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DOE/AD-0043

FY 1994 - FY 1998 INFORMATION RESOURCES MANAGEMENT LONG-RANGE PLAN

U.S. Department of Energy
Office of Information Resources Management
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MASTER

Foreword

The Department of Energy (DOE) is currently in the process of reengineering the information resources management (IRM) planning process to focus on managing Departmental information, not just the information technologies employed. This will ensure that IRM planning is an integral part of the Department's strategic planning process. Consequently, portions of this year's DOE Information Resources Management Long-Range Plan will be presented in an abbreviated format.

A Departmentwide IRM Planning Process Improvement Team has been chartered by the Office of Information Resources Management to accomplish the reengineering task. The Team has representation from Headquarters and the field, including Office of Information Resources Management and Program Management organizations, Operations Offices, field sites, and DOE management and operating contractor organizations.

The process being developed will orient IRM planning to support and integrate with Departmental strategic planning. This will ensure IRM is properly aligned to support critical Departmental missions and functions as well as Departmental IRM initiatives. The accomplishment of this task will maintain the vitality of IRM planning within the Department.

Full implementation of the new process is estimated to take from 1 to 3 years. During that period, the DOE IRM Plans will continually evolve to support and conform to the new process, ensuring that future versions serve as fundamental and useful management tools.

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Section 1: Introduction

The Department has consolidated the IRM plans of its sites into a single document, the DOE FY 1994 - FY 1998 Information Resources Management Long-Range Plan. This Plan is the product of a long-range planning process used to project both future information technology (IT) requirements and the resources necessary to meet those requirements. It encompasses the plans of the various organizational components within the Department and its management and operating contractors over the next 5 fiscal years (FYs), 1994 through 1998.

The Information Resources Management (IRM) activities that support the diverse programmatic missions in the Department of Energy (DOE) are complex. Additionally, IRM requirements are continually changing to reflect changes in technology, policy, and program missions. A long-range planning process for IRM is therefore in place to assure that adequate support is available for cost-effective accomplishment of mission objectives.

The Secretary has announced a major reorganization of the Department's management structure. A flexible and adaptable planning process is especially important now as the changes, which became effective on April 1, 1993, will have an impact on much of the planning information presented in this document. During the coming year, planned resource initiatives and acquisitions may shift to support other areas of mission responsibility established by the Secretary. Any shifts in information resource planning will be identified in succeeding IRM plans.

1.1 Objectives

The principal objective of this Plan and its companion document, the Information Technology Resources Assessment, is to describe IRM activities and the information technology resources and capabilities of the Department, the future requirements, and the strategies and plans to satisfy the identified requirements. The long-range planning process provides the systematic means to meet this objective and assists the Department in assuring that IT support is provided in an efficient, effective, and timely manner so that its programmatic missions can be accomplished. Another important objective of the Plan is to promote better understanding, both within and external to the Department, of its IT environment, requirements, issues, and recommended solutions.

1.2 Scope

This DOE IRM Plan takes into consideration the IRM requirements of approximately 50 different sites. The annual long-range planning cycle for supporting this Plan was initiated by a Call in August 1991 for site plans to be submitted in February 1992 by those Departmental components and contractors with major IRM requirements. The site plans were reviewed by the appropriate DOE Operations Offices; the Office of IRM Policy, Plans, and Oversight; Program Management organizations; and other senior management officials. During this review process, consideration was given to the validity of the programmatic requirements, the reasonableness of

funding estimates, identification and resolution of any issues, and other alternatives available. Publication of this Plan is the culmination of the above process.

1.3 Plan Contents

The Plan is organized into six sections plus an Appendix. A brief description follows.

- Section 2: Departmental Overview and Information Resources Management includes a brief description of the mission of the Department and the supporting IRM infrastructure.

- Section 3: IRM Cost Profile details the IT costs of the Department, categorized into five major areas: personnel, equipment, software acquisitions, commercial services, and other related costs. In addition, printing and publishing costs for the Department are presented.

- Section 4: Planning and Management of Information Resources describes the IRM planning direction of the Department and the framework in place to support the management of Departmental information.

- Section 5: Programmatic Profiles and Uses of IT includes a brief description of the major program areas within the Department and provides examples of how IRM supports programmatic missions.

- Section 6: Information Technology Plans includes a summary of major planned Departmental initiatives to acquire IT and to develop and/or enhance major Departmental information systems.

- Appendix A: Site Profiles synopsizes, for each of the sites included in the planning process, the site's major function(s), program(s) supported, and the primary information technologies in place.

Section 2: Departmental Overview and Information Resources Management

The Department of Energy (DOE) has many diverse programmatic missions. This section describes the Department's mission, information technology (IT) resources, and information resources management (IRM) infrastructure that supports the accomplishment of mission objectives.

2.1 Departmental Mission and Information Technology Resources

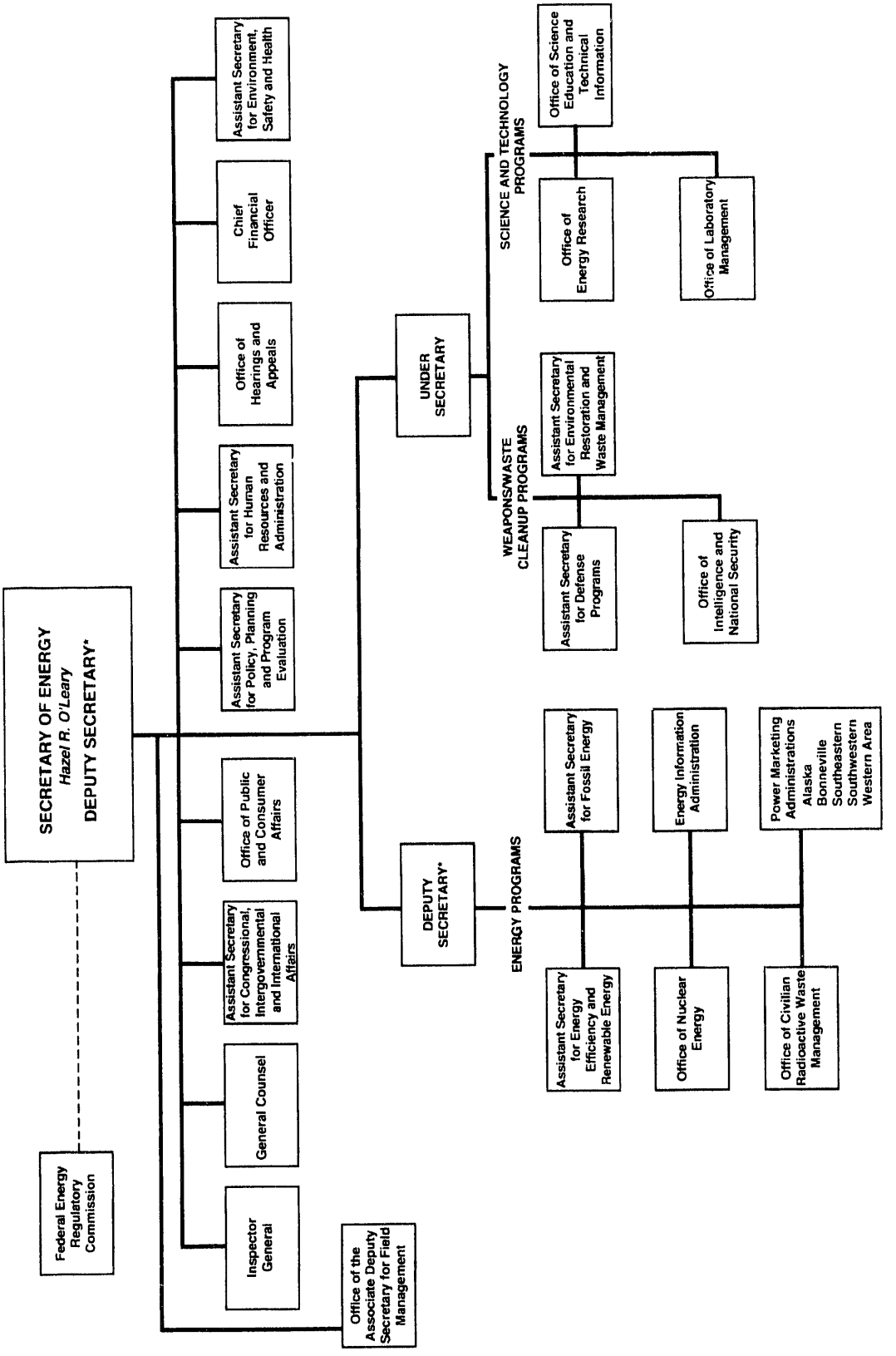
The Department of Energy (Figure 2.1-1), with approximately 20,000 Federal and 145,000 contractor employees and a FY 1994 IT resources budget of approximately $1.8 billion, has the responsibility for ensuring that the United States has sufficient energy to meet its future demands, for describing its future energy demands, and for planning and implementing programs and projects to move the country from its current state of energy management to the energy environment of the future envisioned by the current Presidential Administration. Three principal mission areas have been established by the Secretary to meet the challenges facing the Department--Energy Programs, Weapons/Waste Cleanup Programs, and Science and Technology Programs. Through the Secretary's quality management initiatives, these energy mission program clusters will work with other Department policy, program and support offices, and other agencies and groups to define and carry out the energy, environmental, and technology goals.

- Energy Programs

The energy strategy focuses on activities that will increase the Nation's reliance on clean, economical energy sources. As part of a sustainable energy program designed to strengthen the Nation's security and economic competitiveness and to reduce pollution, the importance of increasing the use of natural gas and renewable energy technologies, improving energy conservation and efficiency, reducing reliance on foreign oil, and providing leadership in global climate protection activities is being emphasized.

- Weapons/Waste Clean-Up Programs

The Department plays a central role in the Nation's strong commitment to curb the spread of nuclear weapons to other nations, reduce the size of the Nation's nuclear arsenal, and clean up the waste that has resulted after five decades of nuclear weapons production. The Department's rapidly expanding environmental programs in this mission cluster are taking on one of the most difficult challenges facing our Nation -- cleaning up the massive contamination at nuclear weapons facilities in a manner that both protects human health and the environment and respects the letter and spirit of Federal and State environmental laws. In addition, Departmental security programs have been merged to enhance the Department's transition to a post-Cold War world.



* Deputy Secretary oversees Energy Programs and serves as Chief Operating Officer of the Department within the Office of the Secretary.

Figure 2.1-1
U.S. Department of Energy

- Science and Technology Programs

The Administration's objectives for the Nation's economic growth build on an investment strategy that supports a highly-skilled workforce; a strong scientific and technological research and development community; and the development and transfer of innovative technologies, in domestic and international markets, to enhance our economy, environmental quality, and national security interests. The Department of Energy and its Laboratories have a unique role to play in the President's science and technology investment initiative. The diverse laboratories, which have made immeasurable contributions to the Nation's security and energy supplies during the Cold War era, now offer the Nation research and development capabilities for a redefined mission -- developing innovative, clean, and efficient energy technologies; developing techniques for waste cleanup, pollution prevention, and environmental protection; conducting basic research; supporting technology transfer; assisting in dismantling nuclear weapons and in curbing nuclear proliferation; and providing advanced education and training in science, math, technology, and engineering.

The information technologies supporting Departmental missions and business functions are varied and complex. Computer software application systems are required by virtually all DOE components to support a broad range of administrative and programmatic functions. These application systems range from small, standalone systems used within a single organization to large, integrated, major systems that affect every DOE and DOE contractor organization. At the beginning of FY 1992, the Department (excluding DOE contractors) had a total of 521 operational administrative/business software systems and spends almost $45 million annually to operate and maintain this software base. At that time, DOE organizations were also planning to develop 29 new software application systems and were in the process of developing 60 additional systems. The majority of these 89 new administrative/business software projects will cost less than $100 thousand each.

The Department also collects scientific, technical, and copyrighted software at the Energy Science and Technology Software Center (ESTSC) in Oak Ridge, TN. The ESTSC has over 1,600 software programs in its active collection. They cover a range of subject areas including environmental and earth sciences; radiological safety, hazard, and accident analysis; heat transfer and fluid flow; data preparation and management systems; and general mathematical and computing system routings. This collection includes several software packages that have been copyrighted by Federal contractors for commercialization and technology transfer. By having collection, announcement distribution, and management activities in a central point, those software packages are available in a consistent and appropriate manner to others in the DOE community, other Federal Agencies, U.S. industry and educational institutions, and foreign entities.

Departmental programmatic computing requirements are satisfied on computer systems that vary significantly in both capacity and capability. The various levels of computing systems within the Department have been characterized as microcomputer, minicomputer, mainframe computer, and supercomputer/high-performance computer. While mainframe computers are the workhorses in computing, supercomputers and other high-performance computers are needed to satisfy an increase in scientific/engineering applications, including the growing need to model complex systems, the solution of which is impossible without the capacity and capability of these systems.

DOE scientists and engineers are continually seeking better tools in the form of increased computing capability as a means for solving more difficult computational problems. Computing knowledge, techniques, and capability must advance along with the technical advancement in the energy programs to enable adequate computing to support Departmental programs in the future. At the beginning of FY 1993, the Department had an inventory of 2,265 major computer systems and more than 160,000 microcomputers. These computers establish the base upon which plans are made for providing future computing support to meet the computational requirements of Departmental programs. A detailed profile of the vast array of computing resources employed at DOE sites may be found in Appendix A.

The Department also uses all forms of telecommunications equipment and media to distribute the vast amounts of information generated by people and computers to support DOE's missions and business functions. Sophisticated systems and architectures are in place or planned at all major facilities to provide the support required by the dynamic DOE user community to accomplish the Department's research and development, administrative, operational, and manufacturing functions. These resources provide connectivity within the Department as well as access to worldwide networks in order to share information and technology. The complex and diverse programs of the Department require that telecommunications managers be flexible and highly responsive. They must also conform to various national directives, regulations, and public laws governing the procurement, deployment, and management of telecommunications resources.

2.2 Information Resources Management

While the implementation of IRM is carried out at every DOE location, oversight of IRM throughout the Department is under a centralized management structure. This structure includes the management and oversight of computer software, computing resources, and telecommunications resources, as well as activities pertaining to records management, printing and publishing, IRM standards, and information technology security. The IRM activities that support the programmatic missions are continually changing to reflect changes in technology, policy, and programmatic areas of mission responsibility.

The Assistant Secretary for Human Resources and Administration is the designated senior official for the IRM activities of the Department. Within this organization, the Office of Information Resources Management (OIRM) provides a central focus for the establishment of common policy and for the coordination of IRM activities on a Departmentwide basis in order to maximize the value, quality, and use of information resources in the accomplishment of DOE's mission and objectives. The OIRM is comprised of two subordinate offices as follows.

The Office of IRM Policy, Plans, and Oversight (IRM Policy) is responsible for establishing Departmentwide IRM policies and procedures and for establishing a process to review the IRM functions at DOE sites to ensure compliance. The Office serves as IRM liaison to organizations such as the Office of Management and Budget, the General Services Administration (GSA), the National Institute of Standards and Technology, the General Accounting Office (GAO), the Government Printing Office, the National Telecommunication and Information Administration, the National Security Agency, the National Archives and Records Administration, National Communications System, and Congress. IRM Policy manages the Departmental IRM long-range planning process, the IT acquisition management program, the records management program, the printing and publishing program, the unclassified computer security program, the classified communications and emissions security program, the radio/spectrum management program, the national security emergency preparedness telecommunications program, the Departmental program on the accessibility and use of IT by the disabled, and the IRM standards program.

The Office of Information Technology Services and Operations (ITSO) is responsible for the management and operation of all Headquarters IRM services, corporate DOEwide administrative computer systems, and certain DOEwide telecommunications systems and services, such as the Secure Automatic Communications Network and the Federal Telecommunications System 2000. ITSO develops policy, standards, and design criteria for Headquarters and DOEwide information and communications systems, and ensures successful system implementation and operation. ITSO provides management and oversight for Headquarters IT planning and technology assessment, and the design, development, implementation, and maintenance of Headquarters and DOEwide information systems, such as the Departmental Single Integrated Financial Management System, which are the responsibility of Headquarters organizations. ITSO services also include the operational aspect of the DOEwide Forms Management Program, operational responsibility for classified and unclassified common user computer and communications systems and services; software support; DOE commercial timesharing; and the Headquarters office automation program.

Section 3: IRM Cost Profile

This section of the Plan describes the current and projected costs for information technology (IT) for the Department of Energy. Information regarding the Department's projected printing/ publishing costs in FY 1994 are separately discussed in subsection 3.3.

3.1 Departmental Information Technology Resources Costs

Total IT costs for the Department include the purchase and lease of automated data processing (ADP) and telecommunications equipment, personnel costs, software acquisition, commercial services costs, and other costs. They are based on planning data and are subject to change during the planning and budget processes.

As shown in Figure 3.1-1, Departmental planned IT costs are projected to grow from $1,697 million in FY 1992 to $1,854 million in FY 1998. The average annual increase during the period is 1.4 percent. From FY 1992 through FY 1995, Departmental IT costs are projected to increase about 3.4 percent per year. Current plans call for the projected growth to decline an average -.4 percent annually between FY 1995 and FY 1998 as budget constraints continue to be implemented and computing and telecommunications technology advances provide improved cost performance. IT costs are projected to be approximately 9 percent of the Departmental FY 1994 budget request. The variations in the total IT costs from FY 1994 through FY 1998 are primarily a result of the timing of planned IT acquisitions.

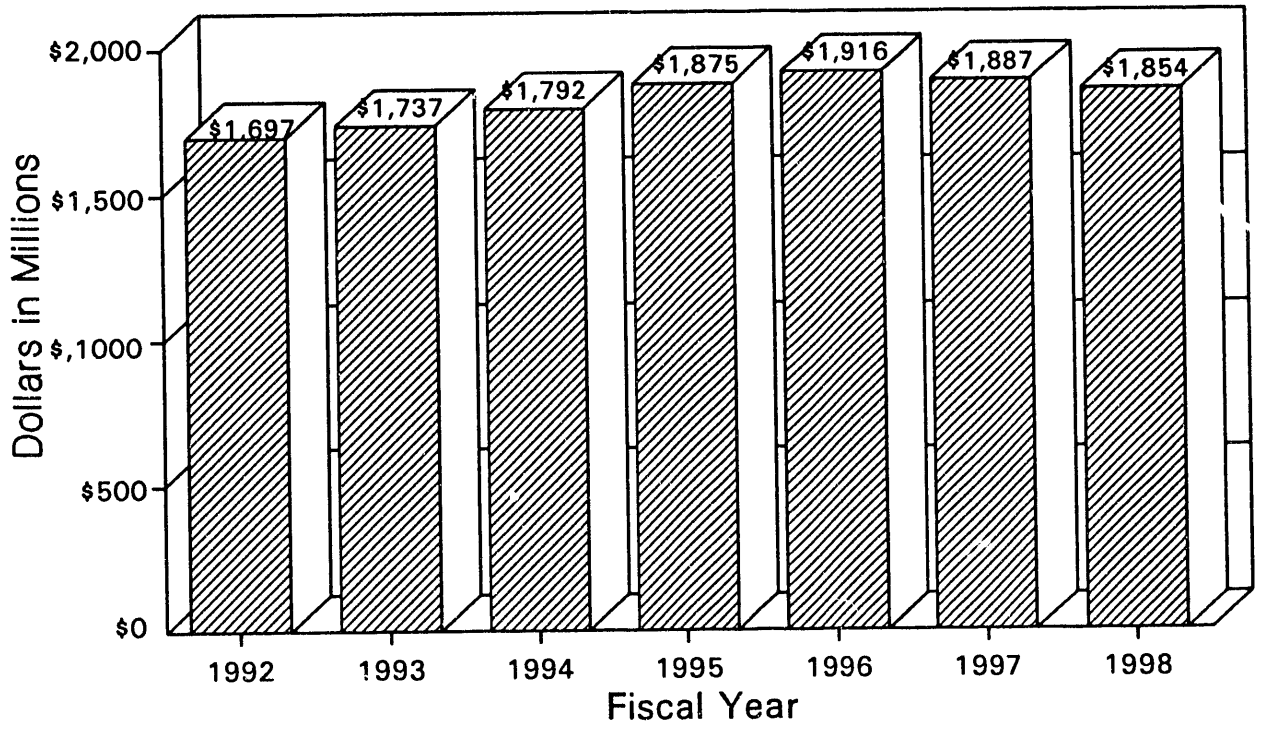


Figure 3.1-1
Total Departmental IT Costs By Fiscal Year

3.2 Costs By Category

The IT costs of the Department are presented in five major categories: equipment, personnel, software acquisitions, commercial services, and other costs. Table 3.2-1 shows the costs for FY 1992 through FY 1994 broken down into these categories. The average annual growth rate during this period for these categories is as follows: equipment, -2.3 percent; personnel, 5.7 percent; software acquisitions, -1.7 percent; commercial services, 4.9 percent; and other costs, 6.1 percent. The detailed items, which comprise these five categories, are described later in this subsection.

Category	FY 1992	FY 1993	FY 1994
Equipment	$ 505	$ 488	$ 482
Personnel	601	642	672
Software Acquisitions	120	116	116
Commercial Services	328	345	361
Other Costs	143	146	161
Total	$ 1,697	$ 1,737	$ 1,792

Table 3.2-1
IT Costs By Category
(Dollars In Millions)

Figure 3.2-1 displays the percentage distribution of the projected FY 1994 IT costs by category.

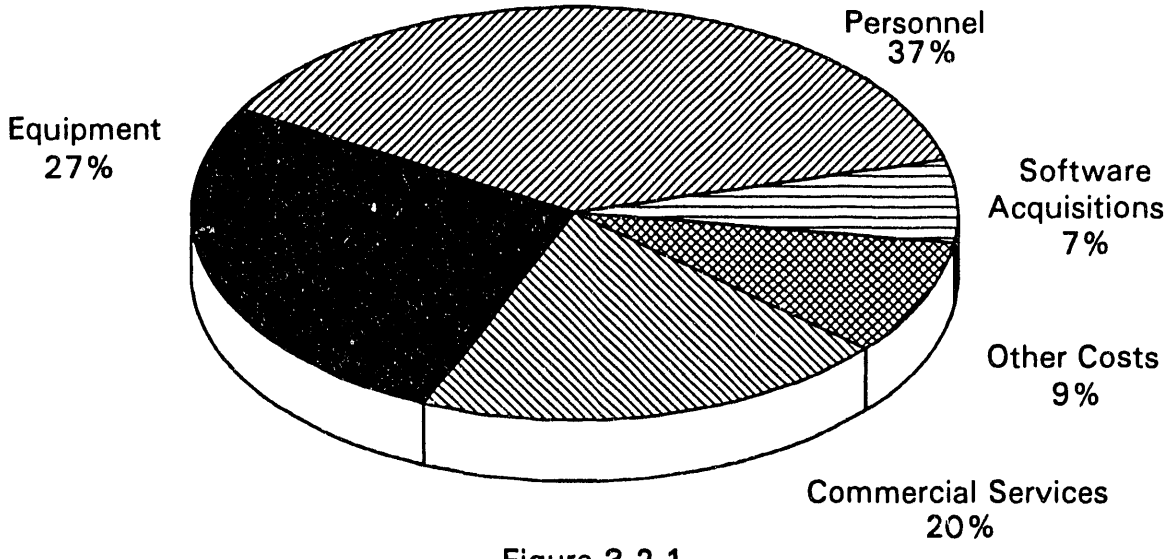


Figure 3.2-1
Percent of Total FY 1994 IT Costs By Category

3.2.1 Equipment Costs

As shown previously in Table 3.2-1, the Department projects to spend about $482 million for IT equipment during FY 1994. This figure includes amounts to purchase or lease both major and non-major items of computing resources and telecommunications equipment. A major item of computing resources refers to the acquisition of a computing resource component or group of computing resource components that have a purchase equivalent value of $1 million or more, irrespective of the method of acquisition.

Of the $482 million projected for FY 1994 IT equipment costs, $100 million (21 percent) is estimated for major items of computing resources, $254 million (53 percent) for non-major items of computing resources, and $128 million (26 percent) for telecommunications equipment. Figure 3.2-2 illustrates the above.

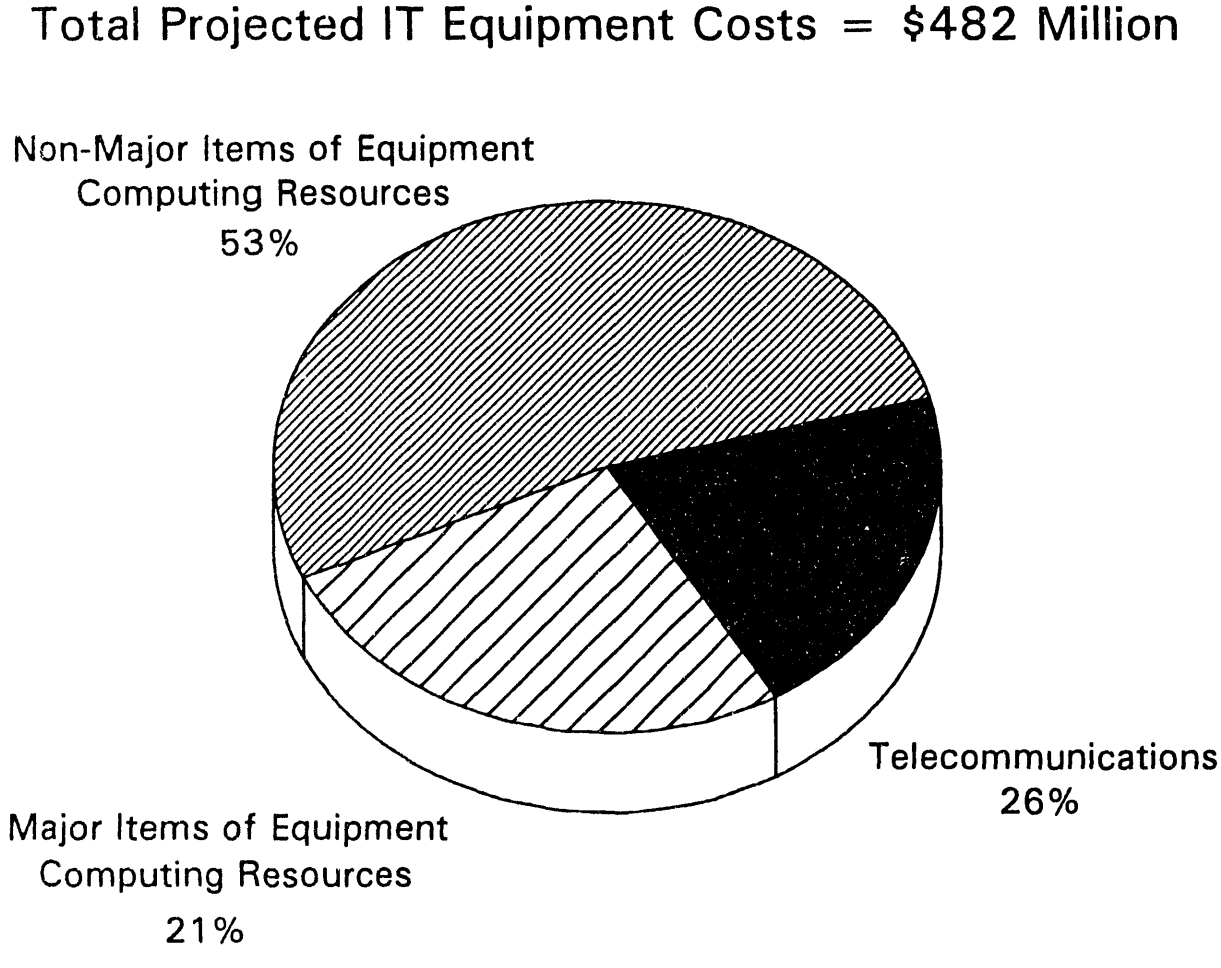


Figure 3.2-2
FY 1994 Projection of IT Equipment Costs

3.2.2 Personnel Costs

For purposes of this section, information technology (IT) personnel are defined as those personnel whose primary functions are directly related to IT activities. This category also includes personnel in user organizations who are principally assigned to IT support functions.

The Department projects to spend approximately $672 million in FY 1994 for IT personnel. This amount can be subdivided into the following areas.

Personnel Subcategory	Amount	Percent
Software Development and Maintenance	$ 306	45%
Telecommunications	128	19%
Computer Operations	101	15%
Inhouse Computer Equipment Maintenance	32	5%
Other Areas	105	6%
Total	$ 672	100%

Table 3.2-2
FY 1994 Distribution of Personnel Costs
(Dollars In Millions)

3.2.3 Software Acquisition Costs

The Department projects to spend approximately $116 million in FY 1994 for software acquisitions. This $116 million can be divided between software purchases of $96 million (83 percent) and software leases of $20 million (17 percent).

3.2.4 Commercial Services Costs

In FY 1994, the Department projects to spend $361 million for commercial services. These costs will be distributed as follows.

Commercial Services Subcategory	Amount	Percent
Software Acquisitions/Development	$ 91	25%
Operations and Maintenance	143	40%
Voice and Data Communications	89	25%
Acquisition of Computer Time	5	1%
Other Commercial Services	33	9%
Total	$ 361	100%

Table 3.2-3
FY 1994 Distribution of Commercial Services Costs
(Dollars In Millions)

3.2.5 Other Costs

The Department projects to spend approximately $161 million for supplies, other operating costs, and space during FY 1994. The costs will be distributed as follows.

Other Costs Subcategory	Amount	Percent
Supplies and Other Operating Costs	$ 136	84%
Lease or Rental of Space for Operations and Office Space	25	16%
Total	$ 161	100%

Table 3.2-4
FY 1994 Distribution of Other Costs
(Dollars In Millions)

3.3 Printing and Publishing Costs

The printing and publishing activities of the Department encompass a wide range of areas. These include publishing scientific and technical, public communications, and statistical publications; operating inhouse printing/duplicating facilities; operating inhouse convenience copiers and inhouse composition activities; and obtaining printing services directly from the private sector or through the Government Printing Office. The Department projects to spend approximately $98 million in FY 1994 for printing and publishing. This amount can be divided into the following areas.

Printing and Publishing Category	Amount	Percent
Inhouse Convenience Copying	$ 31	32%
Private Sector Printing	24	25%
Inhouse Printing/Duplicating	17	17%
Printing/Duplicating Facility Personnel	11	11%
Inhouse Composition	5	5%
Printing/Publishing Equipment	10	10%
Total	$ 98	100%

Table 3.3-1
FY 1994 Distribution of Printing and Publishing Costs
(Dollars in Millions)

Section 4: Planning and Management of Information Resources

This section describes the planning and management process used by the Department of Energy (DOE) relating to information resources management (IRM) activities.

The future success of Departmental objectives is dependent upon informed decision-making, the basis for which is solid and accurate information. Information is critical to mission accomplishment, and is the primary product of the Department's investment in research and development. As the body of information grows exponentially, it becomes more important to develop strategies that continue to capitalize on the value of this Department's vast reservoir of information and to manage it effectively and efficiently. An examination of DOE's major programmatic activities reveals the importance of immediate access to relevant, reliable information.

4.1 Strategic Planning

In April 1991, the former DOE Office of Administration and Human Resource Management issued *IRM Vision 21, Information Resources Management Into the 21st Century, A Strategic Planning Program*. This was the Department's first major step in IRM strategic planning. It provided a common focus and direction for all Departmental Elements involved in IRM activities. IRM Vision 21 was envisioned to provide a well-understood infrastructure, allow flexibility to accommodate the changing needs of the users, and cause the DOE IRM community to focus on the management of information, instead of concentrating only on technology. To establish a framework for managing information, *IRM Vision 21* articulated a purpose, mission, and vision for the Department's IRM program as follows.

Purpose Statement

Information is critically important to accomplish the DOE mission(s); therefore, the IRM purpose is to continuously improve the management and utilization of information and information resources throughout the Department.

Mission Statement

The mission of the DOE IRM Program is threefold:

To provide leadership and services to ensure secure, efficient, and effective quality life-cycle management of DOE information needed to support the diverse missions of Departmental Elements.

To advance information technologies which are critical to the DOE programs, the National Energy Strategy, and the National Interest.

To develop policies, plans, budgets, and standards and to provide services, consultation, oversight, and implementation of appropriate technologies to support DOE information management activities in a cost-effective manner and in accordance with public law and applicable regulations.

Vision Statement

The vision for IRM in the Department is to be recognized as proactive providers of the best IRM leadership and service in the Government with high-quality, timely, and cost-effective information services responsive to customers' current and future requirements.

In October 1992, an update to the original *IRM Vision 21* document was issued that stated the revised and expanded strategic objectives of the program, summarized as follows:

1. IRM Institutionalization - The purpose of this objective is to formally establish the IRM function throughout all Departmental Elements and the DOE contractor community. Inherent in any Departmental initiative is the diversity and complexity of the DOE structure and operations. The integration of IRM as part of the way DOE does business will require formalization through existing Departmental policies and procedures. This initial formalization effort will ensure that effective IRM is integrated into program activities and becomes standard procedure. Included within this effort is aligning the IRM planning process with the Departmental strategic planning process.

