115
Region 9	2004	1023	272
Region 10	2546	686	128

AGENCY	Agriculture	Air Force	Army	Commerce	Corps of Engineers	FBI	GSA	HEW	Interior	Justice	Navy	Smithsonian Institution	TVA	Treasury	VA	NASA	Transportation	ABC	Total
STATE																			
Alabama	0	10	7	0	0	0	5	0	0	0	0	0	5	0	4	1	2		32
Alaska	1	1	1			0	1	5	3		1			0			4		17
Arizona	2	8	3				2	2	11		2				3				33
Arkansas	1	5	3				3								3				13
California	16	37	25	1	1		28	1	8	1	59			1	10	8	7	6	214
Colorado		6	4	1			8		5	1				1	2			2	30
Connecticut		2					4			1	5				2		1	1	14
Delaware		2	1				1	1			1				1				7
District of Columbia		1	4	1			49	1	3	1	6	1		2	1				60
Florida	1	15					9		1	1	19				4	2	1	1	54
Georgia	1	5	7				9	3	1	2	5				4				37
Hawaii		1	1				3		1		1				1		2		9
Idaho	7	2					1		2						1			3	16
Illinois	2	7	3				13		1	1	7				7			3	50
Indiana		4	6				9			2	3				4				28
Iowa	1	4	2				4								3			2	16
Johnston Islands																			
Kansas		4	6				3	1	1	2	1				3				21
Kentucky	1	1	6				5	3	2	1								1	24
Louisiana	2	3	4		1		6	2			2				3	2			25
Maine	1	8					4	1			5				1				20
Maryland	2	4	9		0		13	4	2		19			0	3	1	1	1	59
Massachusetts		8	5				12	3	2		8				5	1	1		45
Michigan	2	12	8		1		4	1	2	2	1				5		1		39
Minnesota	2	5	3				9		2		3				2				26
Mississippi	2	5	1		4		2		2		2				4	1			23
Missouri	1	7	8				19	1		1	1				4			1	43
Montana	6	6	2		1		2		5						2				24
Nebraska	1	4	3				4		1		1				3				17
Nevada	1	4	1				2		2		2				1	1		2	16
New Hampshire		2					3								1				6
New Jersey		2	15	1			9		2		3				3		2	1	38
New Mexico	1	6	4		1		4	2	4		1				1	1		3	27
New York		16	17	1			26	1	1		11				12		2	5	92
North Carolina	1	6	3	1			6	2	3		5		1		4		1		33
North Dakota	1	5			1		2	1	5						2				17
Ohio		12	8				16		1	1	1				5	2		1	49
Oklahoma	2	7	1				5	2	5	2	1				2				27
Oregon	10	6	2		1		4		5		1				3				32
Pennsylvania		3	12		2		12		4	3	15			1	10			1	65
Puerto Rico																			
Rhode Island							2				11				1				14
South Carolina		5	2				1				9				2			1	20
South Dakota	1	2			1		2	3	5						2				16
Tennessee		3	5		1		9		1		2			3	4			1	29
Texas	3	21	12				21	4	3	3	9				9	1	1		87
Utah	1	5	6				5		2										20
Vermont		2					1								1				4
Virginia	2	5	15				14	3	4	1	30				3	2	4		83
Virgin Islands																			
Washington	7	11	5				13	2	8	2	10				4			1	63
West Virginia	1	2					6		3	2	2				4				20
Wisconsin	3	6	3				2								3				17
Wyoming		1					1		4						2				8
Total	86	308	242	6	15	0	398	49	117	30	264	1	4	8	163	23	30	37	1775