2. Leadership, Service, and Quality - In addition to the need for effective leadership and service, this objective recognizes the quality aspect of the IRM function, as well as the value of effective communication and feedback. This objective will build upon the infrastructure established through the Departmental Directive process and through the institutionalization efforts, to form a Departmentwide framework. It is important that mechanisms be put in place for sharing information on IRM-related issues, accomplishments, and activities throughout the Departmental Elements, and for encouraging cyclical communication within the IRM community. The diverse missions and dispersed activities of the Department offer a special challenge in meeting this goal.

3. Directives, Policy, and Standards - Sound IRM directives, policy, and standards provide the framework for planning, budgeting, acquiring, implementing, and sustaining IRM resources in support of DOE Elements achieving their missions. This strategic objective concentrates on this contribution of directives and policy, in the form of published DOE Orders, regarding IRM and its processes. Through this objective, the DOE community will arrive at a common understanding of the various areas which comprise IRM. Secondly, the roles and responsibilities of the organizational entities within the DOE community, as they relate to IRM functions, will be defined. This strategic objective also recognizes both the necessity for and the benefits to be obtained through IRM standards. This objective will provide for the coordination of Departmental efforts in regard to standards and help to concentrate these efforts in areas of vital interest to program missions dispersed across the DOE community.

4. Technology - This objective recognizes the integral role that technology plays in ensuring that Departmental priorities are achieved and that DOE remains at the forefront in technology and service. This objective outlines the process by which DOE will establish a systematic technology direction for the future. Key components of this process include conducting research and development in information technologies and information technology forecasting. Technology forecasting not only will provide an understanding of the information technology horizon, but will also present a perspective and focus on technologies of particular interest to DOE program activities and requirements. The process will identify potential DOE applications and program activities for effective use of new technology. This process will also include technology impact studies to ensure that changes necessitated by the introduction of new technologies are appropriately recognized and incorporated into planning.

Progress on evolving and implementing *IRM Vision 21* is continuing, although much remains to be accomplished. The first year was tempered by the realization that the breadth and scope of the IRM contribution to DOE's mission was understated. The composition of the IRM team, as well as the scope of the activities, require significant expansion to accurately encompass the contribution of IRM toward accomplishing the Department's goals. A significant step towards institutionalizing the IRM function was the establishment of the IRM Council, which includes representatives of Program Management organizations and field elements. The Council will foster a high level of cooperation to support Departmental priorities and program requirements.

A comprehensive IRM program, implemented effectively, ensures that all the various information management functions are performed in a coordinated and cost-effective manner, thus contributing to the success of DOE's programmatic missions. DOE spends over a billion dollars in information management related activities annually. Integrating IRM with other programmatic priorities will maximize the benefits of this investment.

4.2 Long-Range Planning

The Department has long been recognized as a leader within the Federal Government in managing its information technologies, having an exemplary IRM planning program that has been in place for over 13 years. Recently, however, events have prompted the Department to reevaluate the program in order to focus on the management of Departmental information, not just the management of the information technology (IT) employed. This will ensure that IRM is an integrated component of the Departmental strategic planning process.

A Departmental IRM Planning Process Improvement Team was chartered by the Office of Information Resources Management (OIRM) to accomplish this task, with representatives from Headquarters and the field, including OIRM and Program Management organizations, Operations Offices, field sites, and DOE management and operating contractor organizations. The new process being developed by that team will orient IRM planning to support and integrate with the Departmental strategic planning. This will ensure that IRM is properly aligned to support critical Departmental missions and functions as well as Departmental IRM initiatives. Accomplishing this task will maintain the vitality of IRM planning within the Department. Full implementation of the new process is estimated to take from 1 to 3 years. The following is a description of the current planning process, which is being provided for information purposes.

Background and Description of the Current IRM Planning Process

The Department established a long-range planning process for the acquisition or development of IT resources to ensure that programmatic requirements are met efficiently, effectively, and economically. In addition to meeting internal Departmental information resources management and control objectives, the long-range planning process is designed to decrease the reporting burden of the Departmental Elements and contractors. The plans provide a base of information to use in responding to requests for special reports and inquiries from within the Department and to satisfy applicable policy, budgeting, and reporting requirements set forth by other Government organizations, such as the Office of Management and Budget (OMB) and the General Services Administration (GSA).

The long-range planning process helps assure each DOE organization that the IT portion of IRM (e.g., computer software, computing resources, and telecommunications) required to support that organization's mission and objectives will be available when needed. The process provides information necessary to support and improve Departmental decision-making with respect to planning, budgets, requirements identification, design, engineering, acquisition/development of systems and services, resource sharing, and reutilization of computing resources equipment.

The current long-range planning cycle (shown in Figure 4.2-1) for producing this Departmental Plan began in August 1991 with the issuance of a Call for FY 1994 Long-Range Site Plans. This Call also included requirements for site FY 1993 - FY 1995 Printing and Publishing Plans and Office of the Chief Financial Officer automated financial management systems planning information. The Call was issued to all Departmental sites who significantly use IT to assure that their future needs are anticipated and met. Because the Department supports a diversity of programs ranging from state-of-the-art nuclear weapons design and development to the marketing of hydroelectric power, site program requirements and supporting IT needs are diversified. Each site prepares its own long-range plan according to the format and reporting requirements contained in the Call.

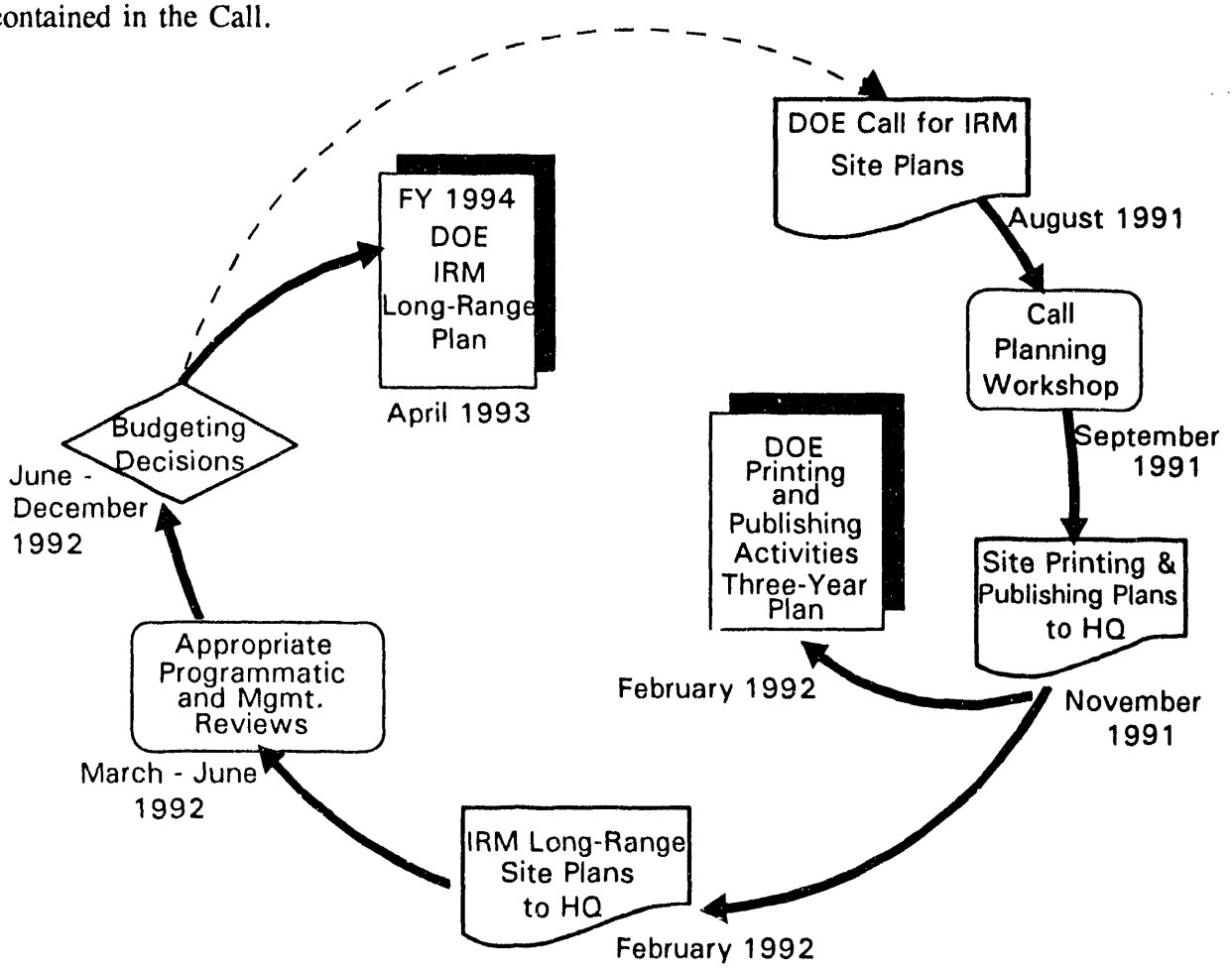


Figure 4.2-1
FY 1994 Long-Range Planning Cycle

In order to provide a long-range perspective of a site's programmatic requirements and planned initiatives, the planning data reported in a site plan spans an 8-year period beginning with the actual data for the previous fiscal year. For this planning cycle, the period began with FY 1991

data. This approach permits identification and review of a site's requirement for additional major IT resources during as many as five annual planning cycles before an acquisition must be included in the current budget cycle. This allows sufficient time to confirm the validity of the requirement and to investigate and evaluate alternative methods of acquiring/developing the needed resources before actual budgetary decisions are required.

Each site plan includes a description of the site's current IT environment, major accomplishments of the previous year, projection of future requirements, and strategies and plans to satisfy the requirements along with their projected costs. Each site develops its plan using site-specific planning tools plus those included in the Call. The basic data for describing the actual and projected IT needs of the site are derived by the scientists, engineers, and other technical and management personnel who are responsible for achieving the Departmental missions and programs at that site. These program support requirements are then compared to the IT available at the site. Plans and strategies are then developed by the site to provide additional IT to meet the requirements, if needed.

Each year, the review cycle of individual long-range site plans begins with review and approval by their own site management. Where appropriate, the site-approved long-range plans are forwarded to the cognizant Operations Office for review and comment. The site plans are then forwarded to Headquarters along with any applicable Operations Office comments and/or recommendations. Sites that do not report to an Operations Office forward their plans directly to Headquarters.

At Headquarters, both programmatic and IRM reviews of site plans are made. The plans are provided to the cognizant program offices for their evaluation of the estimated programmatic requirements among all pertinent sites, both individually and collectively. This assists the program in making overall planning decisions, as well as establishing their priorities in making IRM budgetary allocations.

The IRM review of site plans examines the justification for the requirements and the projected costs for providing the estimated resources, as well as the plan's consistency, completeness, and consideration of technical alternatives. As the information presented in the individual site plans is examined, issues (or potential issues) are identified and resolved. The results of these reviews are provided to the sites for appropriate consideration in the formulation of their next site plan.

The final phase in the planning cycle is the annual preparation of this document, the Department of Energy IRM Long-Range Plan, which is a consolidation of individual site plans with appropriate adjustments to reflect the revisions made during the various planning and budgeting reviews in order to present overall requirements, strategies, and directions. This consolidated Plan is distributed throughout the Department and, upon request, to industry, the general public, and other Government organizations. Experiences gained during each planning and management process will be reflected in changes to subsequent planning cycles.

4.3 Management Program

Federal Agencies are required to establish a comprehensive strategy for managing their information resources throughout the information life cycle, including information creation, collection, processing, dissemination, management, and disposition/retirement. Management activities throughout this life cycle should be targeted toward making the information useful and effective in accomplishing agency missions. For DOE, the IRM function must support the current Administration's energy strategy, as well as Departmental priorities. The information itself must lead to effective decision-making in the management process through providing an expanded knowledge base on the various programs of the Department. Thus, information is more than the consolidation and integration of data. To be useful in decision-making, data and then information must be organized, analyzed, interpreted, realigned, validated, cross-referenced, and made readily available.

To ensure that DOE organizations are adhering to basic policies and procedures for IRM planning, development, implementation, and operation, as well as to assess the effectiveness of DOE policy, the Department utilizes a management review program to oversee the IRM activities and practices of each DOE organization. Reviews of DOE sites and other Departmental Elements are conducted on a 2- to 3-year cycle by IRM Policy. The DOE Operations Offices, in turn, conduct similar reviews of the management and operating contractor sites under their cognizance. The primary objectives of the review program are to:

- Improve the process by which the Departmental Elements execute their IRM responsibilities.
- Test the guidance and policy issued by the Department for quality and effectiveness.
- Provide feedback when new or better guidance is needed.
- Facilitate the transfer among Departmental Elements of innovative practices and techniques.

Based on the results of a management review, a formal report of findings and recommendations is prepared and sent to the organization reviewed. This organization then responds by providing an implementation plan for specific actions that will be taken to address the findings and recommendations. IRM Policy has established an automated system for tracking recommendations and associated plans for implementation of corrective actions to ensure that all previously identified recommendations have been fully addressed.

The management review process is continually being refined and revised to reflect changes in technology, policy, and programmatic missions. In addition to the management review program,

the management process utilizes other mechanisms for each area of IRM that is described in the following subsections.

4.3.1 Software

DOE software initiatives and expenditures are undertaken to support program missions, strategic objectives, and management priorities. Software is a valuable information technology resource and Departmentwide policies and procedures require that it be managed as such. Computer software management within the Department is based upon the utilization of a life-cycle management methodology which follows software systems from initial conception through their eventual retirement, and includes the concepts of software quality assurance and quality control.

DOE policy requires that all Departmental components establish and operate their own software management programs, tailored to local site needs. Each program is required to treat software initiatives appropriately, commensurate with their size, complexity, cost, degree of external impact, degree of customization, functions performed, criticality, and other factors important to the site's management.

As stated earlier, IRM Policy conducts management reviews of the Departmental IRM activities. The software portion of these reviews is directed at ensuring compliance with Departmental-established policies, responsibilities, and authorities governing the use of effective life-cycle methodologies in the management of all software activities. These reviews provide findings and recommendations, which are provided to the reviewed organization's management and to senior Departmental management.

Departmental procedures require that, at the completion of the requirements definition stage of the life cycle, IRM Policy receive notification of the planned software development. This document is prepared and submitted by the user organization, and is used to inform all potentially interested parties within the Department of the start of an activity and to update the Departmental inventory of administrative software, the System Review Inventory System (SRIS). In addition, should this initiative impact other organizations within the Department, approval to proceed with development must be obtained from the Director, Office of Information Resources Management.

An integral part of the overall software planning and management process is the annual updating of the Departmental inventory of administrative software, SRIS. Each year, as part of the Department's IRM long-range planning process, all DOE Elements and contractors are called upon to identify their plans for new software systems or major enhancements to existing systems. This information is used to update the SRIS, which contains basic descriptive information on all systems and their enhancements, whether they are under development, being planned, or are undergoing redesign. The SRIS, which is operated by IRM Policy, provides information needed by the Department to properly monitor and manage its software-related activities.

DOE software management procedures specify that all operational application systems should be periodically reviewed by their user organizations, unless such systems have been designated for review by another organization. The purpose of these reviews is to determine the extent to which the system continues to meet intended objectives, to ensure that appropriate security controls are in place, and to assess the system's efficiency and cost-effectiveness. IRM Policy is responsible for reviewing the Department's major software application systems. These major system reviews are also conducted periodically, with a report of findings, conclusions, and specific recommendations for improving the system's usefulness or to correct deficiencies prepared and forwarded to the user organization and DOE management personnel.

Moreover, the need to manage information has driven the effort to explore the use of corporate information systems (CIS) and how such systems can be used as tools throughout DOE. The Department has recently undertaken an initiative to improve the management and accessibility of information and information resources by developing an ongoing process for the management of the Department's corporate information resources and architectures. A Corporate Information Systems Working Group has been formed to assess the utilization of CIS within the Department. The group includes representatives from Headquarters and Field Departmental Elements and reports to the DOE IRM Council. In the short-term, the group will define corporate information, corporate systems, and corporate system architectures. Interpretation and delineation of these concepts will provide the basis needed for the assessment and implementation of hardware and software compatibility, standardization, and configuration management within the Department. The identification of CIS within the Department will facilitate the efficient management of information resources by promoting standardization and reducing the proliferation of similar applications.

4.3.2 Computing Resources

Long-range planning of computing resources is supportive of the budget formulation process by ensuring that the IRM budgeting information is tied to the program and mission requirements of the Department. Identification of the computing requirements in the site plans' out-years helps to improve the budgetary process by providing descriptions of the requirements from the time when the needs are first identified to the time when, all other feasible alternatives having been considered, the acquisition of computing resources becomes part of the budget year submission. This process better ensures that each item will have been fully justified and reviewed within the overall computing resource allocation priorities of the Department. Funding for computing support is contained within each program's budget. In the budget formulation process relating to computing resources, special attention is given to major items of automated data processing (ADP) equipment acquisitions. A major item of ADP equipment is defined, for budgetary purposes, as an ADP equipment component or group of components having a total estimated purchase equivalent cost of $1 million or more, regardless of the actual method of acquisition. All planned acquisitions of major items of ADP equipment supported by the Department are identified and justified in the Departmental budget submitted both to OMB and

Congress. In addition, several crosscut exhibits related to computing resource acquisitions and overall IRM costs are prepared from data in the site long-range plans and submitted to OMB.

The acquisition process is managed by the Department through the review and approval of implementation plans and clearance documents. Following approval of the DOE budget by Congress, procedures require that an implementation plan be prepared by the site that plans to acquire the ADP equipment. The implementation plan provides for a reconfirmation of the computing requirement by the Program Management organization, based upon latest programmatic information. The implementation plan includes a summary of all major factors affecting the proposed acquisition and identification of the important milestones involved. Preparation and review of implementation plans also help to ensure that an appropriate level of competition exists; that specifications for meeting the requirement have been clearly stated; that the selection criteria are clear and fair; that adequate facilities, trained personnel, etc., will be in place when the equipment is installed; and that computer performance evaluations have been conducted, where appropriate, and the results documented along with validation of requirements and an analysis of alternatives. Approval authority for implementation plans for the acquisition of ADP equipment costing less than $1 million is normally delegated to the DOE field elements. Major items of ADP equipment are normally approved by IRM Policy, unless such authority has been specifically delegated to the Field Element.

The acquisition itself is conducted by the site and includes solicitation of proposals, receipt of vendor responses, evaluation of those responses, selection of the winning proposal based on solicitation criteria, and selection of the method of acquisition (e.g., purchase, lease, etc.). Certain acquisitions are selected for more extensive and detailed review by the DOE Operations Office or Headquarters and require the approval of a clearance document prior to contract award.

4.3.3 Telecommunications

The Department continues to set its management objectives to take advantage of increased competition in the marketplace and technological advances within the industry, with the ultimate goal of improving operational efficiency and user satisfaction while concurrently reducing costs. This requires a great deal of interaction between Headquarters, the DOE Operations Offices, and individual field sites. DOE facilities are very often remotely located. In addition, several DOEwide programs function almost entirely in a mobile environment (e.g., the Nuclear Emergency Search Team, the Radiological Assistance Program, and the transportation of Sensitive Nuclear Materials). Overcoming these geographic barriers, maintaining required security, dealing with the ever-changing regulatory and standards environment, and achieving the technological proficiency required to accomplish the Department's missions require a cooperative effort by both the Headquarters and field telecommunications managers. Therefore, Headquarters and field telecommunications managers are working together to plan and implement efficient top-down strategies that will establish short-, mid-, and long-term goals for

their communications support activities. These strategies support DOE management goals as well as the specific goals of the facilities.

Sites must maintain a firm commitment to national priorities. Throughout DOE, strategic initiatives must be tempered with the larger agenda of national priorities. This larger agenda includes adopting Government standards, security policies, National Security and Emergency Preparedness (NS/EP) telecommunications, radio frequency spectrum conservation, Governmentwide common-user services such as Federal Telecommunications System (FTS) 2000, and public safety issues. Current activities in this area include Departmentwide transitioning to Government Open Systems Interconnection Profile (GOSIP) standards, developing NS/EP telecommunications procedures, supporting the development of the Government Emergency Telecommunications System program, expanding secure voice and data communications capability, and implementing trunked radio technology to conserve the scarce spectrum resources.

The diversity of missions within the Department requires different telecommunications solutions, which suggests that management policies must be flexible enough to accommodate these differences without compromising overall accountability. This requires a rather precise definition of Headquarters and field site roles in the joint endeavor of managing information resources.

DOEwide responsibility for telecommunications management has been assigned to OIRM. These responsibilities include setting strategic direction for all field locations, regardless of the mission. IRM Policy must ensure that uniform standards are applied to permit integration of local telecommunications systems into Departmental and national networks. In addition, IRM Policy must ensure that uniform procedures are readily available, which reflect the common policies applicable to all field IRM organizations. Overlying this entire infrastructure is the systematic IRM Policy process of oversight and evaluation that determines effectiveness of field management.

Within this broad framework, field site telecommunications managers may plan, implement, and operate local telecommunications systems tailored to mission needs and site profiles. Local telecommunications systems are defined as equipment and services assembled in a manner that satisfies local needs and provides for interconnection to other Departmental locations and the world at large. This approach is predicated on the concept that field sites are in the best position to determine and manage local telecommunications needs. However, this cannot be construed as total field autonomy, as adherence to National standards and regulations, public law, budget constraints, and Departmental strategic direction and directives is incumbent upon all local telecommunications managers.

Departmental policy advocates that local telecommunications services be provided through a single-vendor contract at each location and obtained through a competitive solicitation process.

Where possible, contract terms should be performance-based, with requirements for management reports that include inventory and assignment records, system performance records, traffic data and station-usage records, and fixed-unit pricing processes for systematic billing verification. Planning and procurement responsibility associated with obtaining and maintaining a local telecommunications system resides with local managers. Headquarters must ensure that operational and technical compatibility of local systems permit uniform interconnection to other locations and common-user networks.

Planning for requirements between sites or among DOEwide locations requires a different approach and is heavily influenced by the site's mission area of responsibility. It is also influenced by common telecommunications requirements, such as providing security and adhering to directives (e.g., mandatory use of FTS 2000 services). The scope of this process exceeds requirements for local site planning and is best performed by a centralized body that gathers local intercity requirements, combines them with common telecommunications needs, produces a common-user solution, procures the required system or services, and provides operational management. This centralized approach eliminates the proliferation of multiple and redundant communication links between similar locations, and permits the integration and consolidation of site services at reduced costs. The Secure Automatic Communications Network (SACNET), the Department of Energy Communications Network (DOECN), and FTS 2000 are examples of this process. Throughout the process, Headquarters has the responsibility of providing direction to ensure a fully compatible and interconnectable system of communications; however, responsibility for developing, procuring, implementing, and operating the system may be delegated to an appropriate field site.

IRM Policy maintains a series of DOE Orders that outline policies and directions regarding all phases of telecommunications management. They are supplemented by procedural guides and manuals for specific functions, when required.

4.3.4 Government Open Systems Interconnection Profile

The Department is aggressively implementing the mandated standards specified in the Government Open Systems Interconnection Profile (GOSIP) for information exchange between the Department's computing systems. The Department issued a policy letter in August 1990 establishing a Departmentwide goal to use the GOSIP standards for computerized information exchange between its facilities by October 1995. DOE is a leader among Federal Agencies in implementing the GOSIP standards. In the long term, having the entire Department's computer information networks conform with these standards will establish the foundation for the secure, accurate, timely, and cost-effective exchange of the Department's computerized information, internally as well as externally.

IRM Policy requires sites to report their plans for implementing the GOSIP standard in their respective site plans. In addition, IRM Policy requires the sites to develop/update their plan for

achieving the Departmental goal of intersite data communications by October 1995. IRM Policy has published and distributed a Departmental GOSIP transition strategy and plan to help the sites with their local strategy and plan. In addition, a DOE GOSIP Procedures and Guidelines document has been issued to help implement the protocols specified in the GOSIP standard in a consistent manner within the Department. This document supplements the National Institute of Standards and Technology GOSIP Users Manual.

Recently, a program was initiated to effect interoperable electronic mail and file transfer information exchanges at an accelerated pace to meet the requirements of the Secretary, Program Secretarial Staff, and their subordinate elements. This program calls for the implementation of GOSIP standards at select sites in FY 1993 and all others in FY 1994, thus achieving the Departmentwide goal a year early. Cooperation and resource commitments from all DOE Elements will bring about success to this important initiative.

4.3.5 Information Technology Security

The Information Technology Security Program includes Unclassified Computer Security (UCS), Communication Security (COMSEC), and Emission Security (TEMPEST) disciplines. TEMPEST RED/BLACK Design/Installation Guidelines were issued in April 1991, providing specific technical criteria for equipment and systems processing classified information for each TEMPEST countermeasure defined by National policy. The document goes hand-in-hand with the TEMPEST Precepts paper, which was issued in January 1990, to define the TEMPEST threat at each DOE facility. By using these new guidelines with the TEMPEST zoning program, a 4-year savings in excess of $26 million has been realized in the application of TEMPEST countermeasures.

COMSEC audits and surveys and TEMPEST RED/BLACK inspections are being conducted together, eliminating the number of visits made to each DOE and DOE contractor facility and affording DOE additional cost savings. Protected distribution system compliance is part of the inspection process. To speed up the inspection process, video equipment is used under an approved security plan for these inspections.

The highly successful DOE Computer Incident Advisory Capability (CIAC), which was established at the Lawrence Livermore National Laboratory in FY 1989, continues to provide DOE excellent service in dealing with computer security incidents, providing technical assistance, and acting as a clearinghouse for computer security events for both unclassified and classified systems.

Electronic Key Management Program

This program, which is being implemented at the National level and involves all civilian agencies and military organizations, will reduce, as much as possible, keying material handling. IRM Policy is actively involved in the working groups that have been organized to define the breadth of the program, the customers involved, and specific needs and requirements in support of this effort. This program will involve years of effort and participation. At DOE, this will be a multiphase effort.

- Phase one began the implementation of over-the-air-rekey (OTAR) in DOE. This capability is available for point-to-point and netted KG-84 circuits. Emphasis is placed on common keyed systems such as SACNET. One goal of this phase is to convert SACNET to OTAR by December 1993.

- Phase two of the program will involve equipment using firefly technology. This technology is currently used in the secure telephone unit (STU)-III equipment and is being added to the design of new cryptoequipment. Budgetary guidance and planning information has been provided to the Operations Offices regarding purchase of the necessary equipment to use this new technology.

- The final phase will be conversion to the electronic key management system.

The goal date for a fully operational capability that provides full support to all electronic key management functions for the Central Facility at the National Security Agency is the year 2000.

The IT Security Division will publish a guideline to assist DOE sites in determining information sensitivity during FY 1993. A Disaster Recovery Program Guideline was published in July 1991 by the UCS program. Other program activities include management oversight reviews and Computer Security Assurance Review (CSAR) process, which will continue as an integral part of the UCS program and help determine the status of UCS at DOE facilities.

Computer Security and Privacy Planning Process

The computer security planning process is intended to reduce the risk and magnitude of harm that could result from the loss, misuse, unauthorized access to, or modification of information. The Computer Security Act of 1987 requires the preparation of Computer Security and Privacy Plans (CSPP) for all unclassified computer systems that process, store, or transmit sensitive information, or that process mission-essential applications.

These requirements have been specified in OMB Bulletin 90-08, which implements the CSPP portion of the Computer Security Act. In response to OMB Bulletin 90-08, the Department

issued a Call for the preparation of unclassified CSPPs. The Call required specific actions by DOE and DOE contractor organizations in the preparation of the plans and a certification that all CSPPs were prepared and reviewed, and all addressed. The Call also established milestones for the completion of the plans. IRM Policy reviewed and approved CSPPs developed by the Operations Offices, other DOE Elements not reporting to a Operations Office, and appropriate Headquarters Organizations. Operations Offices reviewed and approved those CSPPs submitted by their cognizant management and operating contractors and other contractors for which the Operations Office determined that a plan should be prepared. Each Operations Office then submitted to IRM Policy a certification that CSPPs had been completed for all sites under their cognizance and that they were available for review.

Departmental policy will continue to rely on the site-level Computer Protection Plan as the cornerstone of a sound unclassified computer security program. Therefore, DOE sites have been and will continue to be encouraged to use these site-level plans when preparing or updating the CSPPs. IRM Policy will continue to require that DOE sites prepare CSPPs for all new sensitive systems. Updates to existing CSPPs are also required, as detailed in OMB Bulletin 90-08.

4.3.6 Records Management

IRM Policy manages the Departmental Records Management Program through the development and implementation of policies and procedures that govern the life cycle of records from creation through maintenance and use, to destruction, donation, or placement in permanent archives. The major objectives of the program are to provide proper management and oversight of records that contain evidence of financial and legal commitments, have evidentiary value relating to Departmental responsibilities, and have scientific and technical value as a result of basic and applied research. Initiatives are underway to enhance program effectiveness and integrate records management with other IRM functions.

Progress continues on the resolution of key issues resulting from the National Archives and Records Administration (NARA) evaluation of DOE's records management program.

- A Department-level Records Management Committee, that includes key records management personnel from Headquarters Secretarial organizations, Operations Offices, and other DOE field sites, has been established to provide expert advice and guidance on pertinent issues. The Committee also serves as a forum for the interchange of ideas and experiences.

- In a joint effort, DOE and NARA developed a training program on records inventorying and scheduling. The program was implemented on a Departmentwide basis, with over 300 DOE and DOE contractor personnel attending the seminars.

- A Departmentwide inventorying and scheduling initiative has been undertaken, with each site conducting a complete inventory of their records and thereafter developing site-specific records retention schedules. DOE's goal is to have all schedules for active records prepared for NARA approval by October 1, 1993, and inactive records by October 1, 1995.

- DOE and NARA continue to maintain a close working relationship ensuring that representatives attend meetings of mutual interest, such as the DOE 1992 Records Management Conference (sponsored by DOE field and contractor Records Managers) and NARA's Bimonthly Records and Information Discussion Group.

- A comprehensive Departmental Directive that includes policies and procedures for all records, regardless of media, is being developed. The Directive will encompass such topics as micrographics management, electronic recordkeeping, audiovisual records, optical disk, records disposition, and files management. Consolidation of these requirements will promote awareness and provide for efficient and effective program implementation throughout DOE and contractor organizations.

- As recommended by the General Accounting Office (after a review of DOE's progress in implementing the NARA evaluation recommendations), a Department-wide planning initiative to correct program deficiencies have begun. Plans will be developed by DOE and contractor organizations with initial concentration on records disposition. Other phases of concentration will include records creation, proper documentation of policies and programs, records management training, records maintenance, and evaluation of program operations.

4.3.7 Printing and Publishing Activities

The Department's overall printing and publishing objective is to disseminate scientific and technical, public communication, statistical, and administrative information to users efficiently and in a timely manner. DOE and its predecessors have participated in the Federal Printing Program since its inception in the mid-1960s. This program encourages use of the private sector, to the extent permitted, by scheduling and classification requirements. The majority of printing and publishing activities are conducted by contracts with universities and private firms through contracts with the Government Printing Office. DOE implements state-of-the-art computer-aided printing and publishing technologies when and where practical.

The Department has 75 sites with printing/duplicating/copying capabilities. Twelve are operated by Department staff and all other printing environments are operated by contractors. Forty-one environments maintain secure operations to ensure the safeguarding of classified material. Over 48 percent of the Department's printing and publishing is performed by the private sector, either

through the Government Printing Office or by direct procurement, in accordance with paragraph 49 of the Government Printing and Binding Regulations and as mandated by the Federal Printing Program.

Departmentwide time and cost savings are being realized in a variety of ways.

- Expansion of publishing networks to include greater numbers of writers, editors, illustrators, designers, and computer specialists.
- Acquisition of desktop publishing systems and electronic publishing equipment.
- Expansion of existing publishing systems and electronic publishing equipment.
- Establishment of standardized design formats.
- Transition from traditional publishing methods to computerized production of publications.
- Utilization of microcomputer publishing and graphics workstations.
- Additional training of professional staff and backup support personnel.
- Preparation of customers for the transition to high-tech electronic publishing through additional customer support services.
- Expansion of local area networks and installation of local area publishing networks.
- Implementation of automatic composition and publishing software.
- Utilization of second-, third-, and fourth-class mail.

DOE supports the development and implementation of printing and publishing standards in an effort to manage and disseminate scientific and technical information more effectively to a variety of audiences for practical and/or commercial use. The Department is involved in the development of publishing and electronic exchange standards, in evaluating new and existing standards as they relate to Departmental applications, and in developing implementation plans for standards. The Department is also using recycled paper for its printing requirements, where appropriate.

4.4 Managing Information Technology Accessibility

Accessibility management includes planning, acquiring, and integrating information technology products and services in a manner that accommodates the basic access requirements of all people, including the requirements of people with limitations of sight, hearing, or manual dexterity. The Rehabilitation Act of 1973 and Americans with Disabilities Act of 1990 define organizational responsibilities to integrate access needs for people with disabilities within IT planning.

Organizations are responsible for the establishment and management of quality information environments that are conducive to the productivity and flexibility needs of all knowledge workers, including those individuals with disabilities. This policy is implemented in DOE Order 1360.1B, ACQUISITION AND MANAGEMENT OF COMPUTING RESOURCES, dated January 7, 1993, which prescribes that requirements of Departmental employees be considered when procuring computer, telecommunications, and office systems. Historically, IRM Policy has had overall policy and oversight responsibility with implementation being the responsibility of the Program Management organizations, other Headquarters organizations, and Operations Offices.

Efforts to support the IT needs of Departmental employees with disabilities have been decentralized. DOE Headquarters and each Operations Office have their own program to provide adaptive computer and telecommunications equipment. While this has met minimal requirements, there exists a great need to expand and coordinate the program. Funding for adaptive devices has been sometimes difficult to obtain, and only an informal network of involved employees exists to share lessons learned.

Plans are to provide centralized funding and support for the IT needs of employees with disabilities. Major steps planned to achieve this are as follow.

- Implement a DOE Order that establishes this policy.
- Establish a fund from which organizations can draw for adaptive equipment and support services.
- Obtain services of a consulting firm specializing in workplace needs of people with disabilities.
- Develop and implement a nationwide program of providing support to employees with disabilities who use IT and need adaptive devices.
- Develop a program for reviewing the results of these efforts and provide constructive program feedback.

Section 5: Programmatic Profiles and Uses of IT

This section briefly describes programmatic computational support by site and the principal missions of the Departmental programmatic activities. Also provided are examples of how information technology (IT) is employed to support them.

5.1 Program Support by Site

Information technologies have been acquired and used in nearly all facets of operation of the Department of Energy (DOE) because they provide a cost-effective means to accomplish a substantial segment of the programmatic workload. In addition, some types of programmatic work are only possible because of the capabilities provided by the Department's information technologies.

The number of programs receiving computational support varies considerably by site. Twenty-three sites are primarily dedicated to the support of one program or administrative work, 9 sites support two to three programs, and the remaining 13 sites provide computational support to many programs. Energy Programs receive support from 25 sites, Weapons/Waste Cleanup Programs from 19 sites, Science and Technology Programs from 17 sites, and Other Programs from 13 sites. Figure 5.1-1 illustrates site support grouped by principal areas of mission responsibility.

Programmatic Profiles and Uses of IT

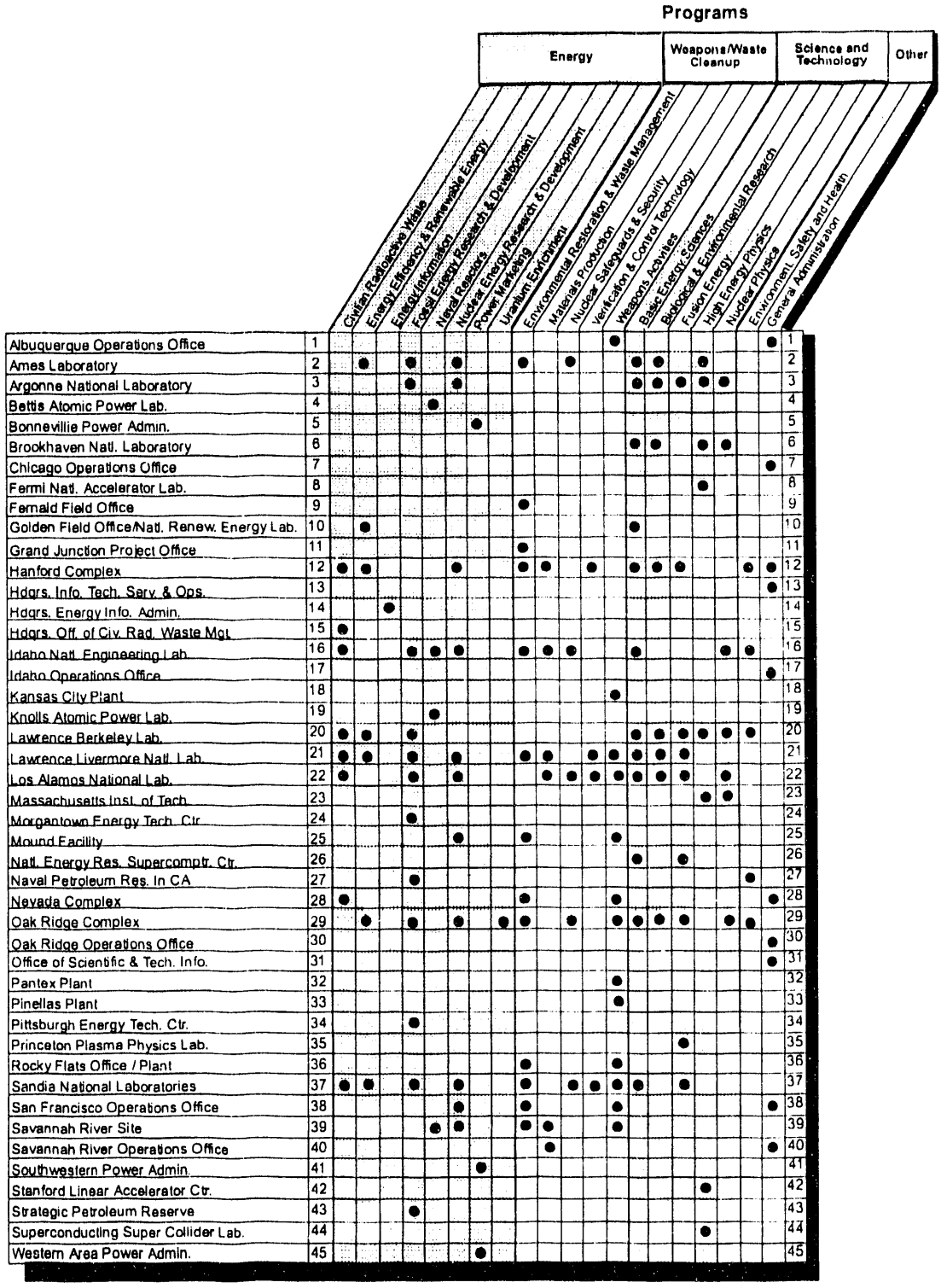


Figure 5.1-1
Major Programs Supported by Site

As stated in Section 3, total FY 1994 costs for IT are planned at approximately $1.8 billion. Figure 5.1-2 depicts by principal programmatic mission area the projected costs to acquire, maintain, and operate the Department's IT.

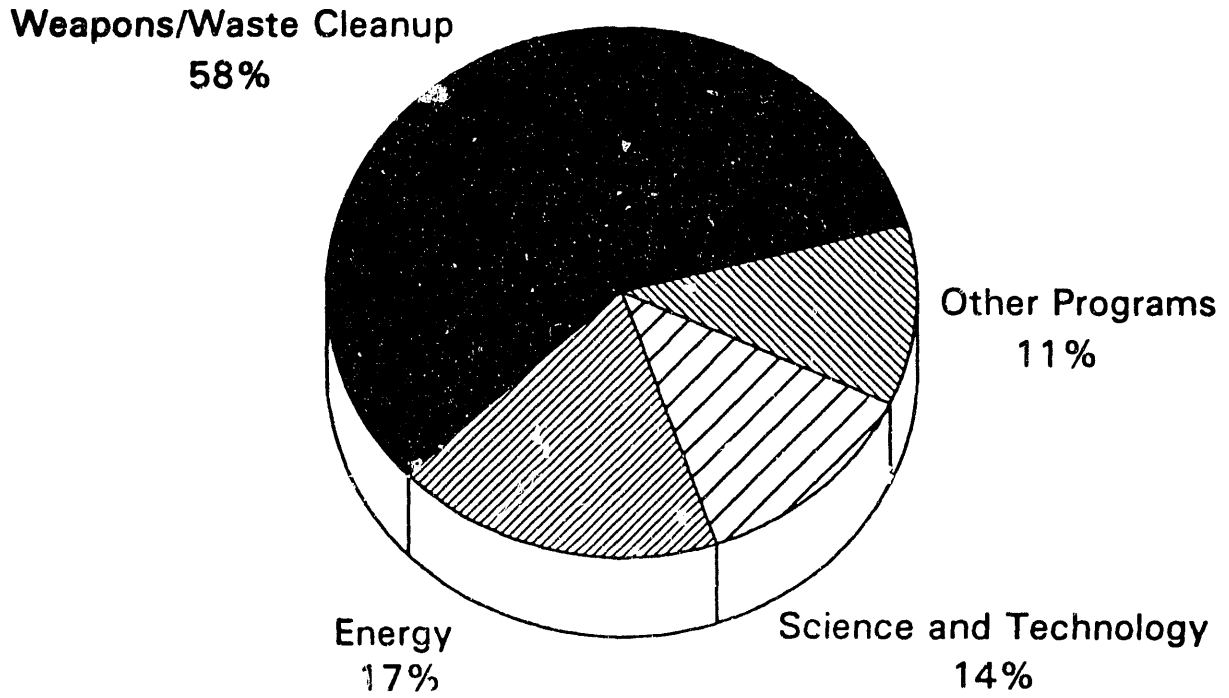


Figure 5.1-2
Percent of FY 1994 Total IT Costs by Principal Programmatic Mission Areas

5.2 Program Profiles and Uses of Information Technologies

Thousands of diverse physical and chemical processes must be modeled and analyzed while conducting the research, development, and testing inherent in the energy, weapons, reactor and environmental safety, waste management, and basic research programs. Compared to other methods, IT provides the most cost-effective means to accomplish the majority of this work. In some cases, such as in certain medical research, nuclear reactor safety systems, or space technology analyses, there may be no alternative to computerized simulations. IT is used to help define physical processes; understand problems under investigation; evaluate and optimize designs; and, in some cases, integrate the manufacturing process. The actual construction of a scientific experiment may cost millions of dollars, but as the following examples indicate, IT can often be used to reduce the number of experiments needed or to enhance follow-on production, thereby saving large sums of money and expenditures of time.

Programmatic Profiles and Uses of IT

The Department uses all forms of telecommunications equipment and media to distribute the vast amounts of information generated by people and computers. Sophisticated systems and architectures provide the support required by the dynamic DOE user community to accomplish the Department's research and development, administrative, operational, and manufacturing functions. These resources provide connectivity within the Department as well as access to worldwide networks in order to share information and technology.

The following profiles and examples of IT used are grouped by the principal programmatic mission areas.

5.2.1 Energy Programs

Energy Programs focus on activities that will increase the Nation's reliance on clean, economical energy sources. The following are programs within this cluster that support the missions and examples of how information technologies are employed.

- Civilian Radioactive Waste Program designs, constructs, obtains license, and operates a repository for the disposal of high-level radioactive waste and spent nuclear fuel, including transportation of such waste; and develops interim storage capabilities prior to the availability of a permanent repository in accordance with the Nuclear Waste Policy Act, Public Law 97-425, as amended.

- Energy Efficiency and Renewable Energy Program formulates and directs programs designed to increase the production and utilization of renewable energy and improve the energy efficiency of the transportation, building, industrial, and utility sectors through support of research, development, and technology transfer activities.

- Energy Information Program provides through the Energy Information Administration, energy information and analyses regarding resources, production, consumption, distribution, technology, and related economic and statistical information to decisionmakers in the Executive Branch, Congress, State governments, and the public. This organization is required by Public Law 95-91, Sec. 205.

- Fossil Energy Program manages the Department's programs that focus on coal, oil, and natural gas, including activities related to research and development; production and storage of petroleum; and regulatory activities related to the Public Utility Regulatory Policies Act of 1978.

- Naval Reactors Program develops nuclear propulsion plants to provide ships with improved power capabilities, increased endurance, and added reliability. The program involves the design, development, demonstration, improvement, and safe operation of naval nuclear propulsion plants and reactor cores for submarines and surface ships. The ultimate objective is to develop new reactors having longer life and enhanced reliability for the naval nuclear vessels.

- Nuclear Energy Research and Development Program formulates and directs the Department's research and development programs associated with the theory and production of atomic energy, through nuclear development, civilian and naval. Through this program, light water and breeder reactor systems are developed as viable energy options that provide environmentally safe, economic, proliferation resistant, inexhaustible energy sources capable of deployment to meet the nation's future energy needs and decrease dependence upon foreign energy supplies. Current program emphasis is in advanced converter reactor technology, nuclear fuel cycle research and development, liquid metal fast breeder reactor, water-cooled breeder reactor systems, and gas-cooled breeder reactor.

- Power Marketing Program manages and coordinates the activities of the Department's five Power Marking Administrations.

- Uranium Enrichment Program uses gaseous diffusion and atomic vapor laser isotope separation processes to meet domestic, foreign, and United States Government requirements for uranium enrichment services in the most economical, reliable, safe, and environmentally acceptable manner possible. The Department conducts extensive analyses of uranium enrichment services, supply and demand, economics, and capacity expansion options from which is derived a long-term enrichment strategy to achieve program goals.

  The United States Enrichment Corporation is responsible for the overall management and execution of the Departments Uranium Enrichment Program, including gaseous diffusion, gas centrifuge, advanced isotope separation, and enrichment business activities. This division is scheduled to become an entity separate from the Department in 1993.

Examples of IT used to support Energy Programs follow.

Information Storage, Retrieval, and Access Management System

The Office of Civilian Radioactive Waste Management (RW) is currently in the process of developing the Information STorage, REtrieval, and Access Management System (InfoSTREAMS), which will provide the functions and features for data, information, and records processing, storage, access, and dissemination to support managerial and programmatic functions across RW program locations. InfoSTREAMS represents the evolutionary consolidation, integration, and enhancement of RW's existing inventory of information technology resources; including those supporting office automation, telecommunications and data, information, and records management.

RW is developing and deploying InfoSTREAMS functionality in a strategic, incremental manner to support specific, near-term programmatic functions; for example, the preparation of waste management system license applications, while adding to the technological infrastructure required to support a longer-term information technology perspective.

In the near-term, InfoSTREAMS computing environment users will have access to personal computers (PCs), connected together through local and wide area networks, running groupware software to enable them to create, route, concur, and track electronic documents. During this process, an audit trail of the stages involved in a document's creation (e.g., comments, multiple iterations) is automatically generated, satisfying quality assurance and records management requirements. A conceptual operational model of the environment is presented in Figure 5.2-1. InfoSTREAMS will provide for the logical linking of a document to other related documents and data for ease of retrieval, dissemination, and disposition. Appropriate access to centralized information systems, and minicomputer resident technical databases will be provided through cooperative processing and telecommunications linkages.

InfoSTREAMS will also employ expert system "tools" to support the differential processing (e.g., dissemination, dispositioning) of programmatic data, information, and records across RW program locations. Differential processing will be value-based; that is, the rules governing the processing of data, information, and records will be based, in part, on their category, content, and the context within which they are being considered. Through InfoSTREAMS, RW will combine the use of expert systems with electronic imaging and full-text information capture and retrieval capabilities to further improve the efficiency and effectiveness of its information management.

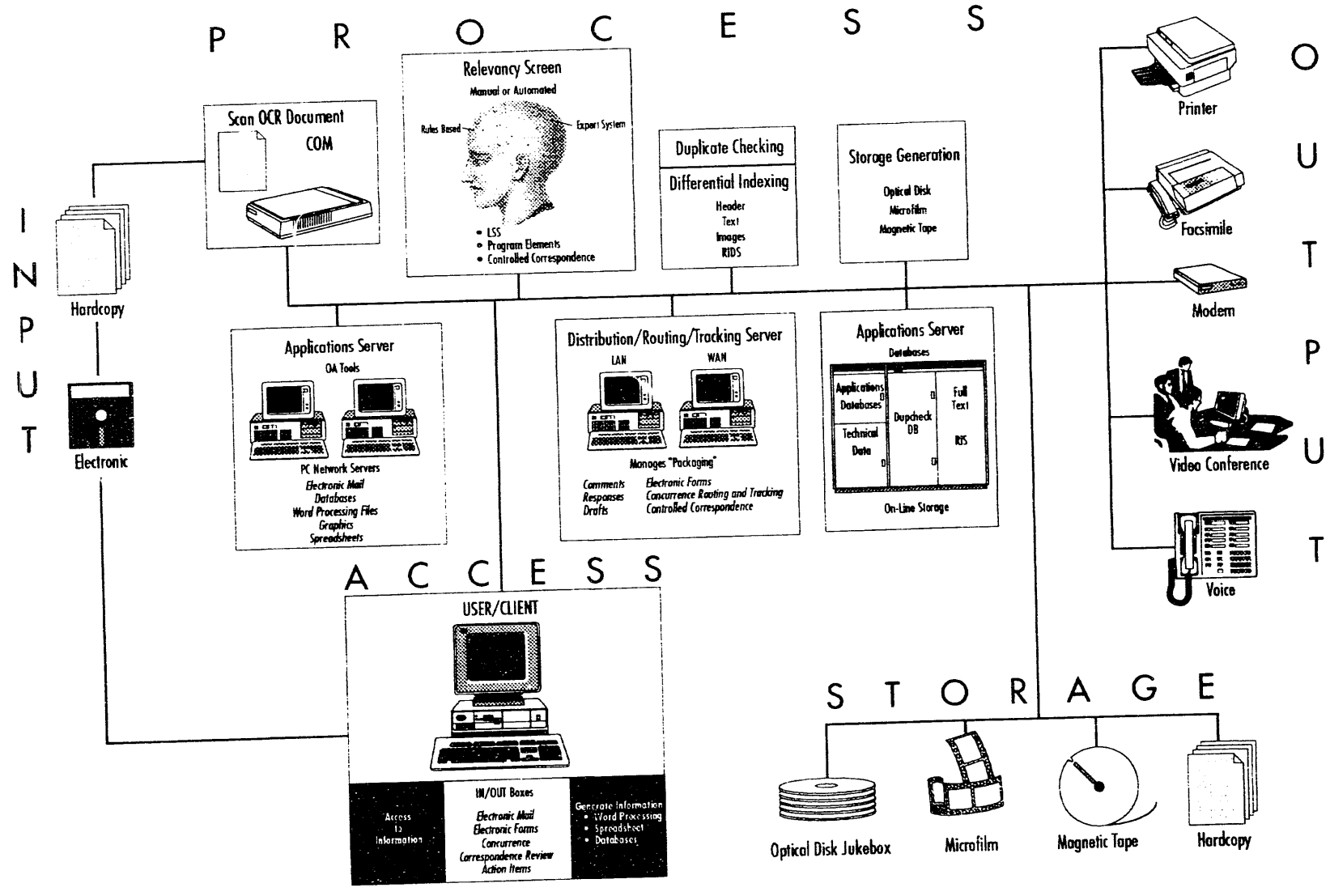


Figure 5.2-1
Information Storage, Retrieval, and Access Management System (InfoSTREAMS)

Building Energy Consumption Analysis

Software code DOE2, Building Energy Consumption Analysis, has been heavily reutilized by DOE, industry, and others. Lawrence Berkeley Laboratory is the contributor of this software and its updates, and the Office of Energy Efficiency and Renewable Energy is the sponsoring organization. DOE2.ID, the latest version, includes a set of programs for the analysis of energy consumption in buildings. Among other things, the programs calculate the heating and cooling temperature and humidity, and compute the life-cycle cost for building operation.

This scientific and technical software is in the central collection of the Energy Science and Technology Software Center (ESTSC) in Oak Ridge. Reutilizing available software is always encouraged to reduce duplication of effort, thus providing significant resource saving.

Fluidized-Bed Capacitance Imaging

The Morgantown Energy Technology Center (METC) has an active development program in a number of Fossil Energy technologies including fluidized-bed combustion, coal gasification, hot gas cleanup, and oil shale retorting. Many of the systems for these technologies include fluidized beds as processing reactors, heat exchangers, or other gas-solids contacting devices. The fluidization behavior of the coarse particle systems of interest in the Office of Fossil Energy has not been extensively studied and methods of designing them are limited. To address this need, a technique utilizing capacitance measurements has been developed to study the detailed hydrodynamics of these systems.

Capacitance techniques to determine point values and cross-sectional averages of voidage in fluidized beds have been used by fluidization researchers for many years. Probes inserted into beds of fluidized solids or split-ring electrodes mounted on the walls of the bed were used to develop time traces of the variations in void fraction within the bed. By using pairs of vertically spaced probes, measurements of bubble velocities and sizes have been made in a variety of systems.

The imaging system used in the studies consisted of a number of electronic circuits that serve to energize, sense, and then record electrical currents in electrodes imbedded in the walls of the system. By recording this electrical information during experiments and later processing the information with a computer graphics program, METC was able to display visual representations to study the dynamics of the fluidized systems. Figure 5.2-2 is an example of a cross-section of a fluidized-bed combustor.

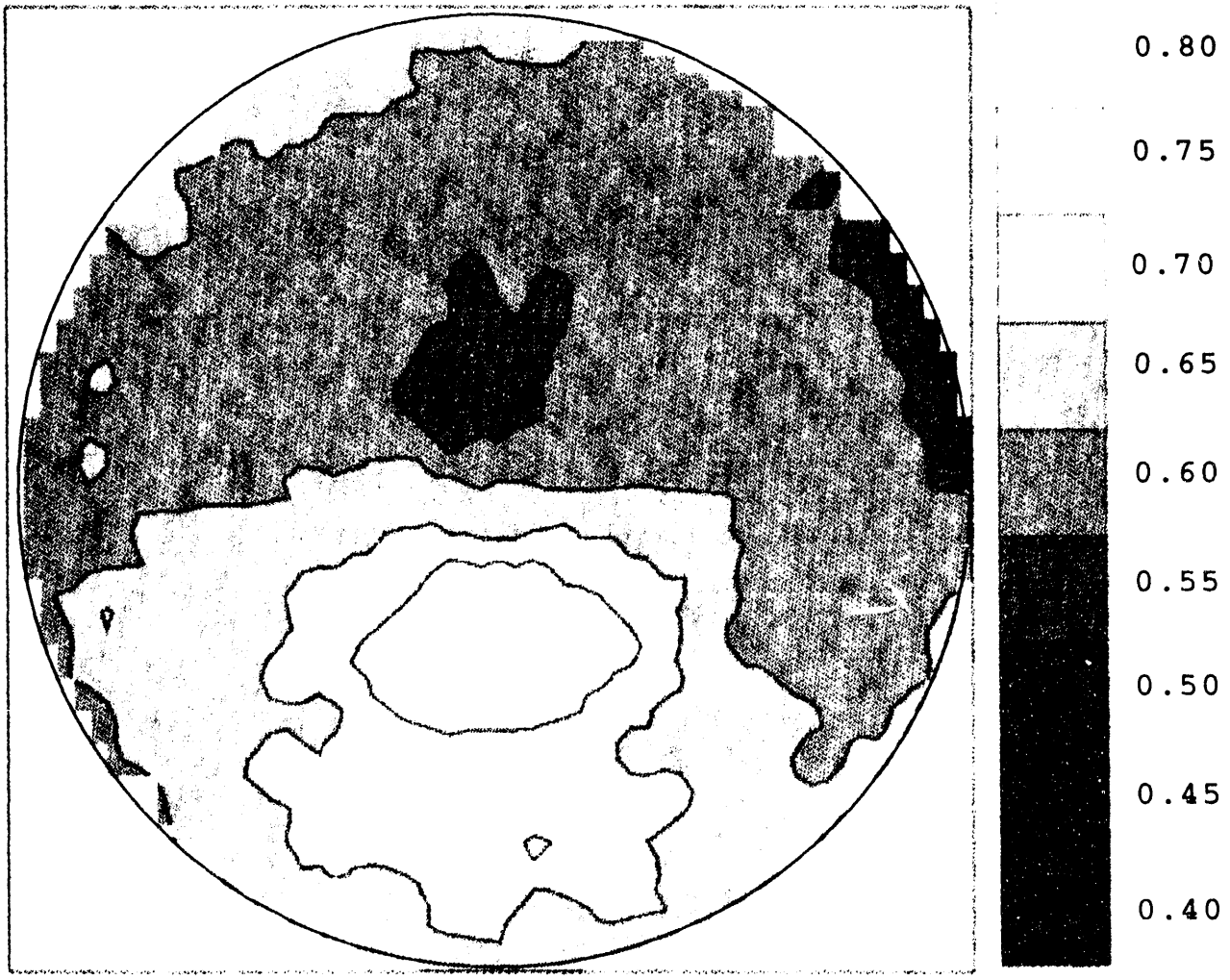


Figure 5.2-2
Example of a Cross-Section of a Fluidized-Bed Combustor

Medical Isotopes

Computers play a key role in the analyses required for several areas of research focused towards the utilization of nuclear reactor-produced medical isotopes. These isotopes are extensively used in most nuclear medicine cancer and other diagnostic procedures today. The isotope Technetium-99m, for example, is used in more than 35,000 procedures in hospitals throughout the United States. In the future, medical isotopes, as radiopharmaceuticals, will be used for therapeutic treatment of several major diseases including multiple forms of cancer, heart disease,

brain disorders, etc. Table 5.2-1 illustrates the application for eight of these medical isotopes that were recently produced in the Fast Flux Test Facility (FFTF) on the Hanford Reservation in Richland, WA.

Isotope	Application
Actinium-227/ Radium-223	"Magic bullet" cancer treatment
Gadolinium-153	Osteoporosis detection and diagnosis
Iodine-125	Osteoporosis detection and diagnosis, and prostate cancer treatment
Osmium-191	Cardiovascular angiography (blood flow studies)
Palladium-103	Prostate cancer treatment
Rhenium-186	"Magic bullet" cancer treatment and bone cancer pain relief
Samarium-145	Brain cancer treatment
Xenon-127	Brain imaging and study for schizophrenia and dementia treatment

Table 5.2-1
Applications for Reactor-Produced "Medical Isotopes"

A number of complex and varied computer applications programs have been used and developed to effectively support studies for medical isotope production and implementation. An example is the work being done with isotopes that attach to biological materials called "monoclonal antibodies." Referred to as "magic bullets," these antibodies, with the attached isotope, seek cancer cells and destroy them without damaging the surrounding healthy tissue. Constructing molecular cages to hold the radioactive isotopes as they are delivered to the cancer site is a very important area of study. Currently, the molecular modelling code called MOPAC is extensively being used at the Westinghouse Hanford Company to pursue this area of research. MOPAC is a general-purpose computer program that helps determine the makeup and structure of a system of bound molecules for a given application. Figure 5.2-3 illustrates an example of a molecular cage structure in which the code MOPAC will be used to calculate information needed to guide laboratory synthesis of the future produced structure. Also shown is the "caged" medical isotope (Ra223), which will upon decay provide the high-energy alpha particles that kill the cancer cell.

This example is just one of many in which computers make a significant contribution. Additional problems associated with shielding personnel and instruments, shipping, packaging, reactor production, and chemical separation, to name a few, require quantitative calculations to keep this exciting and important field of application effectively moving towards the future.

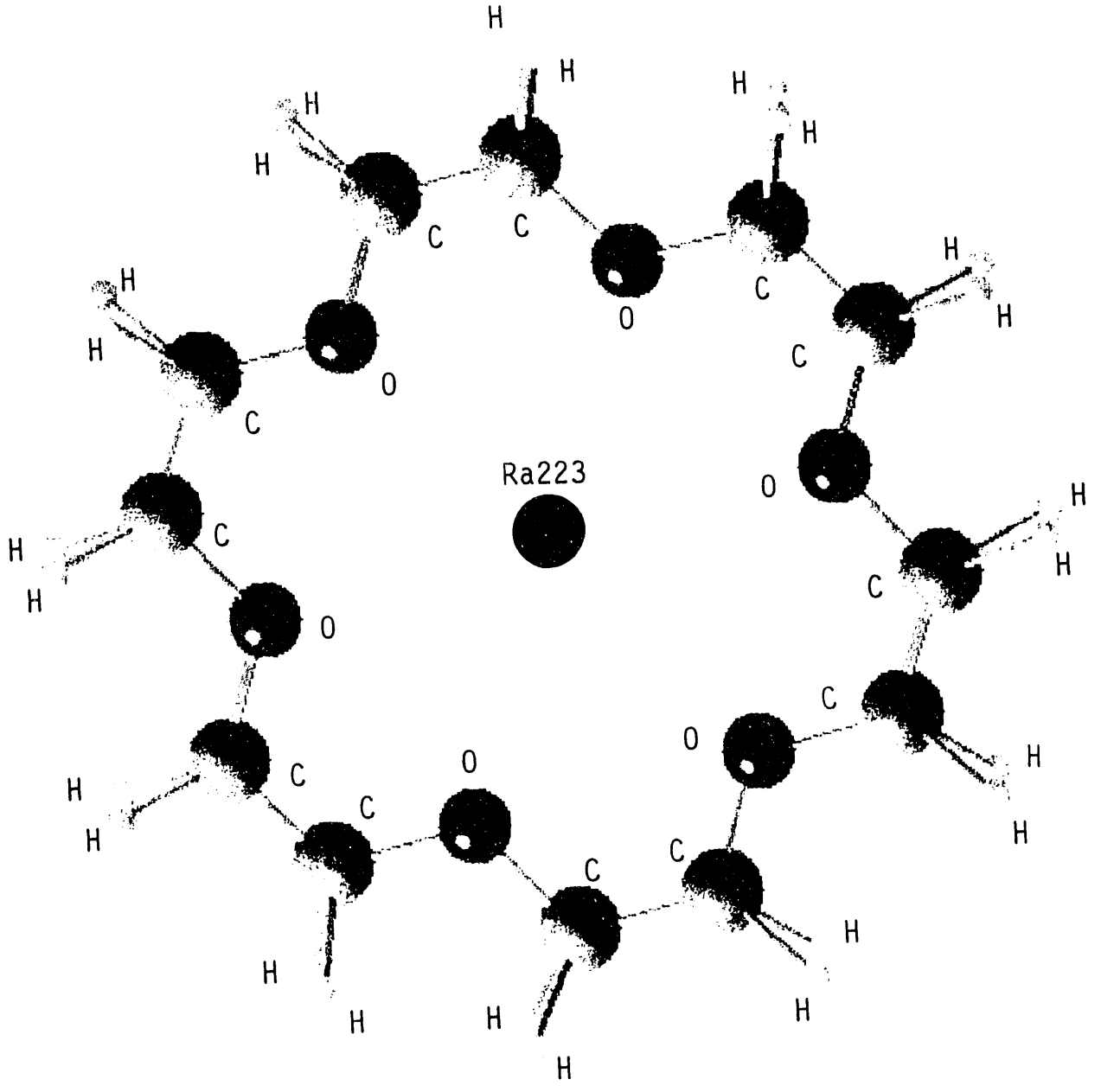


Figure 5.2-3
Example of Molecular Cage and Medical Isotope (Ra223)
"Magic Bullet" Used for Cancer Treatment

5.2.2 Weapons/Waste Cleanup Programs

Weapons/Waste Cleanup Programs focus on activities that will clean up the massive contamination at nuclear weapons facilities in a manner that both protects human health and the environment and respects the letter and spirit of Federal and State environmental laws; safely dismantle thousands of warheads, manage the hundreds of tons of nuclear weapons materials that are recovered, and safely maintain the remaining weapons in the arsenal; and assist in the effective and efficient development of non-proliferation detection and arms control verification technologies.

The following programs are in place within this programmatic mission area:

- Environmental Restoration and Waste Management Program provides policy guidance and manages the assessment and cleanup of Departmental inactive waste sites and facilities in compliance with Federal and State legal and regulatory requirements; and directs a program of safe and effective waste management operations, and develops and implements an aggressive applied waste research and development program to provide innovative environmental technologies to yield permanent and cost-effective disposal solutions.

- Materials Production Program provides for operating reactors to produce nuclear fuels required for other Departmental programs. In addition, it provides for processing and fabricating feed materials for reactors.

- Nuclear Safeguards and Security Program sets policy, provides oversight, and manages safeguards developmental and operational efforts to provide necessary safeguards and security of Departmental facilities and material. Support is provided for the United States nonproliferation objectives through technology transfer and research and development, and is accomplished in collaboration with other Federal agencies, foreign countries, and international organizations.

- Verification and Control Technology Program performs technical and analytical activities in support of nuclear test monitoring, treaty verification, export control, arms control, and nuclear- and energy-related issues.