AGENCY	Agriculture	Air Force	Army	Commerce	Corps of Engineers	FAA	GSA	HEW	Interior	Justice	Navy	Smithsonian Institution	TVA	Treasury	VA	Total
STATE																
Alabama		3	4		2				2				4			15
Alaska	1	5	3			13		2	4		2			2		32
Arizona	8	1							6							15
Arkansas		2	3		19				2							27
California	36	3	8	1	6		1		3		17					75
Colorado			5		1				8							14
Connecticut							2		1							3
Delaware																0
District of Columbia							1				5	1				7
Florida		7					1		2		4					14
Georgia	4	3	17		4			1	3		1					33
Hawaii		4	6	1					1		24			1		37
Idaho	9								1							10
Illinois	1		2						2							5
Indiana		2	2				1				1					6
Iowa		1	1						1							3
Johnston Islands		1														1
Kansas		1	7		1				2							11
Kentucky			21		4		1		1				1			28
Louisiana		2	2		1			1	1		1				1	9
Maine											2			1		3
Maryland		3	9		1		3				6			1	2	25
Massachusetts		4	3						3		1					11
Michigan	2		1		1		1		3		1					9
Minnesota	2															2
Mississippi			1		6				2							9
Missouri					1		1		2		1			1	1	7
Montana		1	1		1				5							8
Nebraska					5				1							6
Nevada									1							1
New Hampshire	2	2							2							6
New Jersey		2	5								3					10
New Mexico	3	2	1		1				3							10
New York	2		3				1	1	2		1			2	1	13
North Carolina	2	2	2						6		7					20
North Dakota		2			4				1							7
Ohio		2			6						1					9
Oklahoma		4	27		6	1			1							39
Oregon	23		1		7				1							32
Pennsylvania			2		6				4		6					18
Puerto Rico		1	2								3					6
Rhode Island	1								1		3					5
South Carolina		2	7						4		1					14
South Dakota					8			2	3							13
Tennessee	1		2						1					4		8
Texas	3	6	7		22				4	2					1	45
Utah	4	1	1						1							7
Vermont									1							1
Virginia	2	1	1	1	1	1	1		7		7		2			24
Virgin Islands									2							2
Washington	9	1			2				10	1	6			1		30
West Virginia									4		1					5
Wisconsin	5								1							6
Wyoming	2								9							11
Total	122	71	157	3	115	15	14	7	126	3	105	1	7	14	6	767

Agency

Agriculture	156
National Forest Campgrounds	116
Insect Experiment Station	1
Horticulture and Soil Lab	1
Beef Cattle and Research Station	1
Fairgrounds	1
Northern Research Lab	1
Barley and Malt Lab	1
Deactivated or No Longer Federal	34

Air Force	101
Air Force Bases	47
Air Force Plants	11
Hospital	1
Range	1
Plating Plant	1
Camps	1
Missile Range	5
Failed to Take Action	13
Deactivated	17
Less than Criteria	4

Army	186
Depots	21
Arsenals	8
Bases	88
National Guard	1
Training Areas	2
Terminal	1

Agency

Army (cont.)

Space Flight Center	1
Stations	1
Hospitals	2
Nike Missile Sites	3
NORAD Site	2
Receiving Area	1
Ammunition Plant	6
Failed to Take Action	20
Less than Criteria	11
Deactivated	18

Corps of Engineers 166

Lock and Dam Reservoir	91
District Office Site	2
Parks	12
Canals	1
Recreation Area	6
Army Reserve Center	1
Fish Hatchery	1
Less than Criteria	48
Deactivated	4

Commerce 5

Reserve Shipyard	1
Research Station	1
Mag Seismo Observatory	1
Less than Criteria	2

FAA	6	
Airports		2
National Airport		1
Aeronautical Center		1
Deactivated		1
Failed to Take Action		1
GSA	15	
U. S. Courthouse		4
Medical Supply Depot		1
Post Office		1
Federal Center		1
Industrial Reserve Plant		1
Heating Plant for D. C.		1
VA Heating Plant		1
GSA Administration Building		1
Military Personnel Records Center		1
Less than Criteria		2
Deactivated		1
HEW	5	
Hospitals		3
Communicable Disease Center		1
Quarantine Station		1
Interior	124	
Reserves		5
Institutes		1
Indian Agencies		10
National Monuments		3
National Parks		13
Research Centers		3

Agency

Interior (cont.)