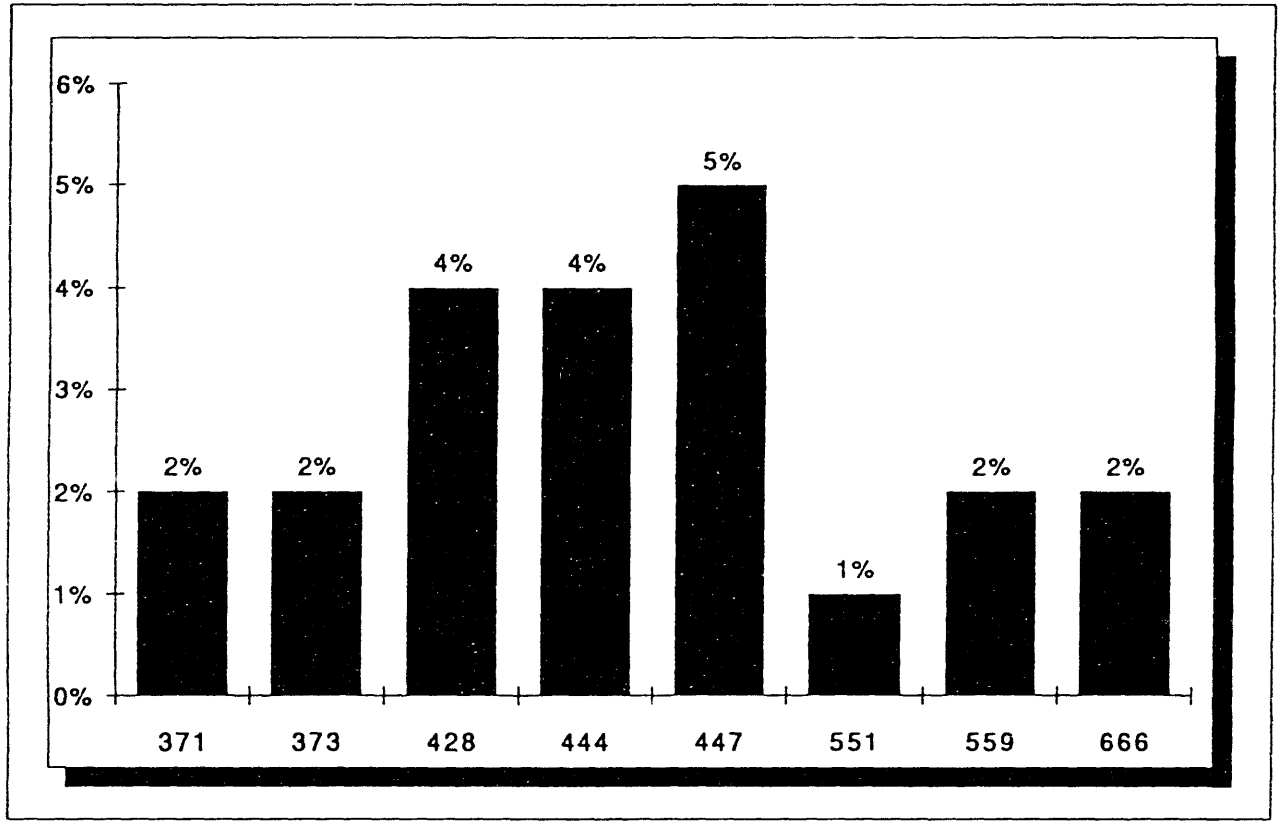
- Weapons Activities Program provides for the research and development, testing, production, and reliability assurance of the Nation's nuclear weapons. Also included are developmental and operational efforts associated with inertial confinement fusion programs for national security and civilian power applications.

Examples of IT used to support Weapons/Waste Cleanup Programs follow.

Waste Surveillance Database System

The Waste Surveillance Database System (WSDS) is an example of the effective use of personal computers and commercial software to provide user-friendly interfaces, while utilizing state-of-the-art development techniques. This system provides a database and reporting function for waste management compliance to Resource Conservation and Recovery Act (RCRA) regulations. The Rocky Flats Plant (RFP) waste storage area inspection results are entered into the database and the results are summarized by building and Assistant General Manager. The reports are provided quarterly to RFP and DOE management in both graphical and textual formats. Figure 5.2-4 is a sample of the graphical report.

NON-COMPLIANCE by BUILDING REPORT
QUARTER:01 YEAR:92 PLANT AVERAGE -- 2.58%



SUMMARY

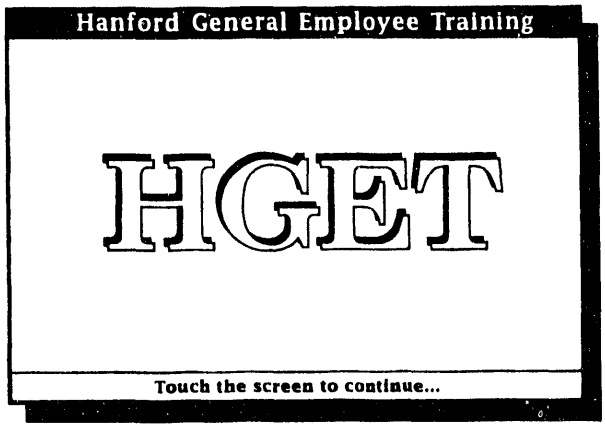
371	373	428	444	447	551	559	666
2%	2%	4%	4%	5%	1%	2%	2%
2184/28/28*	201/3/3*	231/7/7*	1221/37/37*	197/9/9*	312/4/3*	312/4/4*	234/3/3*

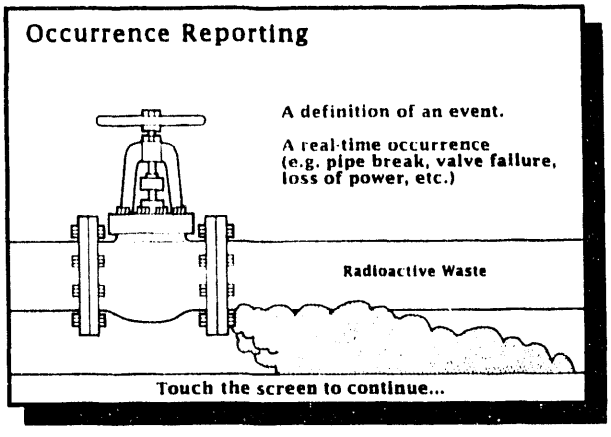
*possible points/# of inspections/# of findings

Figure 5.2-4
Sample WSDS Graphical Report

Hanford General Employee Training -- Advanced Training Technologies

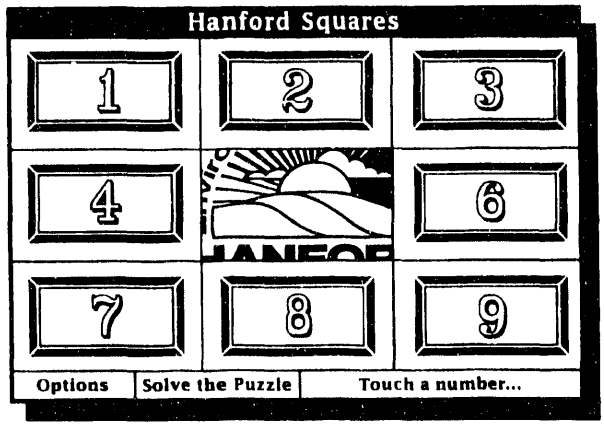
Hanford General Employee Training (HGET) is an instructor-led Interactive VideoDisc (IVD) course designed to cover all required, recurring general employee training. It is updated annually and covers a broad spectrum of general employee training topics: basic industrial safety; security, including computer security; quality assurance; total quality; quality improvement; procedure compliance; employee concerns; drug abuse; hazards retraining for five of the major facilities at the Hanford Site. The computer-based segments address standard policies and procedures, while instructors present special topics or recent events.

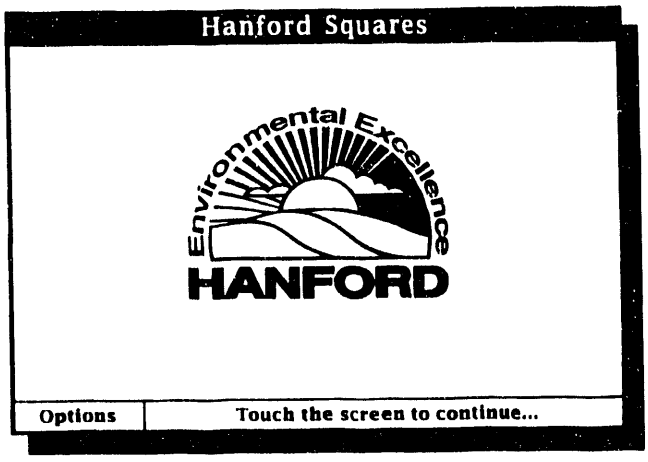




HGET, version 2.0, takes the form of a TV game show in which a game board of nine panels conceals a puzzle. A Master of Ceremonies explains that behind each square is some required training. The learner selects panels, watches video sequence, and answers a series of questions. If the learner answers correctly, the panel opens revealing a piece of the puzzle. If not, the learner receives a remedial lesson, then returns to the game board.

All applicable Institute of Nuclear Power Operations (INPO) guidelines for general employee training are addressed. It also covers general employee training requirements and procedures. The illustrations used simulate typical and potential employee activities.





As the learner demonstrates knowledge of the subject matter, he sees pieces of the puzzle and moves on to the next subject. This process continues until the learner has received the required HGET curriculum.

The courseware monitors learner performance throughout HGET. If cumulative performance falls below a predetermined level, the learner must satisfactorily complete a final exam to receive credit for the course.

Individuals can proceed at their own speed. Most staff complete at least 9 classes in 2 hours that would usually be scheduled for 1 hour each. Cost savings are approximately $1,317K each year.

Nuclear Reactor Pumped Laser

The Department's Nuclear Reactor Pumped Laser (NRPL) project at the Idaho National Engineering Laboratory (INEL) is investigating the feasibility of using the high energy density in a nuclear reactor to provide the excitation energy for large scale leasing. Several numerical models are employed to simulate the experimental laser system. A two-dimensional, time-dependent, coupled fluid dynamics and charged particle computer code is used to determine the fluid properties of a flowing gas laser cavity, as well as a Fourier propagation simulation to determine the resulting optical behavior. The output consists of several state functions, gas, temperature, energy disposition, and index of refraction.

The data consists of four sets of 3D variables, gas temperature, energy density, index of refraction, and far field intensity. One of the primary objectives was to discern the correlations between the gas density and the energy deposition (Figure 5.2-5) together with their relationship to the far field intensity (Figure 5.2-6). To help analyze the relationship between energy deposition and the gas density, a method was needed to visualize both 3D quantities. As both dependent variables were calculated on the same grid, there were four parameters left to plot simultaneously. A common approach for this type of scenario is to texture map one quantity onto a surface generated by the other.

To generate the texture map itself, the range of the dependent values, energy deposition and gas density, were linearly scaled to a predetermined range in hue, saturation, and value (HSV) color space. The HSV values were translated to a red, green, and blue color space for use in constructing the substance properties list. Since the HSV color value of a point is easily

modifiable, the user can display the data with a small number of distinct color bands, or with gradual range of hues.

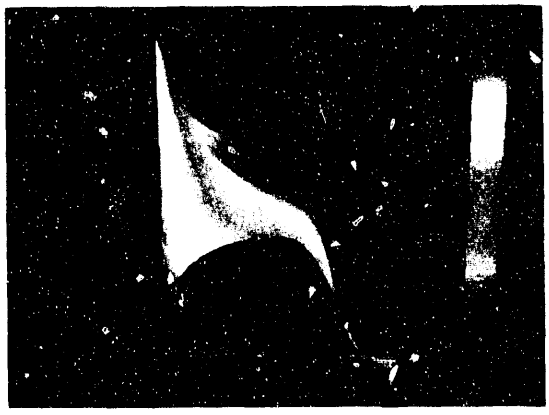


Figure 5.2-5
NRPL Gas and Energy Profiles

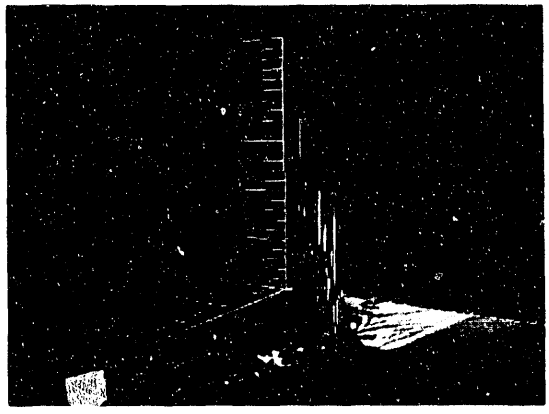


Figure 5.2-6
NRPL Far Field Intensity

Stereolithography

Today's fast paced, competitive world of free enterprise, continues to increase emphasis on getting the product to market faster and at less cost to the customer. Industries who can successfully achieve these goals will ultimately be the survivors of the future. The introduction of Computer-Aided Design and Computer-Aided Manufacturing (CAD/CAM) technology has radically altered designing and manufacturing applications. Rapid prototyping has spawned from the CAD/CAM environment. This involves the ability to turn 3D CAD data from conceptual design to a solid model, which can be placed in the designer, engineer, or customer's hand in an economical and expedient manner.

A new process called Stereolithography (SLA) takes the CAD data and automatically produces a hard plastic model in a matter of hours as opposed to weeks or months when fashioned with conventional methods (Figure 5.2-7). The benefits include the ability for the customer to examine form, fit, and functionality of assemblies, prototypes as guides for model makers, patterns for investment castings, and an enhancement for client presentations and demonstrations. There are currently seven vendors who offer a system providing this new technology.

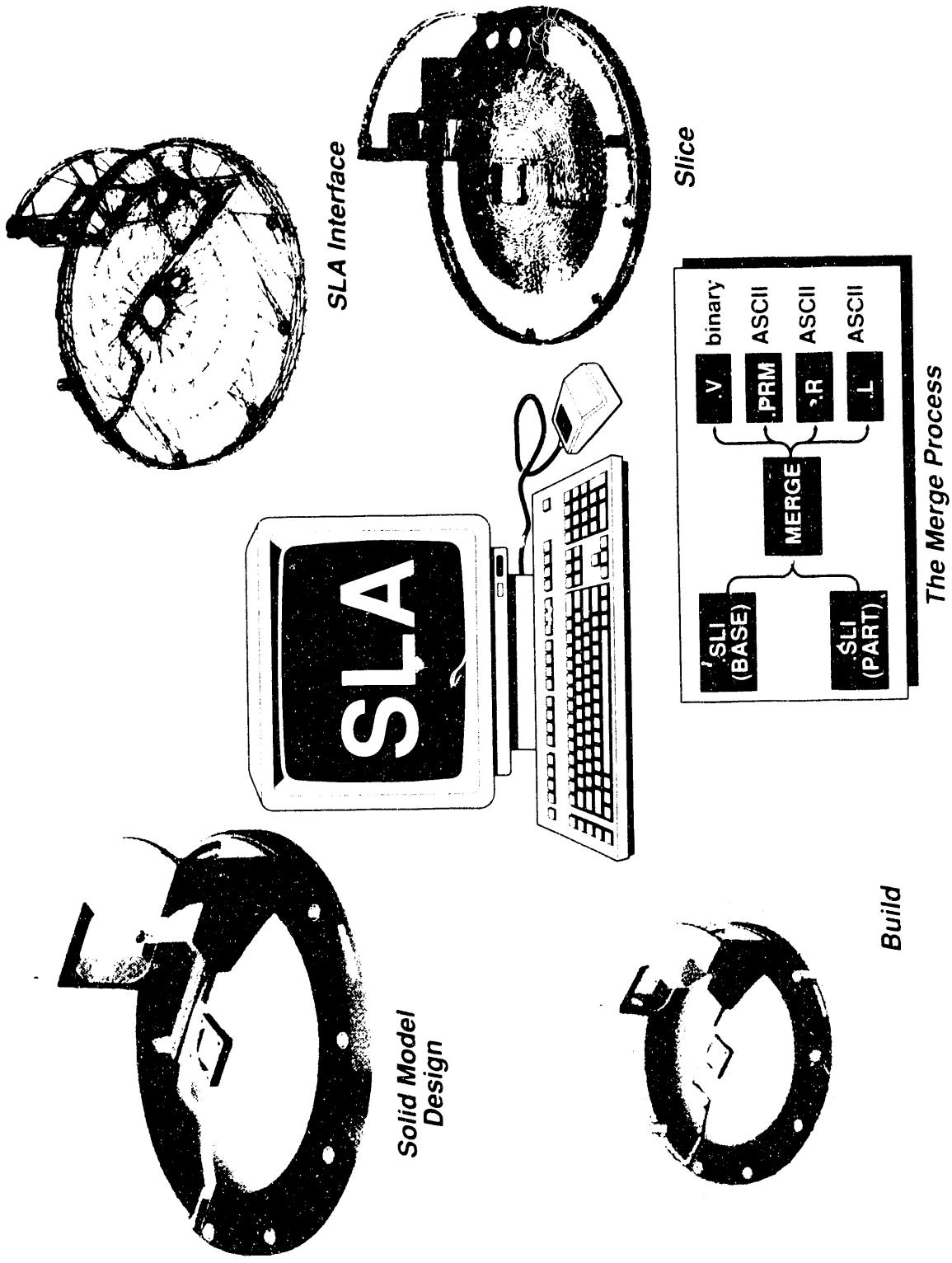


Figure 5.2-7
Stereolithography Process

By definition, Stereolithography is a 3D printing process which copies solid or surface models in plastic. The process employs photopolymerization, a chemical process in which liquid resin converts to a solid polymer after exposure to ultraviolet radiation or visible light. Ultraviolet light is directed onto the surface of the liquid photopolymer. The light beam, moving under computer control, draws each layer or "slice" of an object onto the surface of the liquid. Wherever the beam strikes the surface, the liquid changes to a solid. The process builds the model similar to a "honeycomb" affect, trapping liquid resin inside the walls of the structure as it builds from the bottom up.

Allied Signal, Inc., Kansas City Division (KCD) received funding to develop this SLA process aimed at establishing a practical, expedient, and cost-effective process for fabricating prototype investment castings. They are using a Stereolithography Apparatus. The multi-phased project has already yielded revolutionary results. Three new photo-curable resins were developed, successfully tested, and proven. A "preheat conditioning" process was developed which greatly reduced the probability of shell cracking during the model burnout operation. This was a major breakthrough, allowing progress towards experiments with larger, more complex model designs. The feasibility of using the actual SLA models to develop processing methods, establish numerical control (NC) programs to machine the castings, check for interferences with tooling or fixturing, and establish time studies in advance of the actual arrival of the castings from foundries is being evaluated. This would reduce the flowtime from conceptual design to marketability of the finished product, resulting in cost savings to the customer.

The CAD system being used is a variational and parametric solid modeler. The software is running on four silicone graphics (SGI) workstations. The four SGI workstations and the SLA machine are connected by an Ethernet system called Pegasus, allowing for easy, efficient electronic file transfer. Pegasus also connects the workstations to the host computer allowing for file management and storage. Electronic files from Sandia National Laboratory have been successfully transferred to KCD to be built on the SLA-250.

Video Teleconferencing in Highly Secured Facilities

The Video Teleconferencing Facility at the Pinellas Plant was rapidly brought online for unclassified conferences during July 1991. The unique security requirements of the plant led to a distributed installation, with the conference facility located over 1000 feet from digitizing and encryption equipment. Fiber was pulled though existing protected distribution system protected distribution system conduit to allow this installation to be made in a rapid, cost-effective manner.

The initial communications were made on a dedicated T1 link from Pinellas to Oak Ridge, where the signal was tied into the OPMODEL Satellite Network to hook up with sites all over the country. OPMODEL has since been replaced with a new terrestrial network based on lines leased through the FTS 2000 program. The Plant now has a dedicated T1 link running to

Albuquerque as part of the INTRANET network serving the DOE community. All video and audio information, whether classified or not, is encrypted by an National Security Agency-approved device before it is transmitted on the network.

The physical system consists of a conference room equipped with two large screen monitors, and several cameras and microphones. Under normal operation one monitor will display a full-motion, color view of the participants at the remote site, while the other displays a still picture of a graphic or part which is being discussed. This second monitor can also be used to preview the local room or graphic before the image is sent to the remote site.

The conferences held to this point have been extremely beneficial to the participants. Short meetings have been able to replace trips to Albuquerque, which often required 3 days to complete. Savings are realized both for the elimination of travel charges and the avoidance of lost workdays associated with travel. Another benefit of teleconferencing is that meetings can be scheduled on much shorter notice. This is of significant value in dealing with environmental or safety issues, where timing is critical. In addition, where a trip may have been limited to one or two key individuals, all involved personnel can attend a teleconferencing meeting, stay for only that portion in which they are directly involved, and immediately return to their other job responsibilities. This greatly enhances the timeliness and quality of information exchange.

The system serving this facility is a part of the DOEwide Video Conferencing System that supports conferences at 20 DOE sites. Additional information about and a diagram depicting Departmental video conferencing capabilities is found in subsection 5.2.4.2.

Rocky Flats Plant Simulation -- Artificial Intelligence

The Rocky Flats Plant Simulation (RFPS) is an artificial intelligence (AI) software system that was originally designed to model plutonium operations in production buildings at the Rocky Flats Plant. The system was designed so the "engine" of the model was sufficiently flexible that the change in the plant's strategic direction from production to cleanup and residue elimination required only minor changes to the model's pre- and post-processor modules. RFPS was officially completed in October 1992, as determined by the original specifications. The model is capable of answering high-level "what if" questions concerning residue processing, plant capacities, issues surrounding waste management, nuclear materials storage bottlenecks, and related decontamination and decommissioning/environmental cleanup concerns. Output of the model will also be used to analyze the feasibility of attaining residue processing schedules. The system uses a fileserver and workstations in a UNIX-based operation, utilizing object-oriented AI software languages. Development of the RFPS represents an effective use of AI technology in an application that lends itself well to such an environment. Figure 5.2-8 illustrates the system activities.

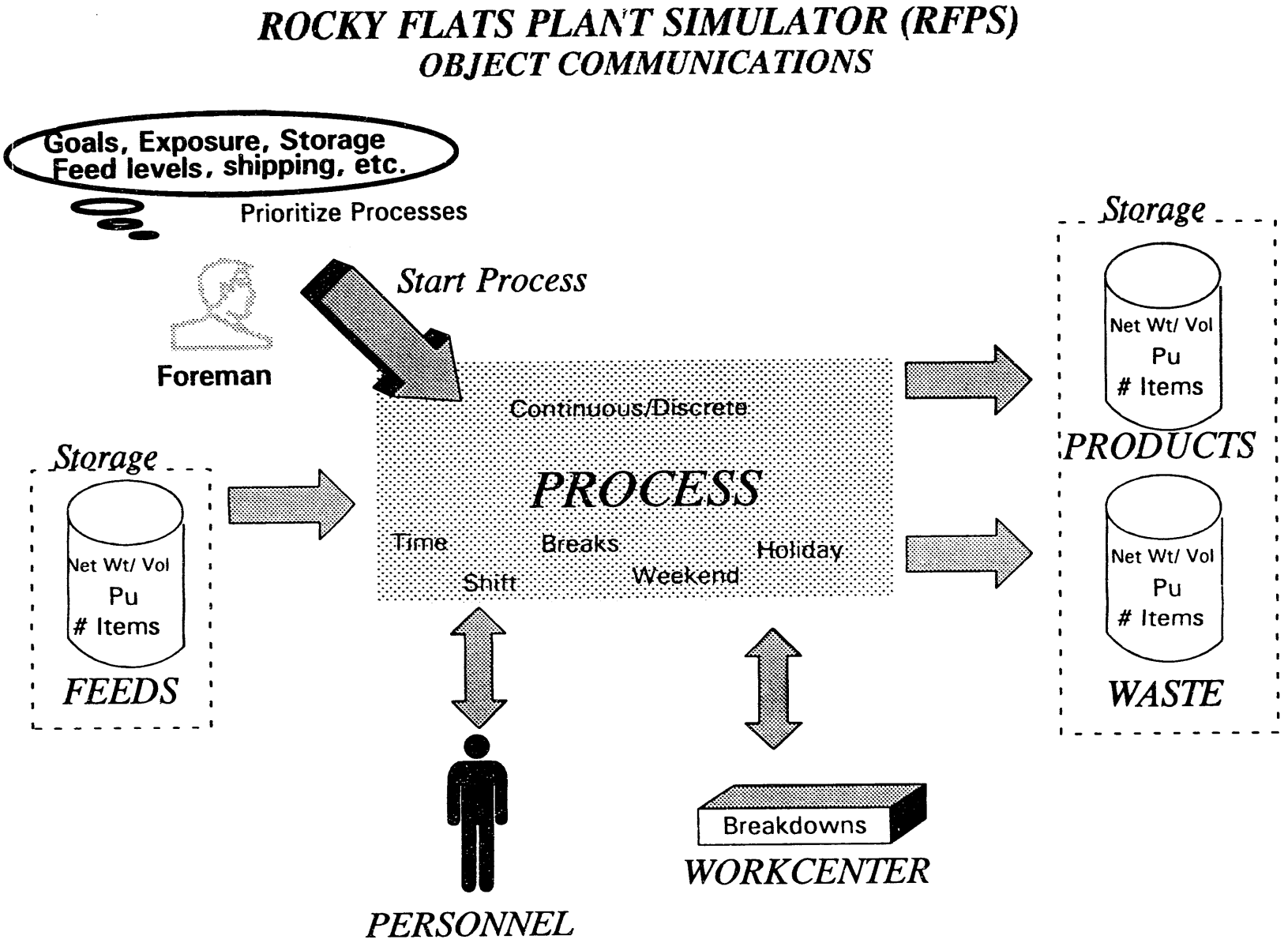


Figure 5.2-8
RFPS Artificial Intelligence System

Automated Inspection Information

An Automated Inspection Information project to develop, demonstrate, and transfer new technology to enhance the Oak Ridge Y-12 Plant's capability for producing part programs for Coordinate Measuring Machines (CMMs) has been underway since 1990. The project goal is to integrate numerical controlled parts programming activity with CMM inspection data requirements. Figure 5.2-9 depicts the system.

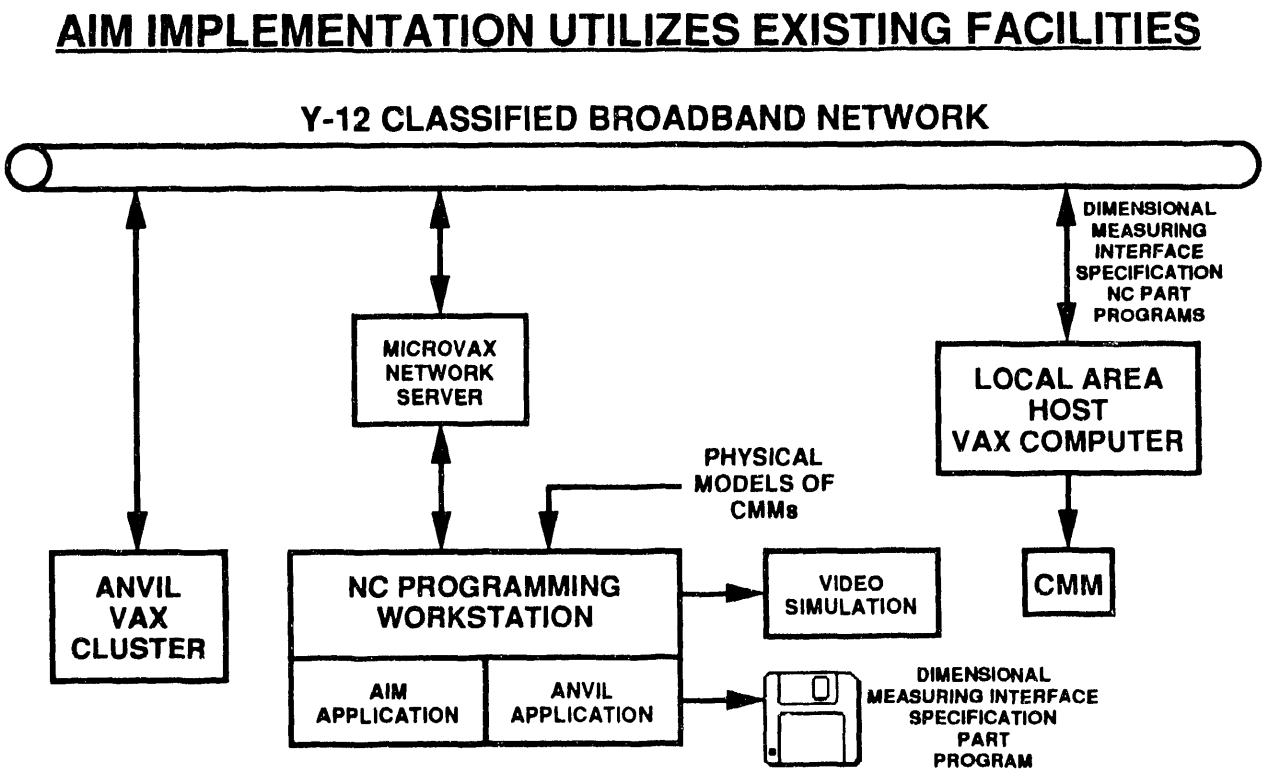


Figure 5.2-9
Advanced Inspection Module

A software module, Advanced Inspection Module (AIM), has been developed and tested that provides new capabilities to support a production-capable, offline programming system for CMMs as an extension and downstream application capitalizing on the Department's investment in its production CAD ANVIL system. The need for AIM was first documented in 1986 to address offline programming in a high-level language suitable for a multi-vendor environment, simulation of part program movements, and postprocessing the resultant program into CMM native language. AIM moves the programming beyond the machine-resident teach mode and beyond the use of desktop standalone programming stations to an environment that utilizes shared product definition models. AIM allows NC programmers to access and interrogate product definition models from the ANVIL system, and through an interactive menu interface, to produce a CMM part program. AIM eliminates the need to redundantly, manually create part geometry in multiple systems and to perform tedious mathematical calculations to derive coordinates for gauging points. AIM provides the CAD integration necessary for an offline program generation tool and additionally provides a powerful graphic simulation of the CMM executing the created NC program.

Implementation of AIM is expected to provide immediate impact in reducing the number of hours required to write a CMM part program. The full production implementation of AIM is projected to result in a 30 percent reduction in programmer hours required to generate new part programs. Recent applications have demonstrated the power and versatility of the software system as well as its cost savings potential.

5.2.3 Science and Technology Programs

Programs within this mission area now have redefined missions: developing innovative, clean, and efficient energy technologies; developing techniques for waste cleanup, pollution prevention, and environmental protection; conducting basic research; supporting technology transfer; assisting in dismantling nuclear weapons and in curbing nuclear proliferation; and providing advanced education and training in science, math, technology, and engineering.

- Basic Energy Sciences Program provides experimental and theoretical research in nuclear sciences, material sciences, chemical sciences, engineering, mathematical and geosciences, biological energy research, and advanced energy projects.

- Biological and Environmental Research Program encompasses a broad effort to gain an understanding of the interaction of radiation and other energy-related pollutants with living organisms and ecosystems.

- Fusion Energy Program performs research and support studies aimed at understanding plasmas with the eventual objective of obtaining useful power by controlled thermonuclear fusion. Emphasis is placed on the experimental demonstration of improved plasma confinement in magnetic confinement devices.

- High Energy Physics Program performs research involved in experimental and theoretical elementary particle physics research in which the basic properties of matter, energy, and fundamental forces of nature are investigated at the National laboratories. Progress in the High Energy Physics research program is based on continuing the scientific and engineering research and development necessary to maintain and advance the technology base.

- Nuclear Physics Program is in place to attain a fundamental understanding of the interactions, properties, and structure of atomic nuclei. The frontiers of nuclear physics have progressed to the exploration of the internal dynamics of nuclei and the investigation of the response of nuclear matter to extreme conditions.

Several examples of IT used to support the Science and Technology missions follow.

Modelling Climate Variability

The possibility that increasing emission of carbon dioxide and other gases into the Earth's atmosphere may result in an increase in the mean temperature of the Earth's surface and major climate changes has generated much concern. Considerable effort is being spent on measurement and models to determine whether such warming has already taken place as a result of existing emissions. A major question in interpreting the results of such studies is whether an observed increase in mean temperature over the period since good records have been kept may be simply a natural fluctuation.

In evaluating the possible existence of global warming resulting from the greenhouse effect, an important consideration is the understanding of the natural variability of the Earth's climate. Empirical data strongly suggest that a century is not an adequate period of time to effectively sample this variability. Additional evidence in support of this view can be found in computer simulations using relatively simple models of general atmospheric circulation. Large global climate simulations are too costly to run for multicentury simulations, but there is considerable value in studying very long simulations with low order models, designed to exhibit the major features of the real climate system.

At Brookhaven National Laboratory, such studies are being carried out using a 27-variable model of moist general circulation at middle latitudes developed by E. Lorenz of MIT in 1984. This model treats the general circulation of a moist atmosphere using two-layer quasi-geostrophic approximation. Prognostic variables are temperature in each layer of atmosphere, ocean surface temperature, and total dew point.

In order to examine the results of the model studies, the results are displayed in real time on a color workstation, a black and white rendering of which is shown in Figure 5.2-10. Even though the model is simple compared with a full circulation model, the analysis of the results, using sophisticated graphical and other computational tools, is quite compute-intensive.