Air Force Station	1
Herbert Grigg Home	1
Slab Housing Units	1
Fish Hatcheries	86

Justice

3

U. S. Penitentiary	1
Deactivated	2

Navy

137

Shipyard	8
Air Station	14
Medical Center	1
Academy	1
Ammunition Depot	1
Propellant Plant	4
Marine Camp	3
Naval Station	29
Supply Depot	3
Reserve Training	4
Air Material Center	1
Laboratory	2
Ordinance Station	4
Missile Test Site	1
Schools	2
Failed to Take Action	31
Less than Criteria	9
Deactivated	19

Agency

Smithsonian Institution	1	
National Zoological Park		1
TVA	9	
Dam and Chemical Plant		1
Steamplant		8
Treasury	22	
Coast Guard Base		8
Air Station		2
Loran Station		1
Reserve Training Center		1
Less than Criteria		9
Deactivated		1
Veterans Administration	5	
VA Hospitals		5

WASTE DISCHARGES AT 963 FEDERAL INSTALLATIONS
AS OF DECEMBER 31, 1964

Agency	Feasibility Studies	Design	Financing w OMB	Financing Approved	Under Construction	Connected to Public Sewerage	Failed to Take Action	Adequate Treatment	Deactivated or no Longer Federal	Less than the Criteria	Total
Agriculture	1	1	0	0	1	3	1	114	1	34	156
Air Force	2	2	1	0	1	14	13	39	17	4	93
Army	4	3	2	1	3	9	20	114	18	11	185
Commerce	0	0	0	0	0	2	0	1	0	2	5
Corps of Engineers	0	1	1	0	0	12	0	102	4	48	168
FAA	0	2	4	3	0	0	1	5	1	0	16
GSA	0	0	0	0	0	11	0	3	1	2	17
HEW	2	1	0	0	0	1	0	1	0	0	5
Interior	3	1	0	1	2	5	0	116	6	7	141
Justice	0	0	1	0	0	0	0	0	2	0	3
Navy	1	5	10	3	2	26	31	31	19	9	137
Smithsonian Institution	0	0	0	0	0	1	0	0	0	0	1
TVA	0	0	0	0	1	0	0	8	0	0	9
Treasury	0	2	0	0	1	4	2	3	1	9	22
VA	0	0	1	0	4	0	0	0	0	0	5
Totals	13	18	19	9	11	92	68	537	70	126	963

Appendix C

Information Requirements for the
Federal Environmental Information Systems

INFORMATION REQUIREMENTS FOR CONCEPT I

IDENTIFICATION DATA

Facility: Name, Agency, Activity, Code (GSA), Year of Data

Contract: Name, Position, Phone Number

Location: Address, Air Quality Control Region (Number and Priority)
Major/Minor River Basin, Priority River Basin,
Congressional District

POLLUTANT SOURCE DATA

Water

Water Treatment Facility Description

Treatment Scheme

Preliminary (Barscreen, Comminutor, etc.)
Primary (Flocculation, Primary Sedimentation, etc.)
Secondary (Activated Sludge, Trickling Filter, etc.)
Tertiary (Sand Filter, Pressure Filter, etc.)
Advanced Waste Treatment (Activated Carbon, Reverse Osmosis, etc.)
Sludge Handling Treatment (Digester, Drying Bed, etc.)

Size

Design MGD
Actual MGD

Load

Design BOD and COD (mg/l)
Actual BOD and COD (mg/l)

Waste Characteristics

Types of Waste
% industrial waste
% domestic waste

Discharge Data

Suspended Solids Influent and Effluent
Percent Removal

BOD and COD
Nitrogen, Phosphorous

Receiving Stream Data

Stream Flow (Average, Low)

Air

Source Description

Fuel Combustion

Size (Input BTU/Hr)
Operating Time (Average Hrs/Yr)
Fuel Characteristics
Type (Coal, Oil, Gas)
Composition (% Ash, % Sulfur)
Fuel Heat Value (BTU/Lb)

Process

Type (Nitric Acid Plant, TNT Manufacturing, Paintspray Booth, etc.)
Process Weight Rate (Lb/Hr)
Operating Time (Average Hrs/Yr)

Incinerator

Size (Tons/Day)
Refuse Rate (Tons/Day)
Refuse Type (Wood, Paper, etc.)

Control Equipment

Type (Wet Collector, Baghouse, etc.)
Efficiency (% Removal Contaminants)
Stack Description (Height, Diameter, Exit Velocity, Temperature)

Emissions

TSP, SO_x, CO, HC, NO_x, Hazardous Materials

Solid Waste

Disposal Type

Landfill, Incinerator, Contract

Landfill

Site Characteristics

Topography (Quarry, Canyon, etc.)
Size (Total Acres, Acres to be used for Landfill)
Operating Time (Yrs)
Previous years of operation
Expected lifetime
Landfill Type (Trench, Area)
Cover description
Frequency (Times/Day)
Thickness (In.)
Recycle/Salvage Operation
Type (Glass, Metal, etc.)
Quantities (Tons/Day)

Waste Characteristics

Type (Industrial, Residential, etc.)
Quantities (Tons/Day)

Environmental Condition

Appearances
Blowing Paper
Burning
Drainage/Leachate Problems
Location of water table
Dust, Odor, Flies, Rodents

OPERATION AND MAINTENANCE PROGRAMS

Operation Data

Operator Certified (Y/N)

Maintenance Data

Inspections (Type, Frequency)
Monitoring (Type, Frequency)
Maintenance Program
Shutdown Frequency
Equipment Check Diagram, etc.

COMPLIANCE AND FISCAL DATA

Compliance Data

Compliance Status (Y/N)
Date of Compliance
Remedial Measures
Project Status
Project Schedule
Applicable Standards
State
Federal

Fiscal Data

Capital Cost
Operating Cost
Maintenance Cost

INFORMATION REQUIREMENTS FOR CONCEPT II

IDENTIFICATION DATA

Facility: Name, Agency, Activity, Code (GSA), Year of Data

Contact: Name, Position, Phone Number

Location: Address, Air Quality Control Region (Number and Priority),
Major/Minor River Basin, Priority River Basin, Congressional
District

POLLUTANT SOURCE DATA

Water

Water Treatment Facility Description

Treatment Scheme

Preliminary (Bar screen, Comminutor, etc.)
Primary (Flocculation, Primary Sedimentation, etc.)
Secondary (Activated Sludge, Trickling Filter, etc.)
Tertiary (Sand Filter, Pressure Filter, etc.)
Advanced Waste Treatment (Activated Carbon, Reverse Osmosis, etc.)
Sludge Handling Treatment (Digester, Drying Bed, etc.)

Size (Average Daily Flow)

Design MGD
Actual MGD

Waste Characteristics

Type of Waste

% Industrial Waste
% Domestic Waste

Air

Source Description

Fuel Combustion

Type (Coal, Oil, Gas)

Process

Type (Nitric Acid Plant, TNT manufacturing, Paint Spray Booths, etc.)

Incinerator

Refuse Type (Wood, Paper, etc.)

Control Equipment

Type (Wet Collector, Baghouse, etc.)

Emissions

TSP, SO₂, HC, CO, NO_x, Hazardous Materials

Solid Waste

Disposal Type

Landfill, Incinerator, Contract

Landfill

Waste Characteristics

Type (Industrial, Residential, etc.)

Quantities (Tons/Day)

Incinerator (See Air)

COMPLIANCE AND FISCAL DATA

Compliance Data

Compliance Status

Date of Compliance

Remedial Measures

Project Status

Project Schedule

Applicable Standards

Fiscal Data

Capital Cost

Operation Cost

Maintenance Cost

INFORMATION REQUIREMENTS FOR CONCEPT III

IDENTIFICATION DATA

Facility: Name, Agency, Activity, Code (GSA), Year of Data

Contact: Name, Position, Phone Number

Location: Address, Air Quality Control Region (Number and Priority), Major/Minor River Basin, Priority River Basin, Congressional District

POLLUTANT SOURCE DATA

Water

Water Treatment Facility Description

Treatment Scheme

Preliminary (Bar Screen, Comminutor, etc.)
Primary (Flocculation, Primary Sedimentation, etc.)
Secondary (Activated Sludge, Trickling Filter, etc.)
Tertiary (Sand Filter, Pressure Filter, etc.)
Advanced Waste Treatment (Activated Carbon, Reverse Osmosis, etc.)
Sludge Handling Treatment (Digester, Drying Bed, etc.)