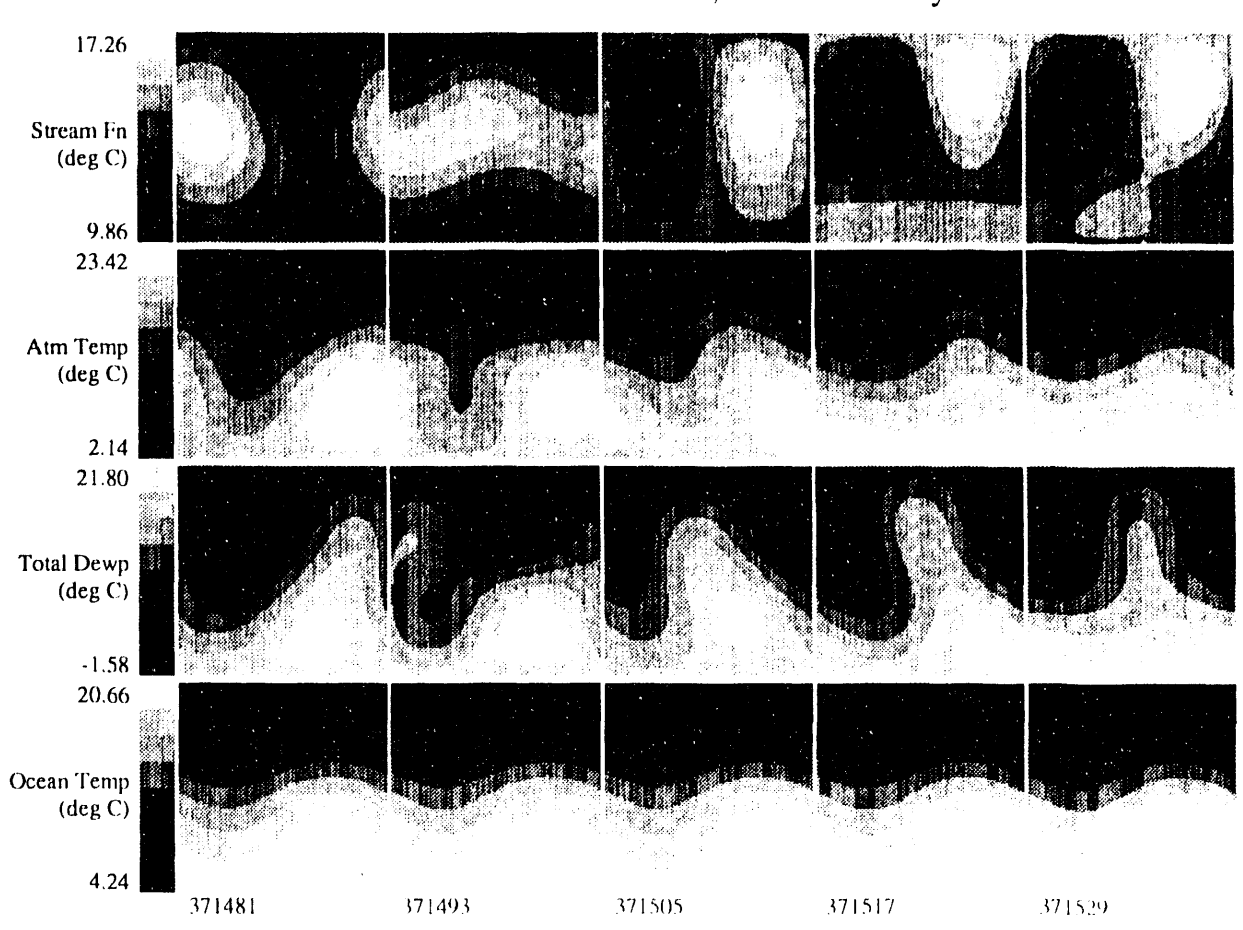


Figure 5.2-10
Modelling Climate Variability

Global Transport of the Kuwait Smoke

During and following Operation Desert Storm, the intense smoke from the burning oil fields in Kuwait created environmental concerns about the possible atmospheric impact, particularly its affect on the global climate. The Los Alamos general circulation model (GCM) was used to simulate the three-dimensional (3D) global distribution and evolution of the smoke from the burning oil fields in Kuwait. The Laboratory assumed a constant injection rate of 6.1 x 10^{10} grams of soot per day having a visible absorption coefficient of 10 meters^2/gram and an infrared

extinction coefficient of 1 meter^2/gram. It was assumed that this smoke was injected up to 3 kilometers above the surface before the model-predicted winds transported it, and the model-predicted precipitation removed it. This scenario ran several times on the supercomputers, each for 30 simulated days; some starting in January conditions, others in June. The model results suggest that the smoke has little effect on the global climate. This has been subsequently borne out by observation.

Figure 5.2-11 shows the smoke from 5 days of burning oil fields in Kuwait. Although the figure is presented in black and white, the Laboratory actually used a colored background (where blue depicted the ocean and green the continents) to create a clear visualization of the smoke from burning oil fields.

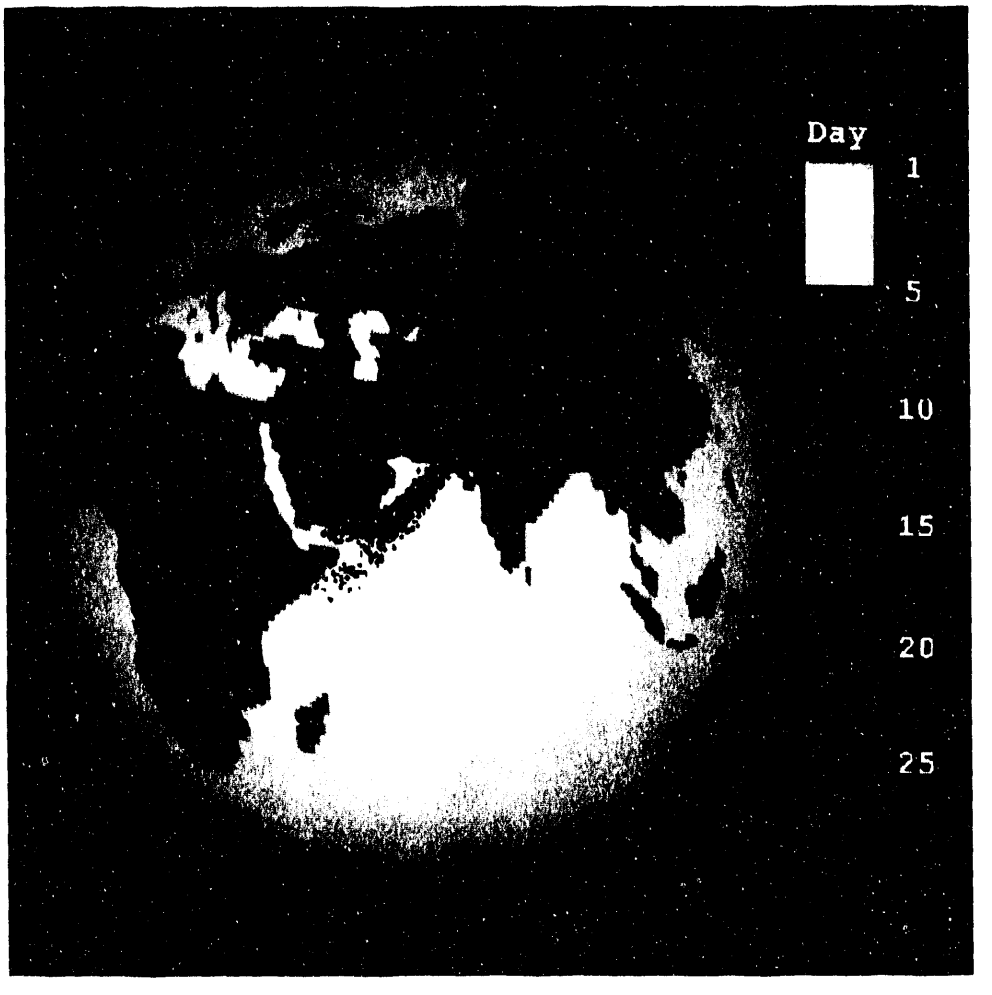


Figure 5.2-11
Computer Simulation of the Global Transport of Kuwait Smoke

Modelling the Effects of Neutron Irradiation on Structural Materials

The reaction theory has been used to develop models describing the microstructural evolution that takes place when structural materials are exposed to neutron irradiation. This work was supported under the Basic Energy Sciences Program at Martin Marietta Energy Systems. It is applicable to a number of other programs, such as Advanced Reactor R&D. This work is relevant to nuclear energy systems ranging from the currently-used fission reactors to advanced technologies, such as fast breeder and fusion reactors.

These models have been critical in developing our understanding of the fundamental mechanisms that give rise to the mechanical property changes observed during irradiation. This understanding has permitted us to bridge gaps in existing engineering databases and to extrapolate from the available data into regimes where data are difficult to obtain.

Two notable successes of the theory are shown in Figures 5.2-12 and 5.2-13. In an investigation of radiation creep at temperatures below 300° C, the observed creep, was much higher than expected. Analysis of this data led to the postulation of a new mechanism of irradiation creep, a subsequent model development demonstrated that this mechanism could account for the experimental observation as shown in Figure 5.2-12. Another example of the predictive capabilities of the theory is shown in Figure 5.2-13. The amount of helium produced by transmutation reactions in stainless steel in a fusion reactor will be in the range of 10 to 15 atomic parts per million per atomic displacement. This is referred to as the He/dpa ratio. Radiation-induced swelling measurements in fission reactors are normally limited to either much lower or much higher He/dpa ratios. The predictions of the kinetic models indicated that a swelling peak could exist at the intermediate He/dpa ratio. This prediction was confirmed in a specially designed irradiation experiment that was completed about 2 years after the predictions were made.

This theoretical work makes extensive use of workstations and intermediate class computers for data analysis, code development, running simulations of modest size, and post-processing of the model simulations. The most detailed models require the use of a supercomputer to complete the calculations in a timely way.

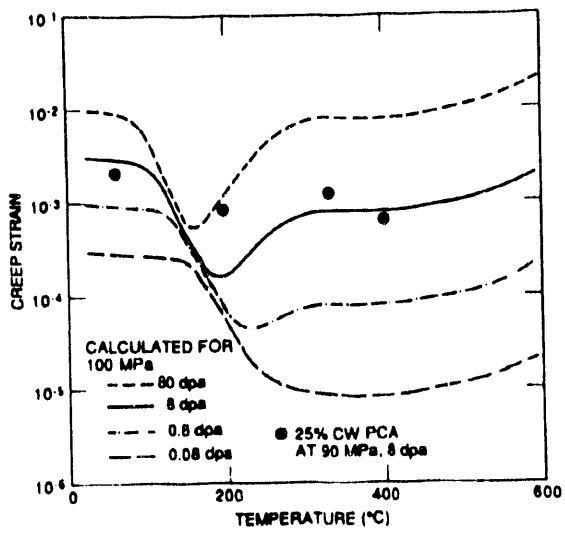


Figure 5.2-12

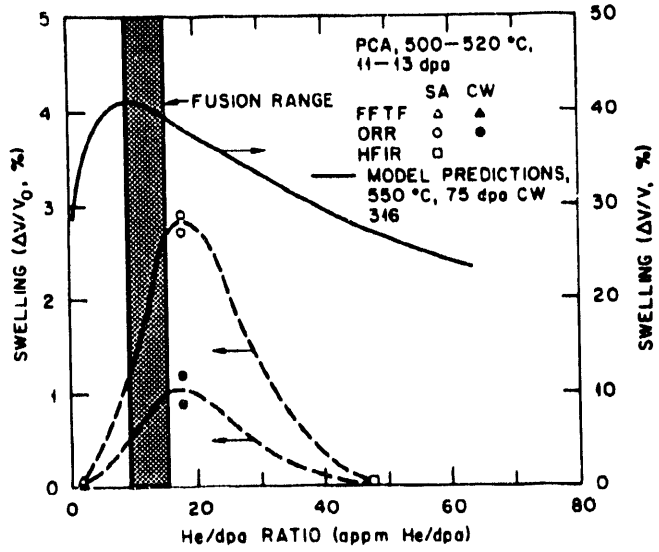


Figure 5.2-13

Modelling Radiation Creep

Superconducting Super Collider Laboratory

The enormity of the computing challenges of the Superconducting Super Collider (SSC) Program are well known. These challenges require special solutions in almost every aspect of computing. At this time, one of the Laboratory's immediate goals is to provide the simulation resources necessary to design the SSC detectors. Two types of Monte Carlo simulations are used to simulate. The calculations to be performed in each simulation are lengthy and detailed, could require many months per run on a minicomputer, and may produce several Gbyte of data per run. A powerful, fully dedicated computing environment was needed to handle the requirements for High Energy Physics (HEP) Monte Carlo simulations of SSC physics and detectors.

Several Monte Carlo programs such as ISAJET and PYTHIA have been written to simulate complete events at the SSC. These programs use known physics to generate lists of particles, including their energies, directions and types, both for potential signals and for their known backgrounds. Other more specialized detector simulations will also be performed.

In typical SSC interaction, several hundred primary particles may be produced. Only a few of these particles may be of interest to the physicist, but as many as possible must be simulated in the detector. In order to study the response of the detector to the signal of interest, about 10^3 - 10^4 events must be generated. Figure 5.2-14 illustrates a cutaway view of the simulation of an event in the completed Solenoidal Detector Collaboration detector. Background events must be studied since they can potentially produce signatures in the detectors that are misinterpreted as signal events. Typically, about 10^5 - 10^6 background events must be generated and studied for each physics signal.

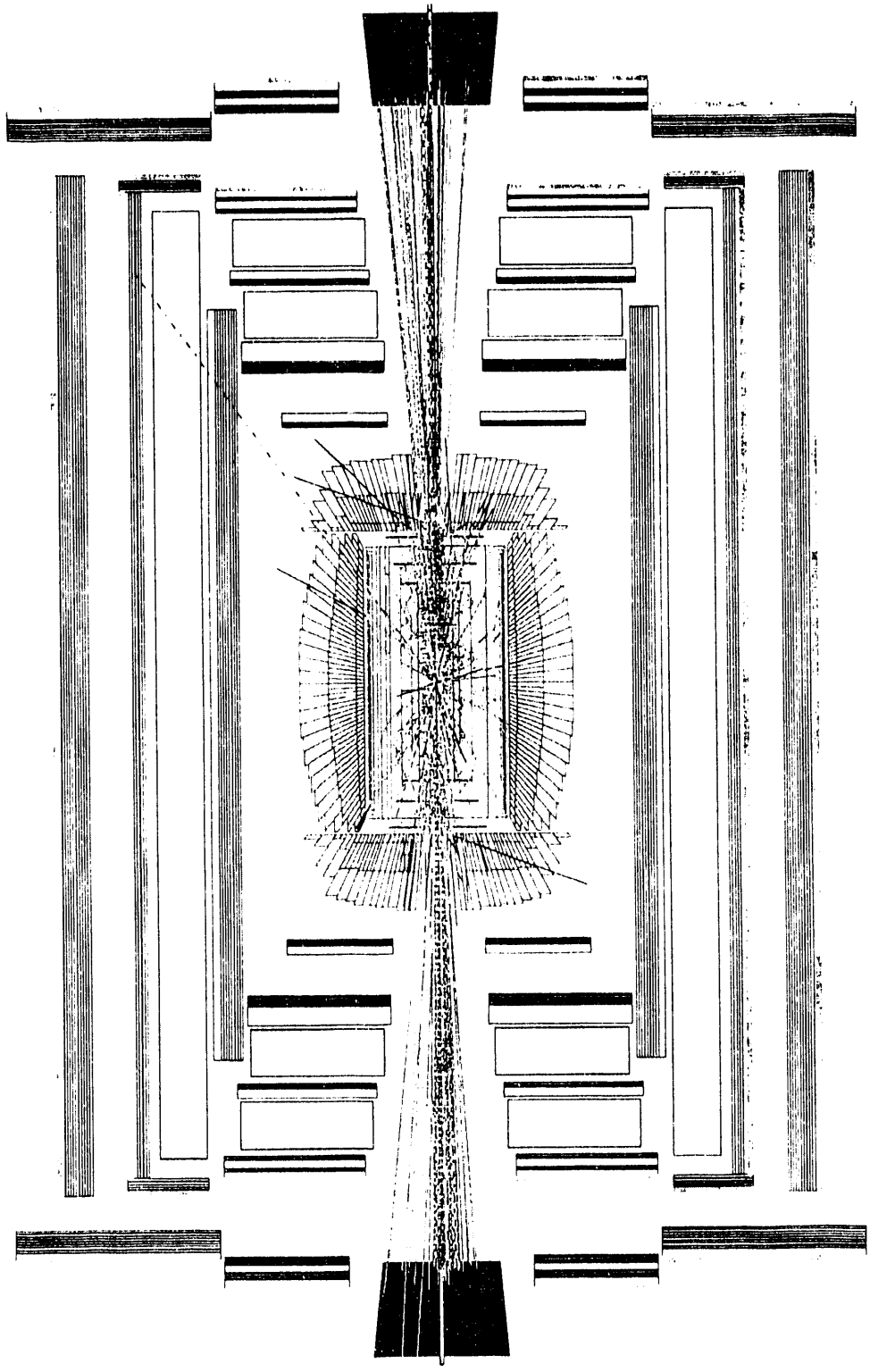


Figure 5.2-14
Event Simulation from the Solenoidal Detector Collaboration Simulation Package

Several levels of detector simulation computations, varying from simple compilation and debugging test runs to detailed runs which may require as much as 10^4 MIPS-seconds per event and produce on the order of Mbyte of data, are envisioned of up to 10^6 events will be generated for detailed studies, while some number of smaller samples of order 10^5 events will be needed to test ideas quickly.

A distributed computing environment of several networked high-speed computing engines was required to meet these requirements. The Physics and Detector Simulation Facility was put in place to provide much of the computing resources necessary to perform the physics and detector simulations outlined. The operational concept of the facility calls for interactive users to log on the system either remotely or locally. A process resident on a file server will assign an idle front-end workstation to that user. With one workstation per user, each user is provided with a completely dedicated resource. The use of this system for detector simulations has steadily grown to its current level of about 70 to 80 percent of saturation. It is expected that approximately 100 FTE scientists will become involved in the physics/detector simulation effort for the SSC during the next year. The work load may be distributed among 200 to 300 different physicists throughout the world.

The SSC Laboratory (SSCL) uses open systems and industry standards where possible for operating systems, languages, utilities, and protocols. To meet this goal, the Laboratory has established a computing environment emphasizing the use of distributed, networked computing, graphics, and peripherals from multiple vendor sources. The SSCL is a member of the Open Software Foundation (OSF) and will install the OSF/1 operating system as soon as possible.

Development of PRESTO-II Methodology and Code

PRESTO-II (Prediction of Radiation Effects from Shallow Trench Operations) is a methodology and computer code designed for the evaluation of possible health effects from chemicals released from shallow-land waste-disposal trenches. The model is intended to serve as a nonsite-specific screening model for assessing chemical transport, radioactive or chemical transformation, ensuing human exposure, and the resulting health impacts to a static local population for a 1000-year period following the end of disposal operations. Human exposure scenarios include normal releases (including leaching and operational spillage), human infusion, and limited site farming or reclamation. Pathways and processes of transit from the trench to an individual or population include ground-water transport, overland flow, erosion, surface water dilution, suspension, atmospheric transport, deposition, inhalation, external exposure, and ingestion of contaminated beef, milk, crops, and water. Exposures and radiation doses to populations, individuals, intruders, and farmers may be calculated. Cumulative health effects in terms of cancer deaths are calculated for the population over the 1000-year period using lifetable approach. Figure 5.2-15 shows the hydrologic and atmospheric environmental transport pathways.

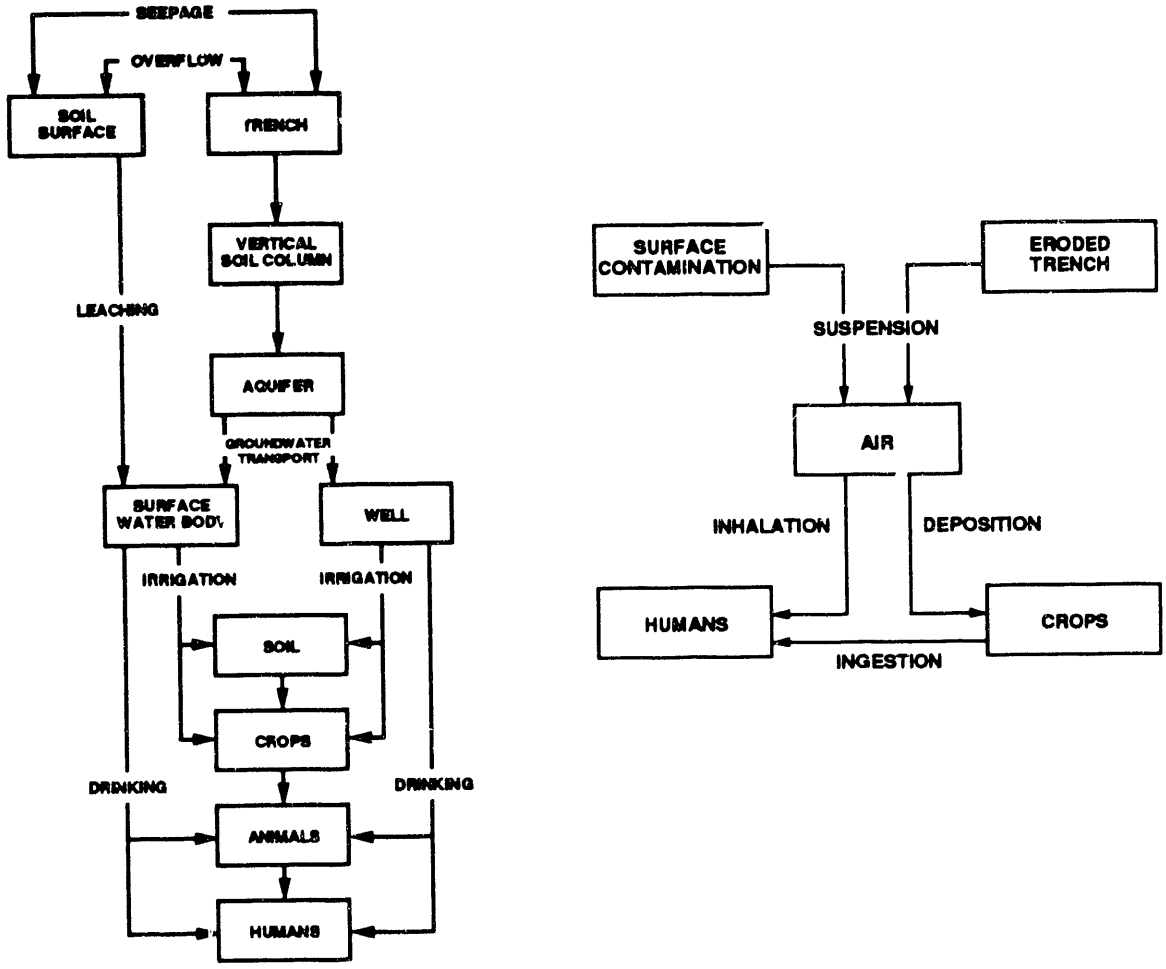


Figure 5.2-15
Hydrologic and Atmospheric Environmental
Transport Pathways

The PRESTO methodology and code were developed at Oak Ridge National Laboratory using DOE-supported computer resources. PRESTO has been applied to disposal sites at Savannah River, Nevada, New York, Tennessee, and Turkey. Continued interest from the international community (including International Atomic Energy Agency and researchers in Canada and China) and from the commercial sector has resulted in a copyright being sought. Several interested parties are pursuing licensing of the PRESTO-II package. The methodology has been implemented in several versions on mainframe and microcomputer systems. Work done for the Nuclear Regulatory Commission has examined the potential consequences of disposing any of four example radioactive waste streams, in any of three geoclimatological regions, using a variety of disposal practices.

5.2.4 Other Programs

Other programs in place at the Department support crosscutting areas. Two such programs are:

- Environment, Safety and Health Program assures the development of comprehensive Departmental policy and procedures pertaining to environment, safety, and health laws and regulations; and assures execution of the policy through independent oversight.

- General Administration Program relates to the administrative management functions of the Department's Headquarters and field components. Within this program, the Assistant Secretary for Human Resources and Administration assures development and implementation of Departmentwide administrative and acquisition management policies, procedures, and systems and assures the Department is effectively managed by providing operational administrative support to Departmental programs.

Examples of the IT provided and maintained through the General Administration Program follow.

DOE Emergency Management Systems

DOE 5500.1A, EMERGENCY MANAGEMENT SYSTEMS, dated 2-26-87 established requirements for the Department's Emergency System to provide for the development, coordination. and direction of DOE planning, preparedness, and readiness assurance for response to operational, energy, and Continuity of Government emergencies involving DOE or requiring DOE's assistance. The telecommunications requirements include the upgrade of DOE's connectivity from the Emergency Operations Center (EOC) at Headquarters to the EOCs at the alternate Headquarters EOC and each of the EOCs at the following locations: Aiken, SC; Albuquerque, NM; Chicago, IL; Golden, CO; Idaho Falls, ID; Las Vegas, NV; Livermore, CA; Oak Ridge, TN; and Richland, WA.

A communications network connecting all DOE Operations Offices with Headquarters by voice and video is a prime feature of the new EOC at Headquarters. It also maintains direct communications with the White House, the Department of Defense, and the Federal Emergency Management Agency.

The communications and monitoring facility in the Forrestal Building was dedicated in January 1993. Round-the-clock operations began December 31, 1992. The multiroom facility houses classified and unclassified fiber optic local area networks, a video teleconferencing system serving the Washington area and the field, secure telephone units, an intercom network, and a mapping database.

Nearing operating readiness are long-haul dedicated communications links, installation of multiplex equipment at all DOE Operations Offices, and the procurement and installation of a Very Small Aperture Terminal (VSAT) satellite system for backup communications. Scheduled for mid-1994 is the linking of all DOE facilities, Operations Offices, Power Marketing Administrations, Energy Technology Centers, and Petroleum Reserves via a high frequency radio link that can serve as a classified or unclassified voice network. Figure 5.2-16 shows the currently planned EOC terrestrial and VSAT networks.

DOEwide Video Teleconferencing (VTC) Services

The current generation of VTC technology within DOE began in 1988 when a secured network was established for the Sandia National Laboratories in Albuquerque and Livermore, and the Allied Signal Plant, Kansas City. The current "surge" for VTC began in February 1990 when the need for this technology between Headquarters and field activities was confirmed by a highly successful demonstration with Forrestal, Germantown, and Albuquerque. VTC is yielding quicker decision making, bringing training to the user, increasing productive time, and saving manhours and travel costs.

In April 1991, The Office of Information Resources Management issued policy for video conferencing, to ensure user requirements would be satisfied with international standardization and interoperability in mind. Central management planning for DOEwide VTC services and resources will be sanctioned and fully implemented in FY 1993. The DOEwide community has actively supported central management of VTC since December 1990, when the Office of Information Technology Services and Operations chaired the first DOEwide VTC Users Group Meeting and the 49 representatives agreed to continue meeting, share information, and form working groups to resolve issues.

The Common-User, Secured VTC Network (CSVN), (Figure 5.2-17), currently connects 20 facilities. This classified network operates at a data rate of 768 Kbps via DOE terrestrial and FTS 2000 Dedicated Transmission Service facilities. A Multipoint Control Unit (MCU) located in Albuquerque provides broadcast and interactive multiparty capabilities for up to eight facilities (primarily in the Western region of the country) and DOEwide Central Reservations Facility located in Germantown.

FTS 2000 Compressed Video Transmission Service (FTS 2000 CVTS), currently connects 10 DOE facilities with the Federal Governmentwide community via FTS 2000 transmission media. This unclassified, GSA/AT&T service offers a data rate of 384 Kbps, broadcast, point-to-point and interactive multipoint conferencing capabilities. Operations personnel supporting the DOEwide CSVN Central Reservations Facility, Germantown, also support DOEwide FTS 2000 CVTS users.

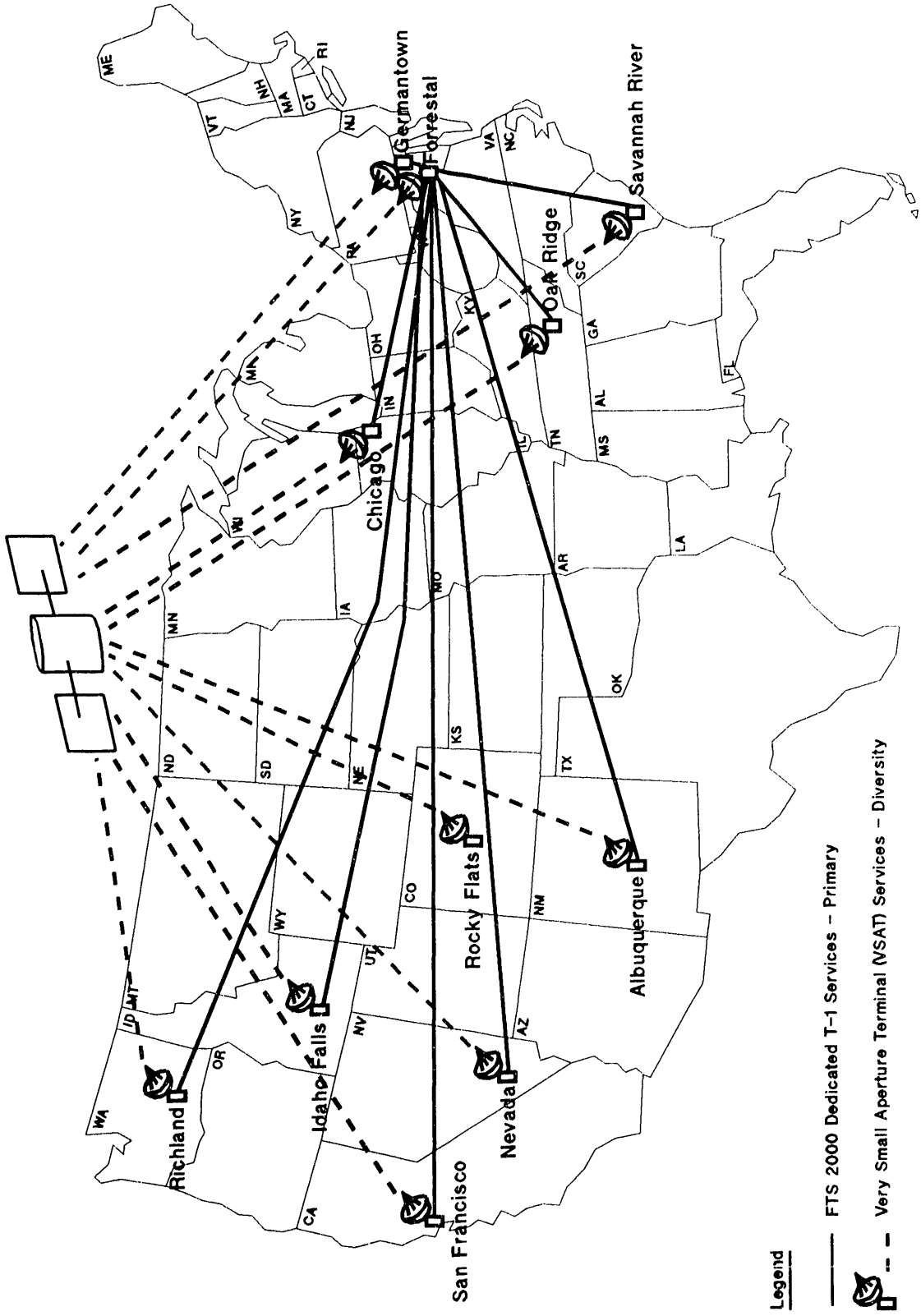


Figure 5.2-16
Proposed Emergency Operations Center (EOC) Network

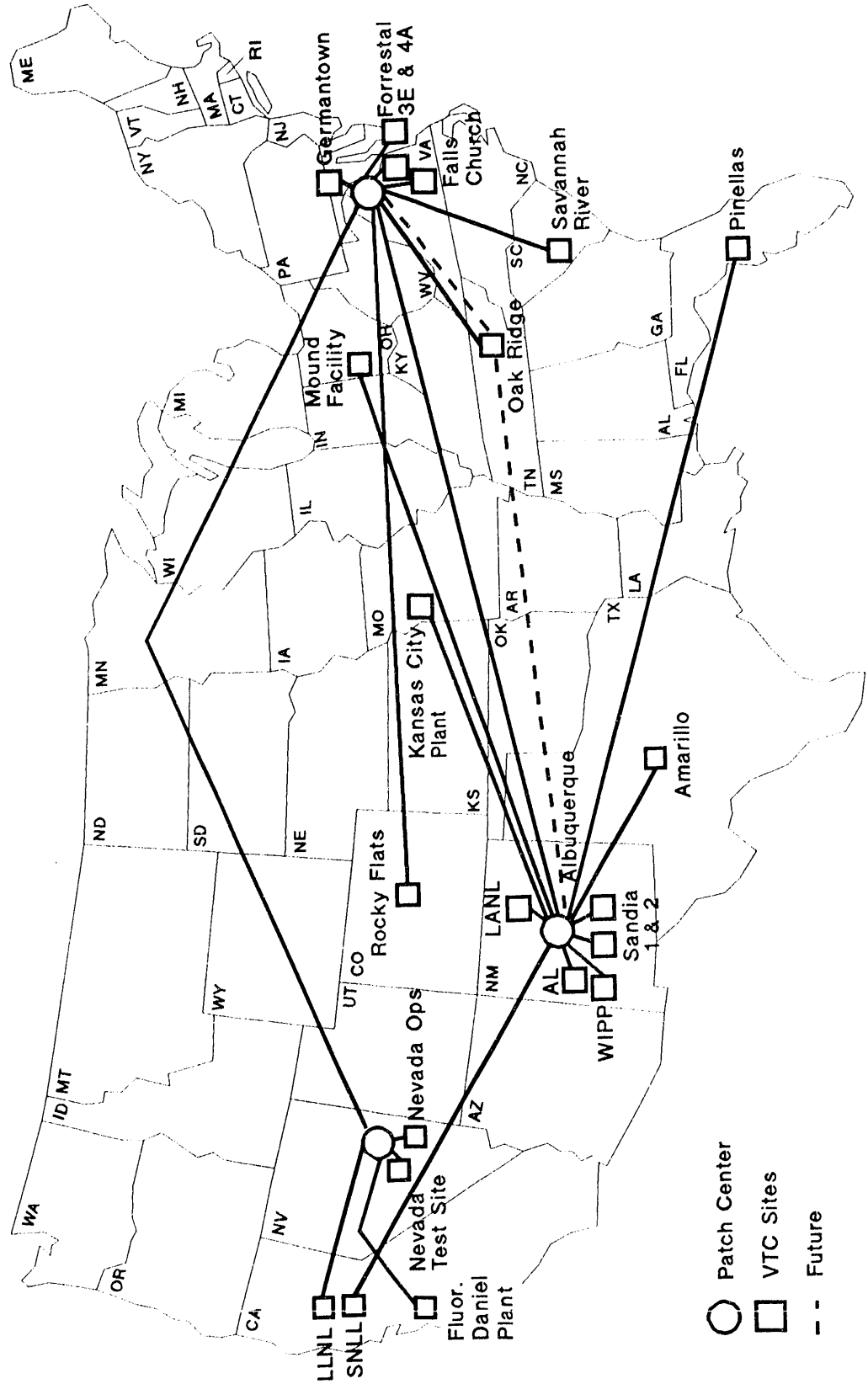


Figure 5.2-17
Common-User, Secured VTC Network (CSVN)

The Office of Energy Research, Office of Superconducting Super Collider VTC Network, operates at a data rate of 128 Kbps via the Energy Sciences Network (ESNET). This network provides dedicated, unclassified VTC service to the Superconducting Super Collider Laboratory in Dallas, TX; the Fermi National Accelerator Laboratory in Chicago, IL; and the Lawrence Berkeley Laboratory in Berkeley, CA.