Size (Average Daily Flow)

Design MGD

Actual MGD

Load

Design BOD and COD (mg/l)

Actual BOD and COD (mg/l)

Engineering Plans

Detailed Engineering Design and Construction Plans

Collection System Description

Sewers (Separate, Combined)

Toilets (Pits, Chemically Treated)

Waste Characteristics

Type of Waste

% Industrial Waste

% Domestic Waste

Source Description

Domestic (Waterborne, Nonwaterborne)
Industrial (Mine, Smelter)

Discharge Data

Suspended Solids Influent and Effluent
Percent Removal

BOD and COD
Nitrogen, Phosphorous

pH, Temperature, Radioactivity, Coliform Bacteria, Setttable Solids,
Hazardous Materials, Metals

Receiving Stream Data

Stream Flow (Average, Low)
Discharge Location (Lat/Long)
Physical Features (H₂O Temperature, Turbidity, Color, etc.)
Chemical Factors (Alkalinity, pH, Dissolved Oxygen, etc.)

Biological Communities

Rooted Vegetation, Algae, etc.
Fish and Plankton Population
Bottom Associated Organisms (Larvae, Sludgeworms, etc.)

Air

Source Description

Fuel Combustion

Manufacture
Model
Size (Input BTU/Hr)
Operating Time (Average Hrs/Yr)
Fuel Characteristics
Type (Coal, Oil, Gas)
Composition (% Ash, % Sulphur)
Fuel Heat Value (BTU/Lb)

Process

Manufacturer

Model

Type (Nitric Acid Plant, TNT Manufacturing, Paint Spray Booths, etc.)

Process Weight Rate (Lb/Hr)

Operating Time (Average Hrs/Yr)

Material Balance Sheet

Material Flow Diagram

Material Charge Composition

Waste Composition

Product Description

Incinerator

Manufacturer

Model

Size (Tons/Day)

Refuse Rate (Tons/Day)

Refuse Type (Paper, Wood, etc.)

Source of Refuse (Recreation, Process Waste, etc.)

Control Equipment

Type (Wet Collector, Baghouse, etc.)

Efficiency (% Removal Contaminants)

Flow Diagram (Gas Flow Rates, Pressure Drops, etc.)

Physical Dimensions (Height, Width, Depth)

Capacity (Removal Rate)

Material Description

Scrubber (Flow, Makeup Rates)

Baghouse (Cloth Material)

Stack Descriptions (Height, Diameter, Exist Velocity, Temperature, Location)

Emissions

TSP, SO_x, CO, HC, NO_x, Hazardous Materials, Ringleman Number

Engineering Plans

Detailed Engineering Design and Construction Plans

Solid Waste

Disposal Type

Landfill, Incinerator, Contract

Landfill

Site Characteristics

Topography (Quarry, Canyon, etc.)

Geology (Surface, Subsurface)

Meteorology (Precipitation, Temperature)

Physical Characteristics

Drainage
Vegetation Barrier
Facilities

Size (Total Acres, Acres to be Used for Landfill)

Operating Time (Yrs)

Yrs of Operation
Expected Lifetime

Landfill Type (Trench, Area, etc.)

Cover Description

Frequency (Times/Day)
Thickness (In.)

Recycle Salvage Operation

Type (Glass, Paper, etc.)
Quantities (Tons/Day)

Site Development Plans

Year Ready
Engineering Plans

Waste Characteristics

Type (Industrial, Residential, etc.)
Quantities (Tons/Day)
Deposition (Public/Private)

Environmental Conditions

Appearance

Blowing paper
Burning
Drainage/Leaching problems
Location of Water Table
Dust, Odor, Flies, Rodents

Leachate (pH, BOD, COD, TSS, TDS, Nitrogen, Metals, Fecal Coliform)

Gas (CH_4 , CO_2 , O_2 , N_2)

Equipment (Type, Number, Manufacture)

Incinerators (See Air)

Contract Disposal

Site Characteristics

Contractor Name

Location

Topography (Quarry, Canyon, etc.)

Size (Total Acres, Acres to be Used for Landfill)

Operating Time (Yrs)

Previous

Anticipated

Landfill Type (Trench, Area, etc.)

Cover Description

Frequency (Times/Day)

Thickness (In.)

Recycle/Salvage Operation

Type (Glass, Metal, etc.)

Quantities (Tons/Day)

Waste Characteristics

Type (Industrial, Residential, etc.)

Quantities (Tons/Day)

Deposition (Public, Private)

Environmental Conditions

Appearance

Blowing Paper

Burning

Drainage/Leaching Problems

Location of Water Table

Dust, Odor, Flies, Rodents

Operation and Maintenance Programs

Operation Data

Operator Certified (Y/N)

Maintenance Data

Inspections (type, frequency)

Monitoring (type, frequency)

Maintenance Program

Shutdown Frequency

Equipment Check Program

etc.

Compliance and Fiscal Data

Compliance Data

Compliance Status (Y/N)

Date of Compliance

Remedial Measures

Project Status

Project Schedule

Applicable Standards

State

Federal

Fiscal Data

Capital Cost

Operation Cost

Maintenance Cost

Appendix D

Detailed Description of Information Storage and Retrieval Systems

The detailed information storage and retrieval system includes the following:

Regional facility index file which is a listing of all federal facilities including identification data and activity data.

Federal agency file which contain useful existing and proposed federal agency files such as GSA tapes, Navy Environmental Data Base, etc.

Regional facility status file containing data for the identification of required reports, a description of required programs, evaluation of compliance programs, operation and maintenance programs and inspection and monitoring programs.

Facility summary file which includes identification, fiscal compliance and pollution abatement data.

Facility management file which composes data to form qualitative and quantitative environmental trends at federal facilities.

File update as indicated by the square blocks in the diagram indicate the necessary programming to generate files.

Data preparation is the keypunching, verifying, editing and processing of information.

Existing EPA regional file catalog are all existing information from the manual files in the EPA regional offices.

INFORMATION STORAGE AND RETRIEVAL SYSTEM FOR CONCEPT I EMS SYSTEM

INFORMATION STORAGE AND RETRIEVAL SYSTEM FOR CONCEPT II EMS SYSTEM

INFORMATION STORAGE AND RETRIEVAL SYSTEM FOR CONCEPT III EMS SYSTEM

Appendix E

Summary of Relevant
Existing Information Systems

A Description of the STORET System

STORET, an acronym for STOrage and RETrieval, is the central computer-oriented segment of the National Water Quality Surveillance and Information System for storing and retrieving data and information on the following subjects: water quality; water quality standards; pollution-caused fish kills; manpower and training; municipal and industrial waste discharge; and waste abatement needs, costs and implementation schedules. Given the above information and data, the STORET user can: define the cause and effect relationship of water pollution; measure compliance of water quality standards; check the status of waste treatment plant needs, grants, and implementations; and determine pollution trends.

The system presently contains data primarily from geographic areas which have been the subject of a water quality study or enforcement action. EPA has begun, however, to utilize the full capabilities of the system by requiring the entry of all data and information gathered by the Agency which is pertinent to establishment of cause/effect relationships of water pollution.

EPA is also encouraging the use of the system by state, other federal, and local agencies with missions relating to environmental protection, water pollution control, or water research. The program to add users to the STORET system has a two-fold mission. First, duplication of information-gathering effort is almost totally prevented among users. Second, EPA gains the use of data and information gathered by those agencies at much lower cost than would be possible otherwise. The system presently has over 130 users including states, counties, and federal agencies.

Data are collected and placed into the system by agency components (cooperator agency) which use such data as part of their function (i.e., municipal waste treatment facilities data by the Division of Facilities Construction and Operation, Office of Water Programs and permit application data by the Refuse Act Permit Program, Office of Enforcement and General Counsel). Such data are needed not only by the collecting programs, but are also useful to other agency functions, such as Planning and Management. Adaptations, changes, and new system segments are devised to accommodate such data; training in system use is provided, and an assistance staff is available 18 hours each working day.