Both CSVN and FTS 2000 CVTS are accessible through a security-approved, crypto bypass switching arrangement. All video conferences via CSVN must be confirmed and added to the electronic video conferencing calendar by Central Reservations personnel. All video conferences via FTS 2000 CVTS for the main Germantown building facility and the satellite Trevion II Building must be confirmed and added to the electronic video conferencing calendar by Central Reservations personnel. The control terminal for the Albuquerque MCU is housed in Germantown and VTC operations personnel serves as central point-of-contact for troubleshooting CSVN network problems.

Section 6: Information Technology Plans

This section highlights the requirements and planned activities to acquire and enhance Department of Energy (DOE) information technologies (IT). A summary of the Department's planned major acquisitions/enhancements of computing and telecommunications equipment and services is presented. Also described are the Department's administrative/business computer software plans for new software initiatives and operational major information systems.

Section 6.1 Planned Major Computer and Telecommunications Acquisitions

During the period FY 1993 - FY 1998, approximately $1.1 billion is planned to support 71 major computer and telecommunications technology acquisitions planned throughout the Department. This subsection of the plan presents a summary of these major acquisitions. Each planned item listed is prefixed by either a "CR" for computing resource or a "TC" for telecommunications. A major CR acquisition is one with hardware acquisition costs greater than $5 million; a major TC acquisition is one with life-cycle costs greater than $5 million. This information corresponds to the information submitted to the Office of Management and Budget (OMB) as Schedule 43B in response to the OMB Circular No. A-11. For the purposes of this Plan, however, the acquisitions have been arranged to coincide with the Secretary's programmatic mission areas. Figure 6.1-1 illustrates the amounts planned over the period for each technology area.

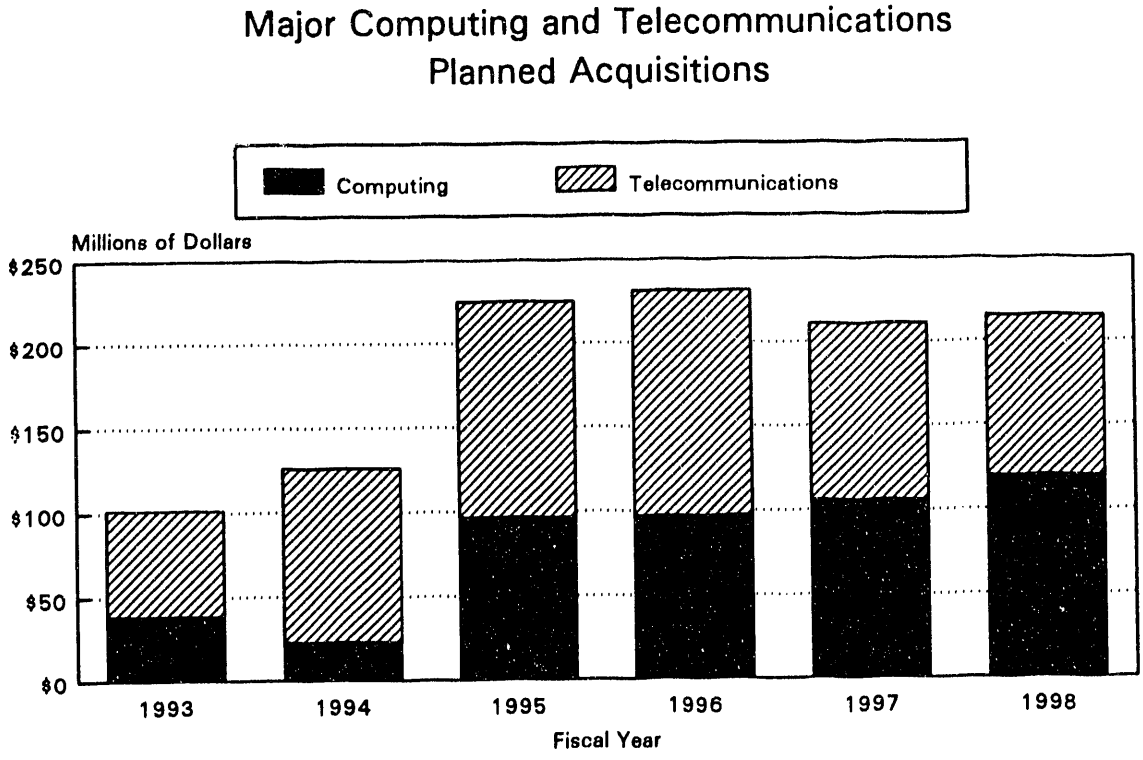


Figure 6.1-1
Major Computer and Telecommunications Planned Acquisitions

The following is a summary of CR and TC major acquisitions planned from FY 1993 - FY 1998 by Departmental sites. Dollars are stated in thousands and are displayed by fiscal year for each acquisition.

6.1.1 Energy Programs

Nuclear Energy Research and Development

Item: (TC) Radio Trunking System Expansion

Obligations:	1993	1994	1995	1996	1997	1998
	3,818	969	530	264	277	291

Description: New radio trunking system expansion and migration of users from existing networks to this new system.

Item: (TC) Integrated Communications Network

Obligations:	1993	1994	1995	1996	1997	1998
		6,900	300	250	3,000	15,400

Description: Oak Ridge Federal Integrated Communications Network (ORF-ICN). The ORF-ICN is planned as a replacement system for the Official Oak Ridge Telephone System. Line item funding will be requested for FY 1994. The ORF-ICN will provide unclassified voice and data communications on-premises digital switching and a cable plant certified capable of handling data rates compatible with emerging ISDN standards.

Naval Reactors Development

Item: (CR) Advanced Computer System

Obligations:	1993	1994	1995	1996	1997	1998
	32,000					

Description: A large scientific computer system (more than 3 times the computing power of a Cray Y-MP/864) to provide additional capacity and capability for the Bettis Atomic Power Laboratory to accomplish its missions in support of the Naval Reactors Program. This acquisition is for equipment specified as an option in a joint Knolls Atomic Power Laboratory and Bettis solicitation initiated in FY 1992.

Item: (CR) Massively Parallel System

Obligations:	1993	1994	1995	1996	1997	1998
			8,000			

Description: This massively parallel computer will provide this site with an effective cost/performance alternative to large, general purpose supercomputers for doing specific production nuclear and engineering design work.

Item: (CR) Massively Parallel System I

Obligations:	1993	1994	1995	1996	1997	1998
				8,000		

Description: This massively parallel computer will improve the ability to solve large nuclear and engineering design problems in a manner that is expected to be a cost-effective alternative to conventional supercomputers. This system will be used for production problems for a subset of the calculations performed at the site.

Item: (CR) Massively Parallel System

Obligations:	1993	1994	1995	1996	1997	1998
					8,000	

Description: A general massively parallel system that will be compatible with the systems previously acquired. This system will be the current technology of massively parallel computer available at that time and will have all appropriate support hardware and software and network capabilities to run large production design programs.

Item: (CR) Massively Parallel System III

Obligations:	1993	1994	1995	1996	1997	1998
						8,000

Description: A general massively parallel system that will be compatible with the systems previously acquired. This system will be the current technology of massively parallel computer available and will have all appropriate support hardware and software and network capabilities to run large production nuclear design programs.

Southwestern Power Administration

Item: (TC) Static Guide Wire Replacement

Obligations:	1993	1994	1995	1996	1997	1998
	30	2,890	2,840	2,850	2,850	2,850

Description: Southwestern is replacing all of the static guard wire which is gradually failing, with optical guard wire. This replacement will occur over a 12-year period.

6.1.2 Weapons/Waste Cleanup Programs

Research, Development, and Testing (Weapons Activities)

Item: (TC) Security System

Obligations:	1993	1994	1995	1996	1997	1998
	1,102	1,102	1,102	1,102	1,102	1,102

Description: The security radio system includes voice encryption and paging along with operation and maintenance.

Item: (TC) Very High Speed Data Communications Project

Obligations:	1993	1994	1995	1996	1997	1998
	1,239	8,298	8,564	8,351	8,134	8,134

Description: A two-phase prototyping effort to investigate the applicability of circuit switch technology to the problem of very high speed data transfer. The project will initially provide a switch capable of switching 32 inputs at a data rate of 250 Mbps and 1,000 connections per second per channel. When this is successful, the project will attempt to increase the capacity to 1 Gbps and 5,000 connections per second. The switch will be tied into the 800 Mbps HIPPI Channels on the Cray XMP and YMP in the Livermore Computer Center.

Item: (TC) Livermore Voice and Open Data System

Obligations:	1993	1994	1995	1996	1997	1998
	1,272	1,272	1,272	1,272	1,272	1,272

Description: The 5ESS private branch exchange (PBX) is a digital-based Integrated Services Digital Network (ISDN) switching system supporting analog and digital voice and data terminals for intrasite and intersite open communications.

Item: (TC) Albuquerque Building Rewiring

Obligations:	1993	1994	1995	1996	1997	1998
	2,100	2,100	2,100			

Description: Using a phased approach, the buildings will be rewired to bring them into compliance with the Sandia standard for voice/open data wiring.

Item: (TC) High-speed Supercomputer Communications

Obligations:	1993	1994	1995	1996	1997	1998
	2,110	2,310	2,310	2,310	2,510	2,510

Description: Install two T3 rate (45 Mbps) communication lines between Sandia National Laboratories Albuquerque and Sandia National Laboratories Livermore for high-speed.

Item: (TC) Albuquerque Long Distance & Local Telephone Service

Obligations:	1993	1994	1995	1996	1997	1998
	3,776	4,078	4,078	4,078	4,078	4,078

Description: Long distance includes FTS 2000, commercial, and credit cards. Local includes services on Kirtland Air Force Base (KAFB) and other non-KAFB locations; adds, moves, and changes; and services from local exchange carriers.

Item: (TC) Albuquerque Voice and Open Data System

Obligations:	1993	1994	1995	1996	1997	1998
	4,280	3,423				

Description: Installation of an AT&T 5ESS digital telephone switch with associated site preparation and customer stations. This switch will replace an existing 1AESS at KAFB.

Item: (TC) Los Alamos Integrated Communications System (LAICS)

Obligations:	1993	1994	1995	1996	1997	1998
	7,444	10,664	10,460	10,353	9,572	8,806

Description: The Los Alamos Integrated Communications Systems (LAICS) acquisition will provide switched and dedicated voice, data, and imaging teleservices over common high-speed fiber-optic transmission facilities.

Item: (CR) Supercomputer Upgrade 94

Obligations:	1993	1994	1995	1996	1997	1998
		5,300				

Description: Online disks and mass storage sufficient to support FY 1994 programmatic supercomputer storage requirements.

Item: (CR) High-Speed Communications I

Obligations:	1993	1994	1995	1996	1997	1998
		6,000				

Description: Equipment to upgrade the network infrastructure to provide a more efficient and homogeneous environment. This increment will integrate Redundant Array of Inexpensive Disks (RAID) disk technology into the network as a buffer for archival storage.

Item: (CR) Supercomputer (94)

Obligations:	1993	1994	1995	1996	1997	1998
			10,100			

Description: Additional supercomputing capacity and capability (either through upgrades to installed systems, replacement with state-of-the-art capability, or additional resources) to support programmatic requirements for safety, enhancement, and/or testing of weapons and associated components.

Item: (TC) IRAC Radio Conversion 12.5 Kilohertz

Obligations:	1993	1994	1995	1996	1997	1998
			3,000	3,000	3,000	3,000

Description: Replace all 25 kHz channel radios with 12.5 kHz channel radios.

Item: (CR) High-Speed Communications II

Obligations:	1993	1994	1995	1996	1997	1998
			5,000			

Description: Equipment to upgrade the network infrastructure to provide a more efficient and homogeneous environment. This item will provide sufficient RAID disks and associated interfaces to eliminate disks local to the mainframes and possibly a high-speed block-oriented memory buffer as a network peripheral. The High-Speed Communications I will have defined the technology for this purchase.

Item: (CR) Supercomputer Upgrade 95

Obligations:	1993	1994	1995	1996	1997	1998
			5,000			

Description: Online disks and mass storage sufficient to support FY 1995 programmatic supercomputer storage requirements.

Item: (CR) Network Upgrade 95

Obligations:	1993	1994	1995	1996	1997	1998
			5,000			

Description: High-performance network interfaces and/or network based storage for the two high-performance central networks (secure and restricted) at this site.

Item: (CR) Peak-Teraflops Architecture MPR Computer

Obligations:	1993	1994	1995	1996	1997	1998
			15,325			

Description: Prototype of one of the new class of architectures appearing in 1995 that provides a peak performance of a trillion operations per second.

Item: (CR) Supercomputer (95)

Obligations:	1993	1994	1995	1996	1997	1998
			30,000			

Description: Additional capacity and capability to support increasingly complex workload on the Integrated Computer Network.

Item: (CR) CPU Capacity/Capability Upgrade IV

Obligations:	1993	1994	1995	1996	1997	1998
				5,000		

Description: Equipment to upgrade massively parallel production system.

Item: (CR) Engineering Scientific MP Supercomputer

Obligations:	1993	1994	1995	1996	1997	1998
				5,000		

Description: Interactive, large scale, massively parallel supercomputer for interactive design and scientific visualization.

Item: (CR) Supercomputer 96

Obligations:	1993	1994	1995	1996	1997	1998
				30,000		

Description: Additional supercomputer(s) to provide enhanced capacity and capability at this site.

Item: (CR) Supercomputer (96)

Obligations:	1993	1994	1995	1996	1997	1998
				30,000		

Description: Additional supercomputer(s) to provide enhancement capacity and capability in the Integrated Computer Network.

Item: (CR) Advanced Technology Parallel Architecture II

Obligations:	1993	1994	1995	1996	1997	1998
					2,814	9,672

Description: A parallel architecture multiprocessor (at least 64 cpus), with 512 megawords of main memory, high-performance magnetic disc subsystem, I/O processors with buffer memory, and at least 3-6 network interfaces.

Item: (CR) Supercomputer Upgrade

Obligations:	1993	1994	1995	1996	1997	1998
					5,000	

Description: Augmented storage or additional processing elements (nodes) as required to expand first production supercomputer - new generation.

Item: (CR) Network Upgrade 97

Obligations:	1993	1994	1995	1996	1997	1998
					5,000	

Description: High-performance network interfaces and/or network based storage for the Integrated Secure Network and the Integrated Restricted Network.

Item: (CR) Sustainable-Teraflop Architecture MPR Computer

Obligations:	1993	1994	1995	1996	1997	1998
					15,400	

Description: Prototype of the sustainable teraflops massively parallel architectures that emerges in 1997.

Item: (CR) Supercomputer (97)

Obligations:	1993	1994	1995	1996	1997	1998
					35,000	

Description: Additional supercomputer(s) to provide enhancement capacity and capability in the Integrated Computer Network.

Item: (CR) High-Speed Communications III

Obligations:	1993	1994	1995	1996	1997	1998
						5,000

Description: Expect new technology to allow this site to replace the existing HIPPI, FCS network with a higher speed and more cost-effective network. The computational engines will require such an upgrade in order to be used effectively.

Item: (CR) Multi-Mode MPMD MPR Computer

Obligations:	1993	1994	1995	1996	1997	1998
						12,275

Description: Prototype of a new class of massively parallel supercomputer that supports multiple program mode, simultaneously on a multi-program, multi-data computer architecture.

Item: (CR) Supercomputer 98

Obligations:	1993	1994	1995	1996	1997	1998
						30,000

Description: New generation of massively parallel supercomputers.

Item: (CR) Supercomputer (98)

Obligations:	1993	1994	1995	1996	1997	1998
						35,000

Description: Additional supercomputer(s) to provide enhancement capacity and capability in the Integrated Computer Network.

Stockpile Support (Weapons Activities)

Item: (TC) Energy Management and Control System (EMCS)

Obligations:	1993	1994	1995	1996	1997	1998
	439	170	5,601	223	230	236

Description: The existing delta systems are budget candidates for replacement in the FY 1991 Facilities Capability Assurance Program (FCAP). The equipment will be replaced with a new central minicomputer control system and a new building addition at the East Boilerhouse to house a new control room for the central system. The FY 1991 FCAP includes the installation of 220 field direct digital microprocessor control systems and fiber optic communications cable for existing air handling units. The method of acquisition for this item is purchase. It is expected that the acquisition will be accomplished through a fully competitive solicitation.

Item: (TC) Replace Emergency Notification System

Obligations:	1993	1994	1995	1996	1997	1998
	460		5,380			

Description: The focus of this plant project is to replace the existing public address (PA) system at the Kansas City Plant with an electronically supervised plant-wide emergency notification system (ENS) and a non-emergency PA system. The new emergency notification system will be in accordance with DOE Orders and National Fire Protection Association (NFPA) codes listed below:

- NFPA 72 - Installation, Maintenance, and Use of Protective Signaling Systems
- NFPA 101 - Life Safety Code from Fire in Buildings and Structures
- DOE Orders 5480.1B, 5480.4, and 5480.7
- Occupational Safety & Health Act (OSHA), 29 CFR 1910, Requirements Applicable to Exits and Fire Protection Capabilities.

The new ENS will be a multi-zoned system including the main building, all outside buildings, and parking lots. Two separate speaker systems will be installed, new Underwriters Laboratories (UL) speakers for the ENS and an upgrade of the existing PA system reusing existing speakers for non-emergency announcements. The field units on the ENS will consist of amplifiers, speakers, transceiver units, emergency battery power in case of AC power loss, and they will interface with the Allied-Signal, Inc., Kansas City Division fire alarm. All emergency notification will be installed in conduit dedicated for its use only.

Item: (TC) Plant Wide Fiber Optic Network

Obligations:	1993	1994	1995	1996	1997	1998
			8,000	7,200	200	200

Description: Installation of a plantwide fiber distributed data interface (FDDI) compatible fiber optic network connecting all major buildings at the Plant. This network will provide the bandwidth necessary to support increased local area network requirements, and will also support major enhancements to security and fire alarm systems.

Item: (TC) Communications Upgrades for Emergency Operations Center (EOC) Locations

Obligations:	1993	1994	1995	1996	1997	1998
				2,500	4,200	300

Description: Provide communications upgrades for primary and backup EOC locations necessary to bring both locations into compliance with the "Final Report of the Department of Energy Task Force on Compatibility of Emergency Operations Center Communications and Information Processing."

Materials Support

Item: (TC) Computer Controlled Trunked Radio Repeater System

Obligations:	1993	1994	1995	1996	1997	1998
	200	10,010	40			

Description: This is a computer-controlled radio repeater system using software controlled partitioning of communications groups. The system will utilize 20 frequency pairs and will replace the majority of existing discrete frequencies used for two-way voice communications.

Item: (TC) Networks for New Onsite Buildings

Obligations:	1993	1994	1995	1996	1997	1998
	747	1,143	1,383	1,379	824	

Description: Provide 802.x access for all planned onsite buildings outside of B Area during planning period.

Item: (TC) Replacement Telecommunications System

Obligations:	1993	1994	1995	1996	1997	1998
	2,035	1,984	12,784	15,746	16,054	17,379

Description: 1) Complete replacement of existing telephone system onsite and at two offsite Savannah River Site (SRS) locations. 2) Provide new inter-area fiber optic cable to support SRS voice/data/image requirements. 3) Replace all existing intra-area OSP cable facilities.

Item: (CR) Classified/Unclassified General Purpose Computer Upgrades

Obligations:	1993	1994	1995	1996	1997	1998
				8,000		

Description: Upgrade this site's unclassified/classified general purpose computing systems to meet increased workload demands.

Item: (CR) Class VI Replacement Computer

Obligations:	1993	1994	1995	1996	1997	1998
					12,000	

Description: Replacement of this site's Class VI computer will provide at least an increase in computational power, additional main memory, more online storage capacity, and an increase in performance of the input/output processor.

Item: (CR) CCF Mainframe Systems Replacement

Obligations:	1993	1994	1995	1996	1997	1998
						10,000

Description: The site intends to continue the technology replacement program for mainframe systems by replacing systems prior to projected 7-year obsolescence. Replacement will represent current state-of-the art technology and include an upgrade path to allow for the handling of increased processing requirements that may occur over its planned 7-year life cycle.

Defense Waste Management

Item: (TC) Trunked Radio System

Obligations:	1993	1994	1995	1996	1997	1998
	260	2,084	1,340	1,227	213	213

Description: This project provides a trunked radio system that will ultimately replace most of Hanford sites's existing conventional two-way radio communications system with the exception of the security and fire protection radio networks. A phased migration will be used. This new system will utilize up to 20 frequency pairs.

Item: (TC) Hanford Video Teleconferencing (VTC) System

Obligations:	1993	1994	1995	1996	1997	1998
	1,402	1,574	1,254	1,234	1,864	1,264

Description: Video teleconferencing will be implemented in phases over the Hanford Site. The initial phase will provide for a configuration of up to three (3) node digital compressed video system.

Item: (TC) Integrated Voice/Data Telecommunications System (IVDTS)

Obligations:	1993	1994	1995	1996	1997	1998
	3,700	8,400	8,400	8,400	8,400	8,400

Description: A new voice/data switch is scheduled to be procured for the Hanford Site. It will replace the service provided by the existing common carrier for the North Richland Exchange and the 200 Area switch.

Item: (TC) Network Cable Plant Upgrade

Obligations:	1993	1994	1995	1996	1997	1998
		10,000	8,000	4,000		

Description: This funding would provide the infrastructure and telecommunications media to support the Hanford Local Area Network, teleconferencing, and future requirements such as multimedia and graphics imaging for the Hanford Site.

Item: (CR) Large Scale Information System (LSIS) Technology Upgrade

Obligations:	1993	1994	1995	1996	1997	1998
			6,700			

Description: Upgrade of the LSIS processor to provide processing capacity to meet the requirements of the administrative, safety, and environmental processing systems and technology enhancements to minimize the software and hardware support requirements.

Defense Landlord Environmental Restoration & Waste Management

Item: (TC) INEL Trunked Radio Communications System

Obligations:	1993	1994	1995	1996	1997	1998
	200	400	400	26,105	105	105

Description: A multi-repeater trunked radio system which dynamically allocates radio channels based on user demand.

Item: (TC) INEL Emergency Management Communications System

Obligations:	1993	1994	1995	1996	1997	1998
	3,349	1,333	14,244	1,494	1,494	1,494

Description: Establish offsite and onsite communications supporting Departmentwide requirements for Emergency Operations Centers.

Item: (CR) Business Computer System Upgrade III

Obligations:	1993	1994	1995	1996	1997	1998
	5,000					

Description: Upgrade the Idaho National Engineering Laboratory IBM 3090-300J to an IBM ES/9000-720 or equivalent.

Item: (CR) Advanced Scientific Computer System (ASCS) Upgrade I

Obligations:	1993	1994	1995	1996	1997	1998
			10,000			

Description: Upgrade the Idaho National Engineering Laboratory's ASCS processor power to 4 processors and 64 million words of memory.

Item: (CR) Business Computing System Upgrade IV

Obligations:	1993	1994	1995	1996	1997	1998
					7,000	

Description: Upgrade the IBM ES/9000-720 to an IBM ES/9000-820 or equivalent system.

Item: (CR) Advanced Scientific Computer System (ASCS) Upgrade II

Obligations:	1993	1994	1995	1996	1997	1998
					7,400	

Description: Upgrade the Cray Y-MP8I/464 system to a Cray Y-MP8I/8128 or equivalent system.

Defense Technology Development

Item: (CR) EMSL Production High-Performance Computer System

Obligations:	1993	1994	1995	1996	1997	1998
				3,000	3,000	

Description: A shared memory coarse-grained vector multiprocessor tightly coupled with a distributed memory medium or fine-grained parallel multiprocessor.

6.1.3 Science and Technology Programs

Magnetic Fusion

Item: (TC) ESNET

Obligations:	1993	1994	1995	1996	1997	1998
	5,000	7,000	8,000	9,000	10,000	11,000

Description: Establish a multi-year agreement between a U.S. data communications vendor and the University of California to incorporate and then provide the ESNET research community with state-of-the-art networking and data communications capabilities.

Basic Energy Sciences

Item: (CR) Supercomputing Enhancement

Obligations:	1993	1994	1995	1996	1997	1998
			5,000			

Description: Central processor, memory, high-speed disk subsystem, and associated peripherals.

Item: (CR) Advanced High-Performance Computer

Obligations:	1993	1994	1995	1996	1997	1998
					5,000	10,000

Description: An advanced supercomputer capable of providing additional capacity to support the DOE Science and Technology user community.

High Energy Physics

Item: (CR) High-Performance 'Teraflop' Research Computing

Obligations:	1993	1994	1995	1996	1997	1998
			5,100	5,100		

Description: Research Computers and storage systems in collaboration with industry which have scalable design to one teraflop and beyond and provide data access for 1,000 terabyte and beyond. Total expenditure is expected to be $20M with about half from sources other than DOE High Energy Physics programs.

Biological and Environmental Research - Energy Research

Item: (CR) ORNL Atmospheric Radiation Measurement Data Archive System

Obligations:	1993	1994	1995	1996	1997	1998
	1,500	1,500	1,500	3,000		

Description: Mainframe computer, online storage, and mass storage subsystem at Oak Ridge National Laboratory.

Superconducting Super Collider (SSC)

Item: (TC) Private Branch Exchange (PBX) System

Obligations:	1993	1994	1995	1996	1997	1998
	2,053	858	919	985	2,059	1,141

Description: The telecommunications section currently operates and maintains a temporary leased PBX System that supports all sites within the SSC Laboratory. Acquisition of a permanent system is proposed for FY 1993. This will save approximately $350,000 per year in lease costs.

6.1.4 Other Programs

General Administration

Item: (TC) Secure Automatic Communications Network (SACNET)

Obligations:	1993	1994	1995	1996	1997	1998
	1,227	1,026	1,047	1,038	1,024	

Description: Further upgrade of the secure communications network that interconnects and serves DOE field sites and Headquarters.

Item: (TC) NS/EP Telecommunications Service Priority (TSP) Program

Obligations:	1993	1994	1995	1996	1997	1998
	4,343	4,098	4,200	4,200	4,200	

Description: The TSP Program ensures priority treatment for DOE's most important telecommunications services by providing for Departmental and Departmentally-sponsored service users being restored before those without TSP assignments by the service vendors.

Item: (TC) Local Area Network (LAN)

Obligations:	1993	1994	1995	1996	1997	1998
	4,796	6,092	7,737	9,826	12,478	

Description: A LAN that will provide interconnection of group of users and permit the sharing of file servers, databases, software, printers, and host resources.

Item: (TC) EOC Communications Network

Obligations:	1993	1994	1995	1996	1997	1998
	5,429	3,011	3,064	3,124	3,188	3,260

Description: This is a primary terrestrial and backup diversity Very Small Aperture Terminal system to provide communications for the Headquarters EOC to 10 field EOCs. The systems will carry voice, video, and data circuits.

Item: (TC) IX System Maintenance

Obligations:	1993	1994	1995	1996	1997	1998
				2,500	2,575	2,575

Description: Ongoing IX System maintenance support.

6.2 Computer Software

This subsection describes the Department's plans for new administrative software development/enhancement activities described by the various Headquarters and field organizations. The statistical information presented was derived from the DOE System Review Inventory System, which is the Department's centralized inventory of administrative/business software.

Also presented are descriptions of the Department's major information systems. To date, nine systems have been designated as DOE Major Information Systems in accordance with the Office of Management and Budget (OMB) guidance. Five of these systems support overall Departmental administrative management functions and four support Departmental programmatic activities.

6.2.1 Software Development Activities

DOE organizations have a continuing need to enhance existing software systems or develop new systems to meet their requirements for information processing and manipulation. Based on Site Plans submitted during this planning cycle, the majority of enhancements to existing systems are less than $25,000 and their costs are included in the total annual operating costs of the system. In addition, there were 89 new software initiatives reported, with most of them costing less than $100,000. Figure 6.2-1 provides a distribution of these new software projects based on estimated costs.

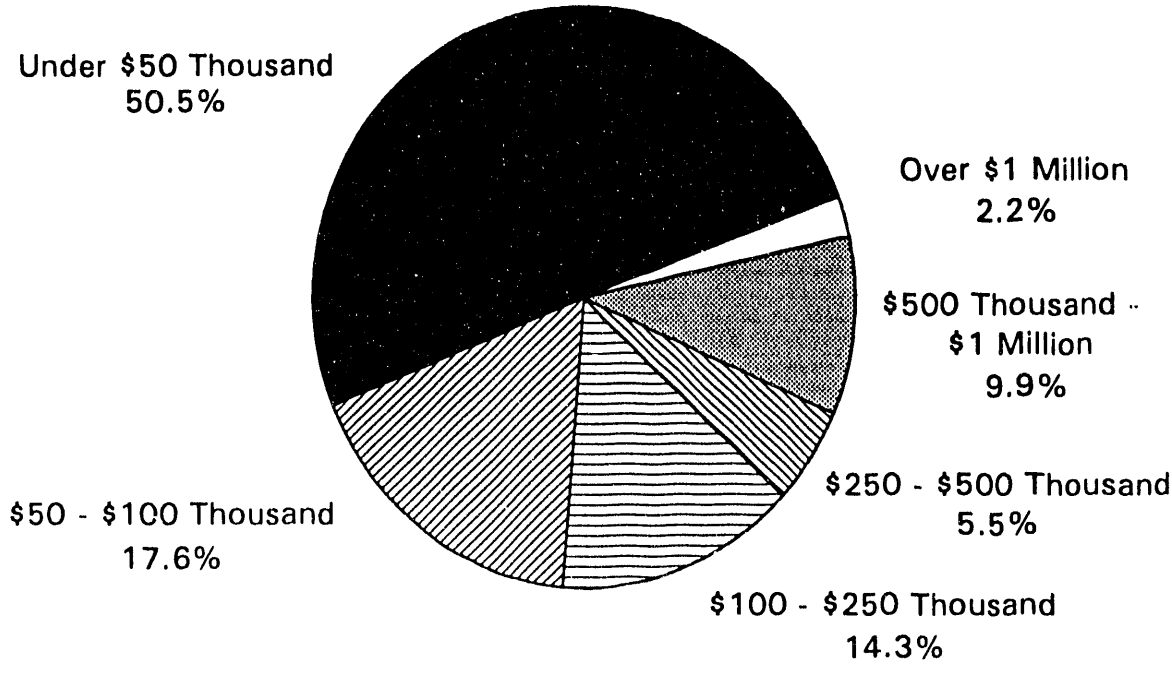


Figure 6.2-1
New Software Projects by Cost Category

DOE categorizes software by the type of impact the system has on DOE organizations external to the system owner's organization. This is an especially important consideration in the development of a new system, since many affected DOE and contractor organizations may be required to provide input to the impacting system. Four categories are used to describe this impact.

- Major DOEwide - Software that requires special continuing management attention because of its importance to an Agency mission; its high development, operating, or maintenance costs; or its significant impact on the administration of Agency programs, finances, property, or other resources.

- DOEwide Impact - Software which provides output to most DOE organizations or which requires input from most DOE organizations.

- External Impact - Software that requires input from one or more DOE or DOE contractor organizations external (not under direct managerial cognizance) to the user's organization, but not extensive enough to be DOEwide.

- No External Impact - Software that is not DOEwide and which has no external impact.

The external impact of the 89 new planned/developmental projects is provided in Table 6.2-1.

Impact	Number of Software Projects		Total	Percent
	Planned	Under Development		
Major DOEwide	1	3	4	4%
DOEwide	1	12	13	15%
Some External	3	6	9	10%
No External	24	39	63	71%
Total	29	60	89	100%

Table 6.2-1
New Software Projects by Type of Impact

While the Department has a substantial number of new software developments either planned or in the process of being developed, most of these projects are not large scale efforts and do not have DOEwide or external impact to DOE and DOE contractor organizations.

Because of the critical functions DOE Major Information Systems fulfill, they are continually being enhanced or redesigned based on policy, program, or technology changes; new management information needs; or the need for improved support relating to the timeliness and accuracy of information.

New Departmentwide Major Information System Initiatives

- Procurement and Assistance Data System (PADS) - PADS is currently being redesigned to improve performance and operational problems resulting from system design and older technologies used in its development. This redesign effort is projected to continue through FY 1994.

- Single Integrated Financial Management System (SIFMS) - The Financial Information System module which is the official repository of financial data for the Department is being redesigned and will be called the Management Analysis Reporting System module.

- DOE Integrated Security System (DISS) - A study of the entire Control of Classified Visits Program has been conducted and recommendations to modify the program have been proposed. A program is being developed and will be tested at one contractor site using a new screen on the Central Personnel Clearance Index (CPCI) System. Results of the test should be known by the end of FY 1993 and may result in modifications to both the CPCI and the Classified Visitor Control System (CVCS) in FY 1994.

- Safety Performance Measurement System (SPMS) - A new system, the Environment, Safety and Health Technical Information System (ES&H TIS) is under development and will eventually replace SPMS. The first databases of the ES&H TIS will become available in 1993.

Detailed descriptions of DOE Major Information Systems follow.

Departmental Administrative Systems

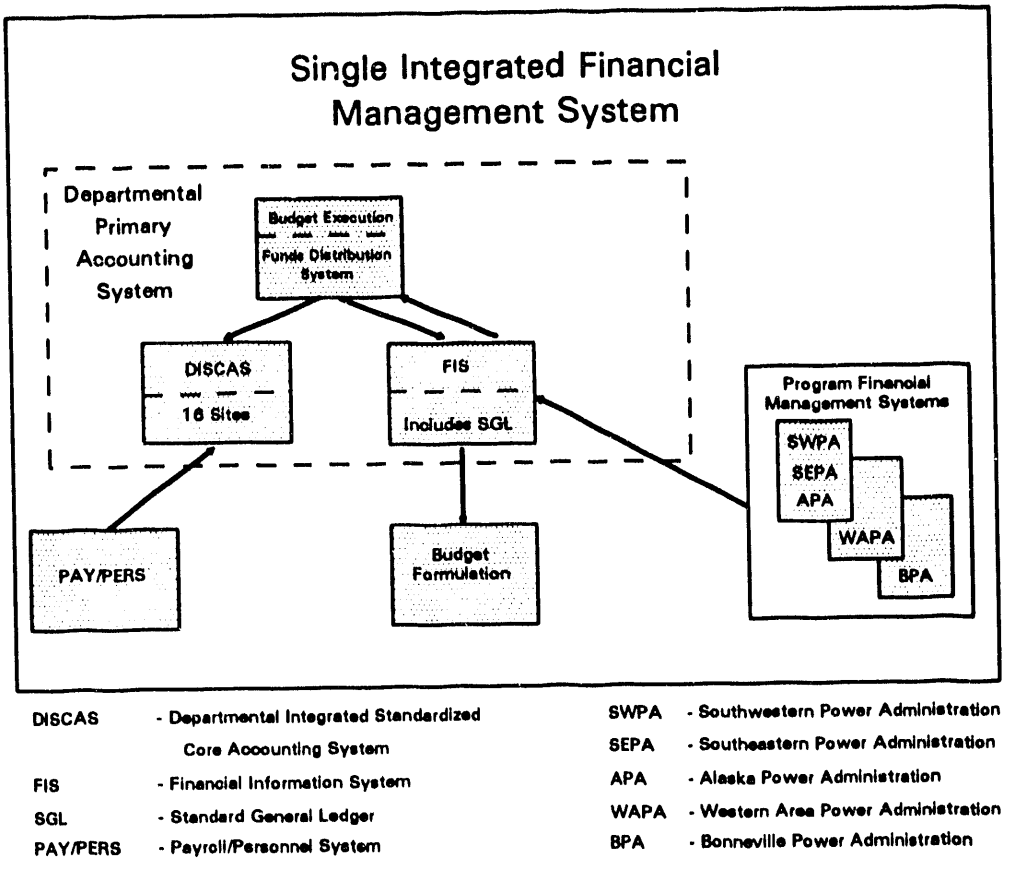
Departmental Single Integrated Financial Management System

The Department remains resolute in it's objective to achieve financial management goals through compliance with OMB Circular A-127, "Financial Management Systems." Achievement of the OMB objective has resulted in the Departmental Single Integrated Financial Management System (SIFMS), which is the standardization and consolidation of what was originally 29 discrete systems.

SIFMS consists of three functional system categories, Departmental Primary Accounting System, Subsidiary Financial Systems, and Program Financial Management Systems, as illustrated in Figure 6.2-2. Within these three categories, SIFMS is comprised of six major component systems and their related subcomponents.

U.S. Department of Energy

Financial Management Systems



DISCAS - Departmental Integrated Standardized Core Accounting System
FIS - Financial Information System
SGL - Standard General Ledger
PAY/PERS - Payroll/Personnel System
SWPA - Southwestern Power Administration
SEPA - Southeastern Power Administration
APA - Alaska Power Administration
WAPA - Western Area Power Administration
BPA - Bonneville Power Administration

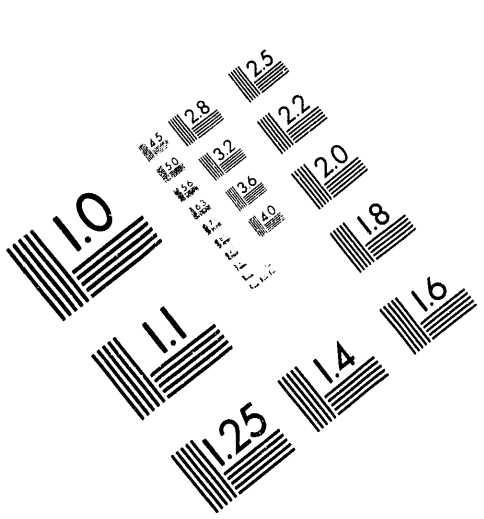
Figure 6.2-2
Single Integrated Financial Management System

- Departmental Primary Accounting System

The Departmental Primary Accounting System is made up of three subcomponents - the Departmental Funds Distribution System, the Departmental Integrated Standardized Core Accounting System, and the Financial Information System. These subsystems are described below.

  - Departmental Funds Distribution System

The Departmental Funds Distribution System (FDS) provides for the distribution of all obligational authority available to DOE for the fiscal year. This system transmits the funding authority levels of DOE programs for all Departmental



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Silver Spring, Maryland 20910

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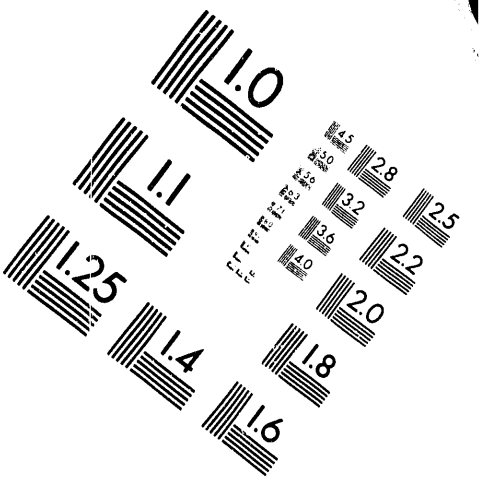
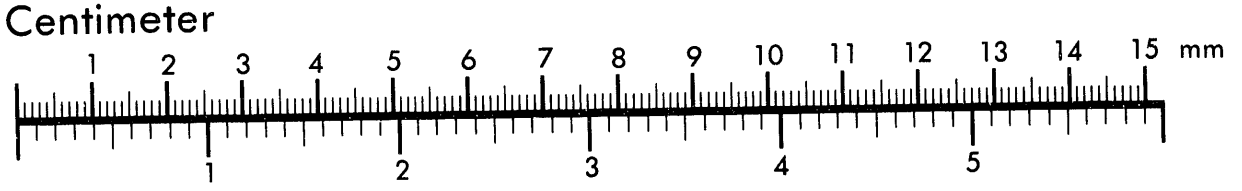
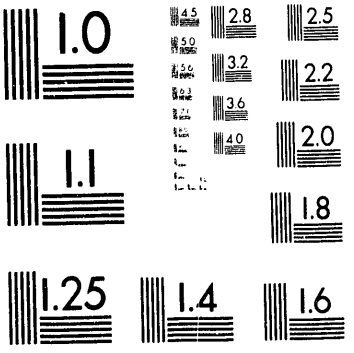
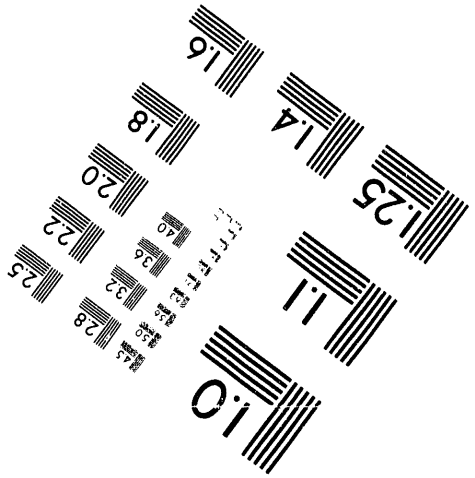
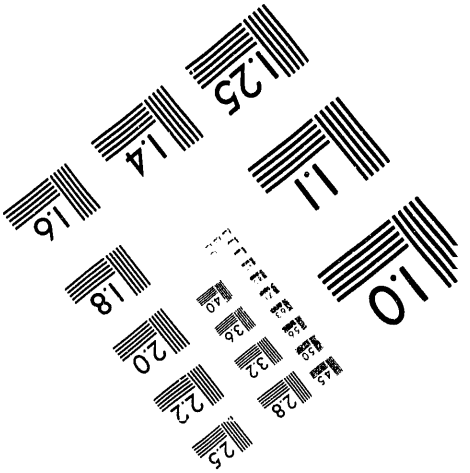










2 of 2

Elements, both in the field and at Headquarters. The Departmental FDS is used to establish and maintain control at the Departmental level to ensure that legal, Congressional, OMB, and internal ceilings and limitations are not exceeded. The system restricts obligations and expenditures in each appropriation to the amount apportioned by OMB. It is the means by which the Department assigns responsibility under the administrative control of funds provision of Section 3679 of the Revised Statutes, enabling the Secretary to fix responsibility for creation of any obligation or making of any expenditure in excess of an apportionment. The system provides the basis for the annual financial execution of programs as approved by Congress, for the distribution of allotted funds to the line organizations that have administrative or technical responsibility for the execution of a program, and for a control to ensure that funds are not distributed in excess of stated limitations. The system meets the reporting requirements of Congress, the General Accounting Office, the Joint Financial Management Improvement Program, OMB, and the Department. The system is operated by members of the Budget Execution Branch, Office of Budget.

- Departmental Integrated Standardized Core Accounting System

The Departmental Integrated Standardized Core Accounting System (DISCAS) is the Department's standardized automated data processing system for accounting and financial reporting. The system is operational at all DOE Operations Offices (Albuquerque, Chicago, Idaho, Nevada, Oak Ridge, Richland, San Francisco, and Savannah River); the Pittsburgh Energy Technology Center; the Federal Energy Regulatory Commission (FERC); the Office of Headquarters Accounting Operations; and the Departmental Accounting and Analysis Division, within the Office of Departmental Accounting and Financial Systems Development. Fernald Field Office, the Morgantown Energy Technology Center, and the Strategic Petroleum Reserve Project Office are operational on the Oak Ridge system; Rocky Flats Office is operational on the Albuquerque system; and Pittsburgh and Schenectady Naval Reactors utilize the Office of Headquarters Accounting Operations system. The system utilizes common hardware (Hewlett-Packard Model 3000/Series 900) and common software, centrally managed by the Financial Systems Development Division, Office of Departmental Accounting and Financial Systems Development, Office of the Chief Financial Officer.

The system provides the capability to perform accounting and financial reporting functions consistent with the accounting policy and procedures contained in the DOE Accounting Practices and Procedures Handbook. DISCAS applications accept allotment data, process all types of accounting transactions, issue payments and billings, produce internal and external financial reports, and provide monthly data for Departmental consolidation to the Financial Information System.

- Financial Information System

  The Financial Information System (FIS) is the official source of consolidated financial information for DOE. FIS is a reporting system rather than an accounting system in that its major functions are to collect, edit, update, consolidate, and report financial information for the entire Department at various management and working levels. It provides Departmental reports to Congress, OMB, Treasury, and other Federal Agencies and provides the Chief Financial Officer with the necessary information to financially manage the Department. The system maintains the widely used budget and reporting codes, the obligation and cost plan/estimate file, and several other edit/report files. The obligation and cost plan data are obtained from the Office of Budget and used by FIS for reporting purposes. The FIS also interfaces with the Procurement and Assistance Data System for contractor information.

- Subsidiary Financial System

  The Subsidiary Financial System consists of two major components - the DOE Integrated Payroll/Personnel System (PAY/PERS) and the Departmental Budget Formulation System. Each of these components is discussed below.

  - DOE Integrated Payroll/Personnel System

    The DOE Integrated Payroll/Personnel System (PAY/PERS) supports both personnel and payroll activities throughout DOE in compliance with appropriate laws and regulations issued by Office of Personnel Management (OPM), OMB, General Accounting Office, Treasury, and the Federal Retirement Thrift Investment Board. The PAY/PERS Management Group directs all activities associated with PAY/PERS and receives day-to-day payroll and personnel policy direction from the Chief Financial Officer and the Assistant Secretary for Human Resources and Administration, respectively.

    PAY/PERS is an integrated system. The advantages of integration are realized in eliminating data redundancy, ensuring consistency between data used in payroll and personnel reporting and processing, and highlighting the interdependence of those functions. All required payroll and personnel reports are available from PAY/PERS, to include the generation of payroll check tapes. Labor cost and other interfaces also provide input for accounting and other systems. Personnel offices have been assigned the responsibility for all Standard Form 50 employment and position data, and for establishing and deactivating master records. The payroll offices are responsible for other earnings; tax information; deductions; bonds; allotments; check mailing; adjustments for pay, leave, and allowances; processing

time and attendance reports; and certification of the payment of biweekly payroll. Regardless of the assignment of update responsibility, the information stored in the PAY/PERS database is available for use by authorized payroll and personnel users through standard and ad hoc reports and query.

- Departmental Budget Formulation System

  The Departmental Budget Formulation System (DBFS) provides Departmental level funding controls for formulating the DOE budget. The system supports the budget formulation processes by summarizing, controlling, and tracking budget requests and the decisional process on the budget through reports required internally and for OMB and Congress. The system contains appropriation accounts that encompass nationwide activity. System reports, prepared at varying levels of programmatic detail, provide DOE Headquarters Organizations with baseline budgetary control throughout the formulation process, and convey Secretarial, OMB, and Congressional decisions. All budget materials are validated against controls maintained by this system to assure conformity. Throughout the budget cycle, the system provides a "what if" capability to assist in decision making. The new inhouse DBFS replaced the previous commercial timesharing system in the third quarter of FY 1992.

- Program Financial Management Systems

  The Program Financial Management Systems component is comprised of three Power Marketing Administration program Financial Management Systems.

  - Southwestern Power Administration Integrated Accounting System

    The Southwestern Power Administration (SWPA) Integrated Accounting System is designed and operated in a manner to comply with the applicable laws promulgated by the Comptroller General, Treasury, OMB, FERC, and generally accepted accounting principles in order to provide the various reporting levels with accurate, timely financial information. SWPA's accounting system is made up of 11 subsystems. Each of the 11 subsystems provide online financial reporting and current status in its applicable area. This consolidated information provides SWPA's managers with a necessary tool in their decision-making process.

  - Western Area Power Administration Financial Management System

    The Western Area Power Administration (WAPA) Financial Management System (FMS) is designed to comply with applicable laws and the regulations of the Comptroller General, Treasury, OMB, FERC, and generally accepted accounting

principles in order to provide accurate, timely financial information. The WAPA FMS provides an integrated management tool that embraces virtually all functional areas. The system is made up of eight components covering budget tracking and formulation, work order and cost accounting, purchase order and encumbrance management, inventory, accounts payable, accountable assets, general ledger, and accounts receivable. All accounting actions are performed automatically based on functional action processed by the system.

- Bonneville Power Administration Financial Management Information System

  The Bonneville Power Administration (BPA) Financial Management Information System incorporates all of BPA's financial planning, budgeting, payroll, and accounting related processes and reporting functions. It is designed to simultaneously serve the needs of an operating utility and a Government entity, as well as comply with the Government Corporation Act, generally accepted accounting principles, and applicable laws and directives.

Procurement and Assistance Data System

The Procurement and Assistance Data System (PADS) provides the Assistant Secretary for Human Resources and Administration with the ability to track and report on procurement and assistance actions throughout the Department. The data contained in PADS enables a day-by-day monitoring of the procurement and assistance processes, contract administration, and the establishment of procurement lead times. The data in PADS is available for all DOE initiating and awarding Offices. PADS is extensively interfaced with other systems and contains data which is sent to Congress, OMB, and the public. Specifically, some of the data PADS contains relates to the following.

- Synopsis requirements of Public Law 98-72, Amendments to the Small Business Act.
- Subcontracting requirements of Public Law 95-907, Amendments to the Small Business Investment Act.
- Research and development funding requirements of Public Law 97-219, Small Business Innovation Development Act of 1982.
- Competition requirements of Public Law 98-369, Competition in Contracting Act.

DOE Integrated Security System

The DOE Integrated Security System (DISS) is made up of three individual systems: the Central Personnel Clearance Index (CPCI) System, the Classified Visitor Control System (CVCS), and the Security Badge Control System (SBCS). These systems provide tracking capabilities for three areas of personnel security. The CPCI tracks security clearances from initial request through disposition for all employees of the DOE, DOE contractors, subcontractors, and other organizations associated with DOE. The CVCS tracks visit information for DOE facilities pertaining to all aspects of a classified visit. The SBCS is designed to assist the Office of Intelligence and National Security at DOE Headquarters with security badge accountability. The integration of the three systems allows for cross-referencing for data consistency purposes.

DISS output consists of responses to online inquiries, preformatted reports, and ad hoc reports. Users are able to interactively query the database for specific data needed. A series of daily, weekly, monthly, and annual reports are provided to support activity as well as the tracking of security clearance processing. Information from all three systems is available to the guard stations at DOE Headquarters facilities in Germantown, MD, and Washington, DC, to verify an individual's clearance and badge levels and authorized classified visits to those sites.

Energy Manpower Personnel Resource Information System

The Energy Manpower Personnel Resource Information System (EMPRIS) supports the DOE human resource management and manpower resource planning, budgeting, and accounting activities. EMPRIS is designed to provide management information support to organizational management and supervisors, and Departmental and organizational administrative staff who are not directly involved in personnel, payroll, and related operational activities, but who still have a valid need for access to accurate and timely human resources information. The system is extensively interfaced with other systems in order to obtain essential data and eliminate duplicative data entry. User data entry to EMPRIS is generally limited to manpower resource planning and budgeting functions.

EMPRIS supports a wide range of administrative functions which include manpower budget, manpower allocation, full-time equivalency accounting, and position/personnel management, which furnishes employee and position data to program managers to assist in their personnel management responsibilities.

Real Property Inventory System

The Real Property Inventory System (RPIS2) provides the capability to track detailed data for all DOE real property, both leased and owned. The Associate Deputy Secretary for Field Management has the responsibility to ensure that DOE is properly planning, constructing, and maintaining the physical plant assets assigned to the Department. RPIS2 provides the Associate

Deputy Secretary with the capability to exercise Departmentwide oversight of the management of real property; responds to external requests regarding the ownership, disposition, condition, and costs of real property assets; and provides an inventory of all real property, owned and leased by DOE. It also provides a reconciliation interface with DOE financial systems and interfaces with GSA systems for specific reports.

The exchange of real property information currently flows between DOE Headquarters and the DOE Operations Offices. The data originates in approximately 51 DOE Operations, Field, and Area Offices which provide real property information to the system. DOE Operations Offices are able to update and query their own data, while Headquarters has access to all Operations Office data.

Departmental Programmatic Systems

National Energy Information System

The purpose of the National Energy Information System (NEIS) is to directly support the mission of the Energy Information Administration (EIA), which is to provide meaningful, timely, objective, and accurate energy information to the Executive Branch, Congress, State Governments, industry, and the public so that those who make energy-related decisions have the tools to make those decisions wisely. To accomplish this, EIA collects, processes, and interprets energy data and exercises independent judgment in gathering, analyzing, and disseminating information. In 1991, NEIS consisted of 38 computer-driven models, 73 energy data gathering surveys, plus associated planning and control applications. The results of NEIS statistical and analytical efforts are published in periodicals and special one-time reports. NEIS periodicals are grouped into families, based on fuel types, and are issued weekly, monthly, quarterly, and annually. During 1991, over 300 issues of over 92 titles of data analysis and interpretative reports were prepared. In addition, about 20 one-time special reports and publications were completed.

Nuclear Materials Management and Safeguards System

The Nuclear Materials Management and Safeguards System (NMMSS) is the national nuclear materials accountability database and information system operating under joint DOE and Nuclear Regulatory Commission (NRC) sponsorship. NMMSS resides on a central network of computers at Martin Marietta Energy Systems in Oak Ridge, TN. NMMSS provides information about inventories and flows of nuclear materials within the United States and also limited international interests for the peaceful application of nuclear energy and in the nonproliferation of nuclear weapons. The purpose of NMMSS is to provide quality nuclear materials data to support both domestic and international nuclear programs. Within the scope of NMMSS are found all nuclear materials applied and controlled under United States law and related international agreements

including nuclear materials production programs and private nuclear industrial activities within the United States.

NMMSS is responsible for maintaining and providing information regarding nuclear materials safeguards, production and materials management, physical accountability, financial and cost accounting, and other information involving the utilization of nuclear materials for DOE, and for providing the NRC with information concerning nuclear materials control and accountability. NMMSS also serves both Agencies in support of reporting commitments under two types of international treaties and agreements: (1) the Agreement between the United States of America and the International Atomic Energy Agency for the Application of Safeguards in the United States of America; and (2) the bi- and tri-lateral agreements of cooperation with other nations concerning the peaceful uses of nuclear energy. In addition, its national and international scope enables it to provide services to other organizations like the Arms Control and Disarmament Agency, the Department of State, and Congress.

Occurrence Reporting and Processing System

The Occurrence Reporting and Processing System (ORPS) is an operational database used by DOE contractor and Departmental Elements to transmit, update, and approve occurrence reports required by DOE Order 5000.3B, OCCURRENCE REPORTING AND PROCESSING OF OPERATIONS INFORMATION. In addition, ORPS provides the DOE community with a readily accessible database that contains information about occurrences at DOE facilities, causes of those occurrences, and corrective actions. This information can, therefore, be used to identify and analyze trends in occurrences. ORPS is maintained by the System Safety Development Center at Idaho National Engineering Laboratory under the direction of the Office of the Assistant Secretary for Environment, Safety and Health at DOE. Since September 1, 1990, approximately 6,000 to 8,000 reports have been put in ORPS annually. Currently, there are more than 4,100 DOE and DOE contractor personnel registered to access ORPS.

ORPS users fall into four categories, Facility Manager, DOE Facility Representative, DOE Program Manager, and General User. These categories are associated with the user's responsibilities for reporting occurrences, as defined in DOE Order 5000.3B.

Safety Performance Measurement System

The Safety Performance Measurement System (SPMS) is an interactive computer system, designed to provide accident/incident information, furnish trend and causal factor analysis, assist in risk assessments, and provide Environment, Safety and Health (ES&H) technical information and communication throughout DOE. It is a collection of six modules.

- Computerized Accident/Incident Reporting System contains information about accidents that result in reportable injury/illness, vehicle loss, or property damage.

- Computer Assisted Tracking System (CATS) contains Tiger Team Assessment Reports, CATS Appraisals, Audits, and Surveys, Complaints, Inspections, Investigations, Compliance Status, and Site-Specific Profiles and Comparisons.

- ES&H News contains Headlines, a Calendar of ES&H Training and Meetings, Rulemaking Status Report, and the Supplier Evaluation and Suspect Equipment.

- Reference Information contains Orders, Directives, and Guidance; Secretary of Energy Notices; Federal Register ES&H Abstracts; the Personnel Expertise and Resource Listing; and the Standards Information Management System.

- Radiation Exposure Module provides reports on radiation exposures to DOE and DOE contractor employees.

- Unusual Occurrence Reports contains abstracts of unusual occurrences that have programmatic or safety significance from January 1981 through August 1990.

The SPMS is operated by the Management Information Systems Unit of the System Safety Development Center located at the Idaho National Engineering Laboratory. Management of the SPMS is under the direction of DOE's Safety Performance Indicator Division, Office of Occupational Safety, Office of the Assistant Secretary for Environment, Safety and Health. The SPMS modules reside on a Hewlett-Packard Model 3000 minicomputer. The Environment, Safety and Health Technical Information System, which is currently under development, will eventually replace the SPMS.

Appendix A: Site Profiles

Major program activities are supported at various Departmental facilities across the country. This Appendix includes:

- A map depicting the location and mission category of the 47 DOE facilities participating in the FY 1994 long-range planning process;
- A chart of the sites indicating which information technologies are profiled; and
- A profile for each of the 47 sites, which briefly outlines the site's location, functions, primary program activities supported, and major information technology resources.

Site Profiles

Headquarters:

EIA	Energy Information Administration
ITSO	Office of Information Technology Services and Operations
RW	Office of Civilian Radioactive Waste Management

Operations Offices:

AL	Albuquerque
CH	Chicago
ID	Idaho
NV	Nevada
OR	Oak Ridge
RL	Richland
SF	San Francisco
SR	Savannah River

Energy Technology Centers:

METC	Morgantown
PETC	Pittsburgh

Power Administrations:

APA	Alaska
BPA	Bonneville
SEPA	Southeastern
SWPA	Southwestern
WAPA	Western Area

Complexes:

(Generally, a complex includes one or more research, test, and/or production facilities that are Government-owned and contractor-operated, and, optionally, an Operations Office.)

HAN	Hanford
NVC	Nevada
ORC	Oak Ridge Complex
SRS	Savannah River Site

Production Facilities:

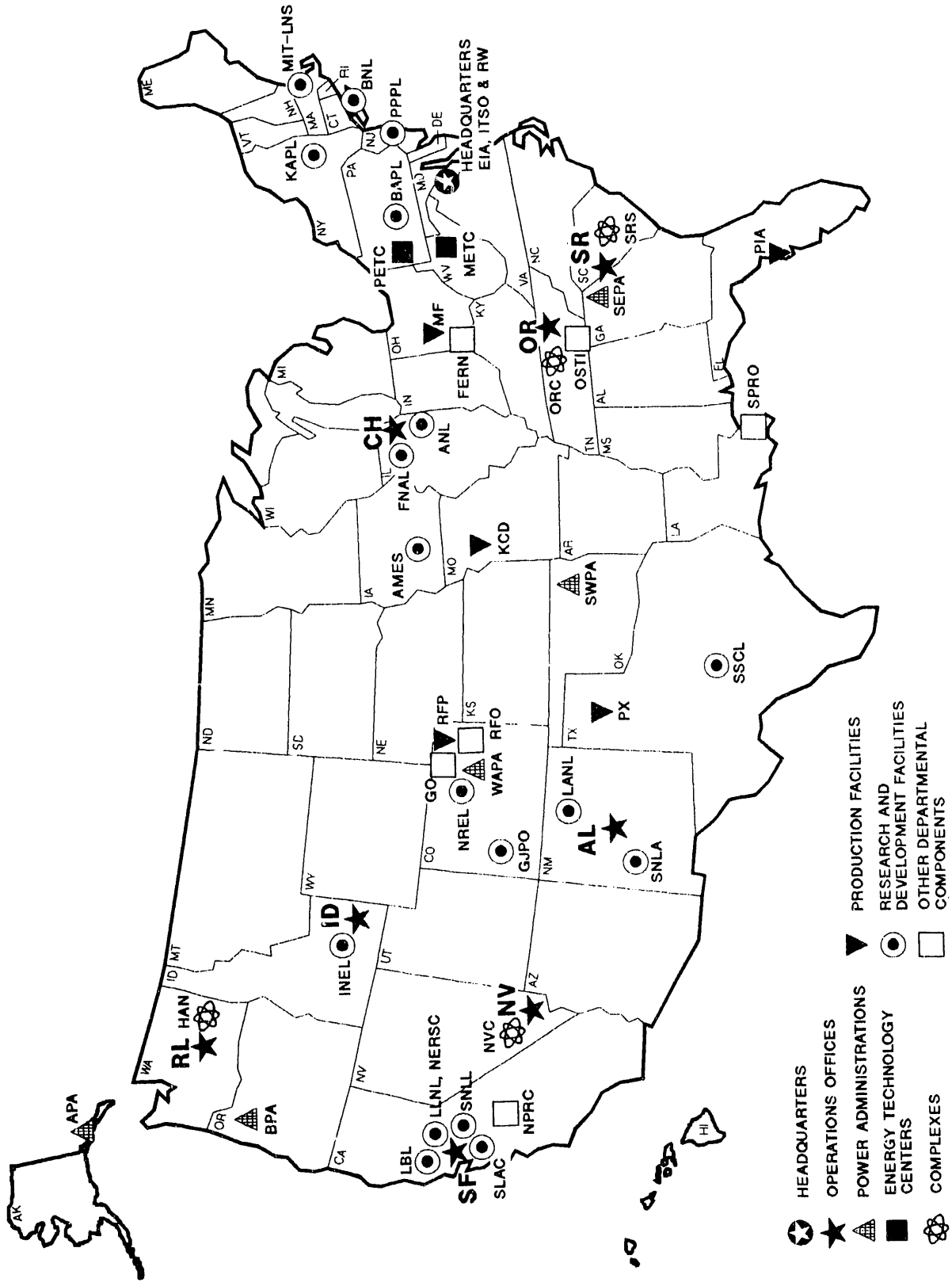
KCD	Kansas City Plant
MF	Mound Facility
PX	Pantex Plant
PIA	Pinellas Plant
RFP	Rocky Flats Plant

Research and Development Facilities:

AMES	Ames Laboratory
ANL	Argonne National Laboratory
BAPL	Bettis Atomic Power Laboratory
BNL	Brookhaven National Laboratory
FNAL	Fermi National Accelerator Laboratory
GJPO	Grand Junction Project Office
INEL	Idaho National Engineering Laboratory
KAPL	Knolls Atomic Power Laboratory
LBL	Lawrence Berkeley Laboratory
LLNL	Lawrence Livermore National Laboratory
LANL	Los Alamos National Laboratory
MIT-LNS	Massachusetts Inst. of Technology - Laboratory for Nuclear Science
NERSC	National Energy Research Supercomputer Center
NREL	National Renewable Energy Lab.
PPPL	Princeton Plasma Physics Lab.
SNLA/SNLL	Sandia National Laboratories, Albuquerque and Livermore
SLAC	Stanford Linear Accelerator Center
SSCL	Superconducting Super Collider Laboratory

Other Departmental Components:

FERN	Fernald Field Office
GO	Golden Field Office
NPRC	Naval Petroleum Reserves in California
OSTI	Office of Scientific and Technical Information
RFO	Rocky Flats Office
SPRO	Strategic Petroleum Reserve Project Office


MIT-LNS
BNL
PPPL
HEADQUARTERS
EIA, ITSO & RW
KAPL
BAPL
PETC
METC
SR
SRS
SEPA
PIA
MF
FERN
OR
ORC
OSTII
SPRO
CH
ANL
FNAL
AMES
KCD
SWPA
SSCL
RFP
WAPA RFO
PX
GO
NREL
GJPO
LANL
AL
SNLA
ID
INEL
RL HAN
BPA
NV
NVC
LLNL, NERSC
SNLL
NPRC
LBL
SF
SLAC
APA
HEADQUARTERS
OPERATIONS OFFICES
POWER ADMINISTRATIONS
ENERGY TECHNOLOGY CENTERS
COMPLEXES
PRODUCTION FACILITIES
RESEARCH AND DEVELOPMENT FACILITIES
OTHER DEPARTMENTAL COMPONENTS

Site Profiles

The chart below lists the sites and indicates the corresponding IT resources listed within this Appendix.