The STORET system information flow is shown in Figure 1. Note that data is input locally by the cooperator agency without any centralized quality control. Any data in the STORET system is protected from destruction by other than the producer agency; however, the system has the advantage that all data is available to a user.

In the case of states and other non-EPA users, a computer terminal is loaned for thirty days and necessary training is provided. After thirty days, EPA continues to pay computer costs and the user pays terminal lease charges.

Access to the system is almost completely via a telecommunications network which utilizes primarily voice-quality telephone lines. EPA Regional Offices, however, use leased lines.

STORET presently runs on an IBM 370-155 computer in McLean, Va. Its use is contracted from Boeing Computer Services by EPA contract #14-08-001-12673. The 370-155 is a third generation computer which

Fig. E.1. STORET System Information Flow

permits accessing of data by many users simultaneously, making it responsive to the needs of a nationwide network of users. Data are stored on high-speed random-access devices, making it possible to respond to over 1,000 information requests daily. Responses to information requests are relayed from the computer to the requesting office via high-speed telecommunications lines, and printed at a computer terminal, providing written answers to questions within minutes.

A Description of the NEDS System

The concept of the National Emissions Data System (NEDS) is shown in Fig. 2, where the data storage and identification files are shown on the left side of the diagram and the automatic data processing (ADP) operations are indicated on the right. The NEDS system is presently in the design and development phase. The system will store data for all point and area (county) sources of emissions with periodic updates. The information flow from source to the NEDS system is shown in Fig. 3. Requests for data from NEDS will come directly to a NEDS information contact by mail or telephone, or to the computer by terminal from states, regional offices, research centers, or headquarters. Three basic categories of programs are possible for data acquisition: summaries, which will be the most commonly used; sorting, a useful tool to be developed after summary techniques are finalized; and special analysis, techniques which will not be provided by NEDS but developed by users.

Data storage is accomplished in the following files:

- a. Point source file - all source information on each point source,
- b. Area source file - all source information on each county area source,
- c. Federal facilities source file - all source information on each federal facility (federal facilities meeting the requirements of a defined point source also are listed in the point source file), and
- d. Hazardous pollutants source file - all source information on each emitter of hazardous or potentially hazardous trace element or compound (emitters meeting the requirement of a defined point source also are listed in the point source file).

Fig. E.2. Emission Inventory System Concept

Fig. E.3. Information Flow for the NEDS System

All emission factor information is stored separately in the emission factor file. This enables changes, at any time, in the emission factor files without modification to the source files. The formats for storage in the source and emission factors files have already been developed.

Additional data required for identification are stored in the following files:

- a. Geographical ID file - all federal regional offices, state, AQCR, and county names and identification numbers,
- b. Control equipment ID file - all control equipment names and ID numbers, and
- c. IPP process ID file - all identification numbers as required in the inventory to be used in IPP modeling programs.

Projection and trend analysis both require the use of extensive population data and associated information on housing, etc. If a State desires to use these analyses, the necessary information will be stored in the data file on population.

Automatic Data Processing (ADP) Software

Following the definition of storage and ID file formats, the ADP programming necessary for data storage, maintenance, manipulation, and retrieval can begin. Conceptually, some of these functions are shown on the right side of Fig. 2. These programs constitute the ADP software necessary to utilize the source and ID data, and include:

- a. Input/output programs - for selecting items of data for input and output,
- b. Emission calculation programs - for use in applying emission factors to source data to obtain emissions,

- c. Areawide inventory programs - for outputting data in a form suitable for reporting point and area sources emissions by source classification and geographical areas,
- d. IPP modeling conversion program - for selecting items of data from the source files to be used for modeling and outputting it in the proper format for input to the IPP programs,
- e. Area source gridding program - for apportioning to grids the area source emissions in a form suitable for input to IPP modeling, and
- f. Trend/projection analysis programs - for utilizing available data to ascertain trends or projections of emissions by sources and geographical areas.

The programs for these operations are being prepared by EPA and will be available in late 1972.

Updating the Data Files

Source files (point, area, and hazardous pollutants) must be continuously updated to keep the emission inventory current. Information for the update can come from permit or registration activities as well as from inspection reports. The emission factors file will also be updated continuously as new information from source testing becomes available.

Data Systems Utilized by Federal AgenciesEnvironmental Protection AgencyAir Programs

NADIS	National Aerometric Data Information Service
NEDS	National Emission Data System
SAROAD	Storage and Retrieval of Air Pollution and Meteorological Data
APTIC	Air Pollution Technical Informa- tion Center
EMS	Enforcement Management System
EOCC	Emergency Operation Control Center
HAPEMS	Hazardous Air Pollutants Enforce- ment Management System
CDHS	Comprehensive Data Handling Systems

Water Programs

STORET	National Water Quality Storage and Retrieval System
NATIONAL ESTUARINE INVENTORY	
WATER SUPPLY SYSTEMS MONITORING	
AUTOMAP AND MICROFILM SYSTEM	

Solid Waste Programs

RAPP Refuse Act Permit Program

SWIRS Solid Waste Information
Retrieval System

SOLID WASTE INVENTORY

Pesticides Programs

PESTICIDES INFORMATION SYSTEM

MONITORING ACCIDENTS

COMMUNITY STUDIES

PROGRAM FOR MONITORING AIR, ESTUARINES,
SOILS AND CROPS

PESTICIDES REGISTRATION FILE

Radiation Programs

NERADS National Environmental Radiation
Data File System

EMISSIONS MONITORING

All Pollutants

MICS Management Information
Control System

EIS Environmental Impact Statements

U.S. Navy

Air, Water, Solid Waste and Noise Programs

EPDB Environmental Protection
Data Base

U.S. Department of Agriculture

Air and Solid Waste

FOREST SERVICE DATA SYSTEM

General Services Administration

Federal Property Owned and Leased

GSA TAPES

Congress

Air and Water

HOUSE COMMITTEE ON GOVERNMENT
OPERATIONS REPORTS

REFERENCES

1. Committee on Government Operations, U.S. Congress, June 29, 1965, Washington D.C., "Disposal of Sewage and Industrial Wastes by Federal Installations," Fifteenth Report by the Committee on Government Operations.
2. Croke, K. G., and Norco, J. E., Argonne National Laboratory, June 27, 1971, Argonne, Illinois, "An Evaluation of Alternative Source Surveillance Systems," presented at APCA Conference, Atlantic City, New Jersey, 1971.
3. Federal Facilities Branch, Division of Abatement, National Air Pollution Control Association, February 1970, Research Triangle Park, North Carolina, "Air Pollution Report, Federal Facilities."
4. General Services Administration, June 30, 1971, Washington D.C., Inventory Report on Real Property Owned by the United States Throughout the World as of June 30, 1971."
5. LCDR Bartlett, R. C., United States Navy, Office of Federal Activities, Environmental Protection Agency, 1972, Washington D.C., "Analysis of an Interim Management Information System for Federal Facilities."
6. Naval Civil Engineering Laboratory, Department of the Navy, 1972, Port Hueneme, California, "Environmental Protection Data Base."
7. Office of Air Programs, Environmental Protection Agency, February 1972, Research Triangle Park, North Carolina, "A Guide for Compiling a Comprehensive Emission Inventory (NEDS)."
8. Office of Air Programs, Environmental Protection Agency, March 1972, Research Triangle Park, North Carolina, "Enforcement Management System."
9. Office of Air Programs, Environmental Protection Agency, June 1971, Rockville, Maryland, "Real Property Owned by the Federal Government in the United States."
10. Office of Water Programs, Environmental Protection Agency, August 1971, Washington D.C., "Water Quality Control Information System (STORET) Handbook."
11. Walsh, R. T., and VonLehmdem, D. J., APCO, 1970, "Estimating Manpower Requirements for Air Pollution Control Agencies," presented at APCA Conference, St. Louis, Missouri, 1970.