Site	Computer Software	Computing Resources	Telecom.
A.1 Alaska Power Administration			•
A.2 Albuquerque Operations Office	•	•	•
A.3 Ames Laboratory	•	•	•
A.4 Argonne National Laboratory	•	•	•
A.5 Bettis Atomic Power Laboratory	•	•	•
A.6 Bonneville Power Administration	•	•	•
A.7 Brookhaven National Laboratory	•	•	•
A.8 Chicago Operations Office	•	•	•
A.9 Fermi National Accelerator Laboratory	•	•	•
A.10 Fernald Field Office/ Fernald Environmental Management Company	•	•	•
A.11 Golden Field Office/Natl. Renew. Energy Lab	•	•	•
A.12 Grand Junction Project Office		•	•
A.13 Hanford (includes Richland Operations Office)	•	•	•
A.14 Headquarters Energy Information Administration	•	•	•
A.15 Headquarters Office of Civilian Radioactive Waste Management	•	•	•
A.16 Headquarters Office of Information Technology Services and Operations	•	•	•
A.17 Idaho National Engineering Laboratory	•	•	•
A.18 Idaho Operations Office	•	•	•
A.19 Kansas City Plant	•	•	•
A.20 Knolls Atomic Power Laboratory	•	•	•
A.21 Lawrence Berkeley Laboratory		•	•
A.22 Lawrence Livermore National Laboratory	•	•	•

Site	Computer Software	Computing Resources	Telecom.
A.23 Los Alamos National Laboratory	•	•	•
A.24 Massachussetts Institute of Technology	•	•	•
A.25 Morgantown Energy Technology Center	•	•	•
A.26 Mound Facility		•	•
A.27 National Energy Research Supercomputer Center		•	•
A.28 Naval Petroleum Reserves in CA	•	•	•
A.29 Nevada Complex (Includes Nevada Operations Office)	•	•	•
A.30 Oak Ridge Complex	•	•	•
A.31 Oak Ridge Operations Office	•	•	•
A.32 Department of Energy Office of Scientific and Technical Information	•	•	•
A.33 Pantex Plant	•	•	•
A.34 Pinellas Plant	•	•	•
A.35 Pittsburgh Energy Technology Center	•	•	•
A.36 Princeton Plasma Physics Laboratory	•	•	•
A.37 Rocky Flats Office (Includes Rocky Flats Plant)	•	•	•
A.38 Sandia National Laboratories	•	•	•
A.39 San Francisco Operations Office	•	•	
A.40 Savannah River Operations Office	•	•	•
A.41 Savannah River Site	•	•	•
A.42 Southeastern Power Administration			•
A.43 Southwestern Power Administration	•	•	•
A.44 Stanford Linear Accelerator Center	•	•	•
A.45 Strategic Petroleum Reserve Project Office	•	•	•
A.46 Superconducting Super Collider Lab.	•	•	•
A.47 Western Area Power Administration	•	•	•

Site Profiles

A.1 Alaska Power Administration, 2770 Sherwood Lane, Suite 2B Juneau, AK 99801

Function: The Alaska Power Administration is a marketing agent for power generated at two Federal hydroelectric projects in the state of Alaska.

Programs: Power Marketing.

Telecommunications Support: Administrative telephone service provided by GSA.

A.2 Albuquerque Operations Office, P.O. Box 5400, Albuquerque, NM 87115

Function: The Albuquerque Operations Office oversees the research, development, production, safety, and surveillance of nuclear weapons for the Albuquerque complex, which encompasses the following prime integrated laboratory and industrial contractor sites.

Los Alamos National Laboratory
Los Alamos, NM

Sandia National Laboratories
Albuquerque, NM and
Livermore, CA

Grand Junction Projects Office
Grand Junction, CO

Pinellas Plant
Largo, FL

Pantex Plant
Amarillo, TX

Mound Facility
Miamisburg, OH

Additional sites that support nonweapons programs, like energy research, development, and demonstration programs in such areas as nuclear fission, nuclear fusion, solar, wind, and geothermal are:

The Inhalation Toxicology Research Institute which performs research on the toxic effect of inhaled energy related by-products; and

The Waste Isolation Pilot Plant which manages the disposal and storage of waste radioactive materials.

Program: Weapons Activities and General Administration

Primary Computer Resources: 1 - IBM ES9000, 1 - HP 3000, 1 - IBM 4381, 1 - DEC VAX 6610, 1 - DEC VAX 8530, and 1 - DEC VAX 6310.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: DATACOM/DB, System 1032, TurboIMAGE/3000, BASIS, SEARCHMATE
Largest Software Applications: AL Document Accountability System, Nuclear Materials Subsystem - Weapons Information System, Reimbursable Work System, Albuquerque Budget Reform Task (ALBURT), Employee Appraisal System (EAS), and Environmental Safety and Health Audit Tracking System (ES HAS).

Telecommunications Support: Voice services through DOE allocated portion of USAF owned 5ESS Digital Switching System at Kirtland AFB; three broadband LANs provide majority of data communications with some dialup access; Secure SACNET Replacement Terminal and facsimile; SECOM Network Control Center and Advanced Response Group (ARG) responsibility operating over VHF radio system; WBCN site.

A.3 Ames Laboratory, Iowa State University, Ames, IA 50011

Function: Ames is managed and operated by Iowa State University. Ames is a national, multiprogram, Government-owned, contractor-operated laboratory that conducts basic research addressed to advancing the understanding of the physical, chemical, materials, mathematical, and engineering sciences. The Laboratory's basic research program emphasizes the disciplines of chemistry, metallurgy, and solid state physics, with primary focus on the preparation, characterization, and evaluation of the properties of metals, alloys, and other solid state materials. Present efforts emphasize applied nondestructive evaluation, quantitative determination of environmental pollutants associated with energy conversion, coal preparation, and coal organic chemistry. The Laboratory maintains a continuing program in basic materials research, chemistry, high energy physics, nuclear physics, applied mathematical sciences, and engineering research.

Programs: Nuclear Energy Research and Development; Energy Efficiency and Renewable Energy; Nuclear Safeguards and Security; Environmental Restoration and Waste Management; Biological and Environmental Research; Fossil Energy Research and Development; Basic Energy Sciences; and High Energy Physics.

Primary Computer Resources: 1 - SCS - 40 XM, 1 - DEC VAX 11/785, 1 - DEC VAX 11/750, 1 - HP 3000, 1 - DEC VAX 11/780, and several DEC MicroVAXes.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: Image
Scientific/Engineering: SmartStar

Telecommunications Support: Voice and local data services are provided by agreement with Iowa State University; local DECNET supported data network; electronic mail; unclassified TWX, TELEX, and facsimile service; radio communications supports operational functions.

A.4 Argonne National Laboratory, 9700 South Cass Avenue, Argonne, IL 60439

Function: Argonne, as one of the nation's major centers of energy research, carries out broad programs of research and development in the physical, biological, and environmental sciences under a management and operating contract with the University of Chicago. Research is also conducted on fast reactor technology. Historically, fission energy technology has constituted Argonne's largest effort. Today, Argonne programs have expanded into fossil fuel utilization, solar energy, fusion, magnetohydrodynamics, and advanced battery development, as well as health and environmental effects of various energy technologies.

Programs: Fusion Energy; Biological and Environmental Research; High Energy Physics; Nuclear Physics; Basic Energy Sciences; Nuclear Energy Research and Development; and Fossil Energy Research and Development.

Primary Computer Resources: 1 - DEC VAX 6410, 1 - DEC VAX 8700, 1 - IBM 3084, 7 - DEC VAX 11/750, 1 - DEC VAX 11/730, 2 - HP 3000, 1 - DEC VAX 6200, and several DEC MicroVAXes.

Primary Computer Software:

Data Base Management Systems:

Admin/Bus/Manufacturing: Inquire, Image, SYSTEM 2000, RDB, Datatrieve, dBASE IV, BASIS

Scientific/Engineering: MASS II Manager, RDB

Telecommunications Support: Voice service provided by digital PBX switch; data communications provided over voice system using local and wide area networks; radio networks provide administrative, operational, and security support; cellular phones.

A.5 Bettis Atomic Power Laboratory, P.O. Box 79, West Mifflin, PA 15122

Function: Bettis is a research and development laboratory operated by the Westinghouse Electric Corporation under a management and operating contract for the Federal Government. Bettis is one of two laboratories that carries out the Naval Reactors program. The laboratory provides design, development, and operational engineering support of nuclear reactor plants for propulsion of naval vessels. Activities include work on reactor core and component technology and

design, thermal and hydraulic systems, materials, reactor physics, fuel fabrication, and classroom training of naval personnel.

Program: Naval Reactors.

Primary Computer Resources: 1 - DEC VAX 8800, 2 - DEC VAX 8700, 1 - DEC VAX 8250, 1 - IBM 4381, 1 - Cray Y-MP/832, 1- Cray Y-MP C90, 1 - Intel iPSC/860, and 1 - HDS AS/XL 80.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: IDMS, INQUIRE, ORACLE, ARTEMIS
Scientific/Engineering: ORACLE

Telecommunications Support: Government-owned voice switching system; secure local network; dialup narrative message services to contractors; radio systems support other modes of communications at the facility; cellular phone system, SACNET Replacement Terminal; classified and unclassified facsimile.

A.6 Bonneville Power Administration, P.O. Box 3621, Portland, OR 97208

Function: The Bonneville Power Administration was created by Congress in 1937 and is a marketing agent for power generated by 30 Federal dams in the Pacific Northwest. Bonneville has designed and built the nation's largest network of long-distance high-voltage transmission lines. In addition to scheduling and dispatching power from the Federal dams, Bonneville wheels, purchases, and interchanges over its grid about 50 percent of the power generated in the region and has capacity to transmit about 80 percent of the region's power.

Program: Power Marketing.

Primary Computer Resources: 1 - IBM 300E and 2 - DEC VAX 8650.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: DATACOM/DB and DB2
Scientific/Engineering: DRS
Largest Software Applications: Financial Management Information System, Program Management Information System, Materials Management System

Telecommunications Support: Administrative voice and data services, either using owned or GSA-leased services; operational voice and data are interconnected by Government-owned microwave (Portland, OR, and Vancouver, WA); data network to regional offices pacific northwest; additional data communications provided by dedicated circuits and dialup connection, UHF and VHF radio networks provide operational support.

A.7 Brookhaven National Laboratory, Upton, NY 11973

Function: Brookhaven National Laboratory is a multiprogram, multidisciplinary laboratory, operated by Associated Universities, Incorporated, under a management and operating contract. The Laboratory has the primary mission of conducting basic research centered around large facilities that are constructed, operated, maintained, and upgraded by the Laboratory for the use of scientists from all over the nation. Major facilities are the Scanning Transmission Electron Microscope, a 33GEV Alternating Gradient Synchrotron, a High Flux Beam Reactor, a Tandem Van de Graaff accelerator, and the National Synchrotron Light Source, which provides the world's most intense, polarized source of X-radiation and vacuum ultra-violet radiation. In addition, there is a multidisciplinary Environmental Inhalation Toxicology Facility, which tests health hazards from chemicals likely to be in the atmosphere due to burning of fossil fuels. Several new facilities are planned that will play important roles in future work at Brookhaven.

Programs: High Energy Physics; Basic Energy Sciences; Nuclear Physics; Biological and Environmental Research.

Primary Computer Resources: 1 - IBM 3090/300, 4 - DEC VAX 11/780, 1 - CDC Cyber 830, 4 - DEC VAX 11/785, 4 - HP 3000, 1 - DEC VAX 8600, 1 - DEC VAX 8820, 1 - DEC VAX 3600, and several DEC MicroVAXes.

Primary Computer Software:

Data Base Management Systems:

Admin/Bus/Manufacturing: TurboIMAGE/3000

Scientific/Engineering: SQL/DS, RDB, SIR, Datatrieve

Telecommunications Support: Voice system being acquired through lease-to-purchase contract; microwave T-1; local and wide area networks; small radio systems complement other communications modes.

A.8 Chicago Operations Office, 9800 South Cass Avenue, Argonne, IL 60439

Function: Chicago Operations Office negotiates and manages between 5,000-6,000 contracts and financial assistance instruments. Recipients range from academic institutions and non-profit organizations to business and industry, state and local governments, and individual researchers in most states and several foreign countries. The programs and projects span the spectrum of DOE endeavors, making Chicago one of the most diverse of DOE's Operations Offices.

In addition to institutional responsibilities, Chicago Operations Office provides specialized support in areas such as construction management, environmental and reactor safety, and nuclear materials safeguards. Most of these efforts are tied to the procurement cycle of negotiation, execution, administration, and close-out of contracts and grants.

Chicago Operations Office management responsibilities include:

- Ames Laboratory, Iowa State University, Ames, IA;
- Argonne National Laboratory, Argonne, IL;
- Brookhaven National Laboratory, Associated Universities, Inc., Upton, NY;
- Environmental Measurements Laboratory, New York, NY;
- Fermi National Accelerator Laboratory, Batavia, IL;
- Bates Linear Accelerator Center, Middelton, MA;
- Michigan State University Plant Research Laboratory, East Lansing, MI;
- Massachusetts Institute of Technology, Laboratory for Nuclear Science, Cambridge, MA;
- New Brunswick Laboratory, Argonne, IL;
- New York University/Courant Mathematics and Computing Laboratory, New York, NY;
- Princeton Plasma Physics Laboratory, Princeton, NJ.

Program: General Administration.

Primary Computer Resources: 2 - HP 3000 and support by Argonne National Laboratory.

Primary Computer Software:
Largest Software Applications: Laboratory Information Management System, Departmental Integrated Standardized Core Accounting System - Chicago.

Telecommunications Support: Voice and data services provided by digital PBX switch through Argonne National Laboratory; electronic mail; secure SACNET Replacement Terminal and facsimile; two-way radio equipment supports security and emergency functions.

A.9 Fermi National Accelerator Laboratory, P.O. Box 500, Batavia, IL 60510

Function: Fermi's primary function is to advance scientific knowledge of the structure of matter. The Laboratory is operated under a management and operating contract by the Universities Research Association, a consortium of 77 research-oriented universities. The principal scientific instrument at Fermi is a proton synchrotron, the world's largest basic scientific research instrument for high energy physics.

Program: High Energy Physics.

Primary Computer Resources: 1 - Amdahl 600E; DEC VAX cluster consisting of 2 - 11/785, 1 - 8600, and 2 - 8650; 1 - DEC VAX 8800, 2 - DEC VAX 8820; 1 - DEC VAX 8830; and 1 - IBM 4381.

Primary Computer Software:

Data Base Management Systems:

Admin/Bus/Manufacturing: SQL/DS, FOCUS, SYSTEM 2000

Scientific/Engineering: RDB, Datatrieve, RIM

Telecommunications Support: Leased voice service; data communications provided through local and wide area networks; facsimile; radiocommunications support experimental, operational, administrative, and security functions at the site.

A.10 Fernald Field Office/Fernald Environmental Management Company, P.O. Box 398704, Cincinnati, OH 45239

Function: The Fernald mission is to perform environmental compliance and waste management and environmental restoration activities at the Fernald Environmental Management Project (FEMP) in an outstanding manner, and to continually improve the processes and services to meet state and federal regulations as well as the needs of the general public and Fernald employees.

Program: Environmental Restoration and Waste Management - Defense Environmental Restoration.

Primary Computer Resources: 2 - HP 3000/950, 1 - DEC VAX 6310/7610/DEC VAX 8550 Cluster and Novell Local Area Network.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: IMAGE
Scientific/Engineering: ORACLE, Intergraph

Telecommunications Support: Voice services provided by Definity G3r (Feb. 93). Novell site-wide LAN provides data communications support, electronic mail, dial up access to offsite networks; facsimile; radio communications systems support security, training, hazardous materials, production and administrative services; K-65 Video Microwave Monitoring System provides safety and security.

A.11 Golden Field Office/National Renewable Energy Laboratory, 1617 Cole Boulevard, Golden, CO 80401

Function: A primary research focus at the National Renewable Energy Laboratory is the development of solar energy technologies that have the greatest promise for cost-effectiveness when transferred to the commercial marketplace. Major efforts are in basic and applied materials science and engineering, fuels and chemicals research and engineering, mechanical and industrial technologies and engineering, assessment of solar and renewable energy resources, and technology transfer.

Program: Basic Energy Sciences and Energy Efficiency and Renewable Energy.

Primary Computer Resource: 1 - IBM 4381.

Primary Computer Software:
Data Base Management Systems: BASIS

Telecommunications Support: Leased onsite voice system shared with Western Area Power Administration; facsimile service; LANs provide data communications support; dialup access to offsite networks; radio systems provide administrative, facilities, security, and emergency support.

A.12 Grand Junction Project Office, P.O. Box 14000, Grand Junction, CO 81502

Function: The Grand Junction Project Office was established by the Manhattan Engineer District in 1943 to coordinate the acquisition of uranium for the Manhattan Project. There have been several major program emphases during these 50 years. Since 1982, the primary mission of the Grand Junction Project Office has been to apply its project management, engineering, and scientific expertise to support the entire environmental restoration/remedial action process - site characterization, remedial investigation and feasibility studies, remedial design,

remedial action, and post-closure and long-term surveillance and maintenance. Grand Junction Project Office's management and operating contractor is Chem-Nuclear Geotech. Administrative support for Grand Junction Project Office is provided by the Albuquerque Operations Office with programmatic support provided by DOE Headquarters.

Program: Environmental Restoration and Waste Management

Primary Computer Resource: 1 - CDC Cyber 170, 1 - IBM 9377, 1 - VAX 3500, 1 - VAX 4000, 1 - Microvax II, and a local area network encompassing 16 PC-based file servers supporting 650 user nodes, LAN dial-in access server, and electronic mail gateway.

Telecommunications Support: Voice services provided by site-owned IBM/Rolm 9751; voice mail and data communications provided by digital integrated system; facsimile; VHF radio systems support security, emergency, and operations activities.

A.13 Hanford (includes Richland Operations Office), P.O. Box 550, Richland, WA 99352

Function: Hanford is a multiprogram/multicontractor operation located near Richland, WA. Activities supported include environmental restoration, waste management, advanced reactor development, isotope separation, radioactive facilities decommissioning, and a broad spectrum of research and development.

The Richland Operations Office has administrative oversight responsibility for the safe, cost-effective management of programs and resources for the Hanford Site. The current principal contractors and the respective functions they perform are:

- Westinghouse Hanford Company (WHC), with Boeing Computer Services, Richland, Inc., (BCSR) as a subcontractor for Information Resources Management, is the management and operating contractor for operations and engineering. WHC manages environmental restoration, waste management, advanced reactor research and development, nuclear engineering, reactor management, and decommissioning and remedial action. BCSR operates as a fully-integrated IRM department with WHC.

- Battelle Memorial Institute, under a management and operating contract, operates the Pacific Northwest Laboratory (PNL). PNL is a multiprogram national laboratory that performs basic and applied research and provides research expertise and program support.

- Kaiser Engineers Hanford is the management and operating contractor for architect-engineering and construction services.

- Hanford Environmental Health Foundation provides medical and environmental health services and conducts medical research studies.

Programs: Nuclear Energy Research and Development; Environmental Restoration and Waste Management; Verification and Control Technology; Civilian Radioactive Waste; Environment, Safety and Health (Research and Development); Materials Production; Biological and Environmental Research; Fusion Energy; Energy Efficiency and Renewable Energy; Basic Energy Sciences; and General Administration.

Primary Computer Resources: 1 - Cray XMP/EA-232, 1 - IBM 3090-300J, 1 - HDS 9060, 1 - UNISYS 1100/63, 3 - HP 3000, 2- DEC VAX 8350 1 - DEC VAX 6420, 1 - Convex C210, 3 - Sequent Symmetry and various DEC VAX 1170s and 11/785s.

Primary Computer Software:

Data Base Management Systems:

Admin/Bus/Manufacturing: DMS 1100, Mapper, Turbo IMAGE, SYSTEM 2000, DB2, ORACLE, NOMAD2, FLow Gemini, Topic, Foxpro, Ingress, Zindex, Imera, PROJECT2

Scientific/Engineering: Rdb, Datatrieve, RSI, Xybion, ORACLE.

Largest Software Applications (Richland Operations Office Only): Departmental Integrated Standardized Core Accounting System - Richland, DOE Security System

Telecommunications Support: Leased voice systems and private automatic exchange systems; microwave network supporting voice and data; extensive baseband and broadband local area networks; secure SACNET Replacement Terminal and facsimile; local security andadministrative radio networks in VHF and UHF bands; STU-III secure voice terminals; video teleconferencing (FTS 2000 CVTS); cellular telephone service; facsimile.

A.14 Headquarters, Department of Energy, Energy Information Administration, Washington, DC 20585

Function: The Energy Information Administration's (EIA) mission is to inform the Congress, the Executive Branch, and the public regarding the nation's energy situation by administering a central and comprehensive program for collecting, interpreting, validating, analyzing, and disseminating energy information. In addition, EIA is responsible for the development and operation of the National Energy Modeling System that supports the Department's National Energy Strategy.

Program: Energy Information.

Primary Computer Resources: 1 - IBM 3084 QX, 1 - IBM 4341, approximately 700 PCs, and 7 LANs.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: ADABAS, INQUIRE, SYSTEM 2000, ORACLE
Scientific/Engineering: ORACLE
Largest Software Applications: National Energy Information System and National Energy Modeling System

Telecommunications Support: All services provided through DOE Headquarters systems; data supported by LANs.

A.15 Headquarters, Department of Energy, Office of Civilian Radioactive Waste Management, Washington, DC 20585

Function: The Office of Civilian Radioactive Waste Management's (RW) mission is to develop a waste management system that will provide for the permanent disposal of spent nuclear fuel and high-level radioactive waste in a manner that protects the health and safety of the public and the quality of the environment. The primary components, or subsystems, of the waste management system include: (1) a Mined Geologic Disposal System (MGDS) for the permanent disposal of waste, commonly referred to as the "repository"; (2) a Monitored Retrievable Storage (MRS) system for the interim storage of spent nuclear fuel; and (3) a transportation system to transport waste from reactors and defense sites to the MRS and the MGDS. RW's management and operating contractor is TRW Environmental Safety Systems, Inc. (TESS)

Program: Civilian Radioactive Waste.

Primary Computer Resources: 1 - DEC VAX 6420, 1 - DEC VAX 6350, 1 - DEC VAX 8700, several DEC MicroVAXes, and 4 SUN workstations.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: BASISPlus, Ingres, INFO
Scientific/Engineering: INFO
Largest Software Applications: Records Information System, Planning and Control System, Interactive Graphics Information System

Telecommunications Support: All voice, video, and data services provided through HQ/DOE Nevada Operations Office systems; data communications supported by local and wide area networks.

A.16 Headquarters, Department of Energy, Office of Information Technology Services and Operations, Washington, D.C. 20545

Function: The Office of Information Technology Services and Operations (ITSO) is responsible for the management and operation of all Headquarters IRM services, corporate DOEwide computer systems, and certain DOEwide telecommunications systems and services, such as Secure Automatic Communications Network (SACNET) and FTS 2000. ITSO develops policy, standards, and design criteria for Headquarters and DOEwide information and communications systems, and assures successful system implementation and operation. ITSO provides management and oversight for information technology resource planning and technology assessment, and the design, development, implementation, and maintenance of Headquarters and DOEwide information systems under the responsibility of Headquarters Organizations. ITSO services also include Departmentwide operation of the Forms Management program; management and oversight of classified and unclassified common-user computer and communications systems and services; software support; DOE commercial timesharing; and the Headquarters' office automation program.

Program: General Administration.

Primary Computer Resources: 1 - Amdahl 5890-300E, 2 - HP 3000/960 and 947, 1 - IBM ES/9000-500, and 1 - IBM ES/9000-170.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: SYSTEM 2000, ORACLE, SQL/DS, BASISplus, turboIMAGE, ALLBASE/SQL
Largest Software Applications: Single Integrated Financial Management System

Telecommunications Support: Two onsite information exchange (IX) systems serving voice and data; data communications supported by modified Ethernet LANs; SACNET switching center; WBCN node; classified and unclassified narrative and facsimile centers; secure video teleconferencing; cellular phones.

A.17 Idaho National Engineering Laboratory, P.O. Box 1625, Idaho Falls, ID 83415

Function: The Idaho National Engineering Laboratory (INEL) is a Department of Energy multiprogram laboratory whose primary mission is to provide the nation with innovations in nuclear technologies, and with unique scientific and engineering capabilities in nonnuclear programs that provide commercialization potential or

enhance the quality of the environment. The INEL also provides use of its unique facilities for the benefit of other Government Agencies and members of the scientific and technical community, and maintains a close interaction with scientific personnel in regional and other universities and industry to promote interest in developing closer research and collaborative ties.

The INEL is administered by the DOE Idaho Operations Office located in Idaho Falls, Idaho. The following management and operating contractors have operations at the INEL: EG&G Idaho, Inc., Westinghouse Idaho Nuclear Company, Inc., Babcock & Wilcox Idaho, Inc., M-K Ferguson Company, Protection Technology Idaho, Inc., plus West Valley Nuclear Services operates the West Valley Project in West Valley, NY. In addition, the University of Chicago Argonne National Laboratory-West and Westinghouse Electric Corporation, who operates the Naval Reactors Facility, have offices at the INEL.

Programs: Environmental Restoration and Waste Management; Nuclear Energy Research and Development; Civilian Radioactive Waste; Materials Production; Naval Reactors; Basic Energy Sciences; Nuclear Safeguards and Security; Environment, Safety and Health (Environmental R&D); Nuclear Physics; and Fossil Energy Research and Development.

Primary Computer Resources: 1 - IBM 3090-300J, 6 - HP 3000, 1 - Cray X-MP/216, 1 - DEC VAX 6410, 1 - DEC VAX 6210, 1 - DEC VAX 6310, and 1 - DEC VAX 5810.

Primary Computer Software:

Data Base Management Systems:

Admin/Bus/Manufacturing: DB2, COM-PLETE, ORACLE, DBEDIT, Adabase, Adabase SQL, VMBACKUP, VM/Nomad2, Nomad Collection, Nomad NAPA, DXT, PREDICT, TurboIMAGE/3000, ALLBASE, OMNIDEX, Adager, SuperDEX

Telecommunications Support: Integrated Digital Information Exchange and fiber transmission systems provide voice/data service, including voice paging; broadband LANs; local teletype network for narrative and facsimile distribution services; secure SACNET replacement terminal and facsimile; provides tenant communications support for Idaho Operations Office, ANL-W, and NRF training site; VHF and UHF radio systems provide support for work coordination as well as security and emergency operations; teleconferencing facilities for remote sites.

A.18 Idaho Operations Office, 785 DOE Place, Idaho Falls, ID 83402

Function: The DOE Idaho Operations Office directs and administers Departmental programs at INEL and other remote sites. These programs include nuclear safety, research, reactor development, reactor operations and training, materials production, waste management and technology development, energy technology and conservation programs, Strategic Defense Initiative research and development, national defense activities, and fuel processing. Other sites reporting to Idaho include a plant in West Valley, NY, for demonstrating solidification techniques which can be used for preparing high-level liquid waste for disposal operated by West Valley Nuclear Services, a management and operating contractor.

Program: General Administration.

Primary Computer Resources: 1 - HP 3000, 1 - DEC VAX 6410/DEC VAX 6610 Cluster, and 1 - DEC VAX 6310.

Primary Computer Software:

Largest Software Applications: Departmental Integrated Standardized Core Accounting System - Idaho, Construction Project Reporting and Information Management System, Compliance Management System.

Telecommunications Support: Service provided by INEL integrated system; relay center for INEL teletype and facsimile network.

A.19 Kansas City Plant, 2000 East 95th St., Kansas City, MO 64131

Function: Allied-Signal, Inc., Kansas City Division, a management and operating contractor, operates the Kansas City Plant for the production and procurement of non-fissile weapon components. The work done at the Kansas City Plant is highly diversified, technically oriented, and embraces the full spectrum of work on non-nuclear products--from research on new materials to the production of complex and reliable weapons components.

Program: Weapons Activities.

Primary Computer Resources: 2 - IBM 3090/200J, 1 - CDC Cyber 855, 1 - CDC Cyber 860, 1 - CDC Cyber 990, 1 - DEC VAX 8650, 1 - Convex C210, 3 - Tandem VLX, 1 - Tandem CLX, 1 - Cray Y-MP 2E/132,

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: BTCS, Focus, IDMS, SQL/DS, TOTAL, DB2, NonStop SQL, CDD, RDB, ORACLE, RIM, Datatrieve, BASIS/DM, INGRESS
Scientific/Engineering: CDD, RDB, ORACLE, RIM, IMDM, Datatrieve, BASIS/DM, INGRESS

Telecommunications Support: Voice system shared with General Services Administration, IRS, U.S. Marine Corps, and Department of Agriculture; local integrated file distribution system; multipurpose LANs provide most classified and unclassified data communications; secure video conferencing node; SACNET, FITS, NWCNET, WBCN.

A.20 Knolls Atomic Power Laboratory, P.O. Box 1072, Schenectady, NY 12301

Function: The Knolls Atomic Power Laboratory is one of two laboratories having responsibility to support the Naval Nuclear Propulsion Program for the design, development, and safety of nuclear power plants for naval vessels and the construction and operation of land-based prototypes. The management and operating contractor is General Electric Company.

Program: Naval Reactors.

Primary Computer Resources: 1 - CDC 7600, 1 - HDS AS/XL-50, 1 - HDS AS/EX 60, 1 - DEC VAX 11/785, 1 DEC VAX 11/780, 1 - DEC VAX 8800, 1 - DEC VAX 8250, 1 - Cray Y-MP/864, and 4 - HP 1000.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: IDMS, INQUIRE, ARTEMIS, ORACLE
Scientific/Engineering: ORACLE

Telecommunications Support: Owned computerized switching system; dialup secure narrative service; secure telecopier service; LANs support onsite data communications functions.

A.21 Lawrence Berkeley Laboratory, One Cyclotron Rd., Berkeley, CA 94720

Function: The Lawrence Berkeley Laboratory (LBL) is operated by the University of California under a management and operating contract. Current research includes fundamental studies in nuclear physics; earth, chemical, and materials science; high-energy physics; biological and environmental research; and conservation and renewable energy. Another initiative is the Advanced Light Source, a generation synchrotron light facility that will provide high intensity/high brightness light beams for advanced materials research in the areas of Surface Science and Catalysis, Advanced Materials Synthesis, and Advanced Device Concepts.

LBL has several key activities that support the technology transfer initiative of the Secretary. The Center for Advanced Materials focuses on solving fundamental materials research problems identified by discussion with industry. The Human Genome Center and the Superconductivity Research Center for Thin Film Applications have relevance to the biotechnology and electronics industry. The Isotopes Project and the Particle Data Group make collections of data on fundamental particles and isotopes available to the worldwide research community.

Programs: Basic Energy Sciences; Nuclear Physics; High Energy Physics; Biological and Environmental Research; Fusion Energy; Energy Efficiency and Renewable Energy; Fossil Energy Research and Development; Civilian Radioactive Waste; and Environmental Health and Safety.

Primary Computer Resources: 3 - DEC VAX 6610, 2 - IBM 4381, 3 - Sun 690MP.

Telecommunications Support: Leased InteCom IBX S/80 PBX installed in FY 1990; emergency voice system; LANs and microwave systems for data communications; access to major research networks; radio systems support service and emergency functions as well as field crews, and two video teleconference centers (one to SLAC; one to several laboratories).

A.22 Lawrence Livermore National Laboratory, P.O. Box 808, Livermore, CA 94550

Function: The Lawrence Livermore National Laboratory is a multiprogram laboratory operated by the University of California under a management and operating contract. The principal program mission of the Laboratory is research, development, and test activities of nuclear weapons. A large portion of the Laboratory work effort is devoted to programs in magnetic and inertial

confinement fusion energy, biological, ecological, and atmospheric research, basic energy science research, and non-nuclear energy projects.

Programs: Weapons Activities; Materials Production; Verification and Control Technology; Fusion Energy; Civilian Radioactive Waste; Biological and Environmental Research (Environmental Research and Development); Environmental Restoration and Waste Management; Energy Efficiency and Renewable Energy; Basic Energy Sciences; Nuclear Energy Research and Development; and Fossil Energy Research and Development.

Primary Computer Resources: 2 - Cray Y-MP, 1 - Cray X-MP, 18 - IBM 550, and 1 - BBN (Lawrence Livermore National Laboratory Computer Center); 1 - Unisys 2200/422, 1 - Amdahl 5890/180E, 1 - HP 3000/980, 1 - HP 3000/68, 1 - IBM 9377, 1 - IBM 4361, 1 - IBM 4381, 1 - VAX 6530, 1 - VAX 6410, and 2 - VAX 6610 (Administrative Information System Center).

Primary Computer Software:

Data Base Management Systems:

Admin/Bus/Manufacturing: BASIS, NOMAD2, ORACLE, COBOL-MSAM, CA-IDMS/R, TurboIMAGE/3000.

Telecommunications Support: Voice and data supported by a 5ESS electronic switching system; ISDN; high-speed (FDDI) networks; secure SACNET Replacement Terminal and facsimile; WBCN site; Satellite Backbone System node; national network centers for: SCAT, CIIC, EMGNET, ARAC, ESNET; local and wide area networks provide data communication support; broadband cable TV networks for education and information services; radio networks for security and administrative services.

A.23 Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545

Function: The Los Alamos National Laboratory (LANL) was founded in 1943 to design and build the first atomic bombs. LANL is operated as a multiprogram research and development laboratory by the University of California under a management and operating contract. The principal fields of research are theoretical nuclear, medium energy, plasma, and cryogenic physics; inorganic, physical, and nuclear chemistry; mathematics; metallurgy; life sciences and biomedicine; and earth sciences. These scientific disciplines support programs in nuclear weapons design and development, the use of nuclear energy for the production of electric power, nuclear safeguards, controlled release of thermonuclear energy through magnetic fusion and inertial confinement of fusion, in geothermal and solar energy applications of stable and radioactive isotopes, cryogenic applications for electrical energy transmission and storage, and advanced instrumentation development.

Programs: Nuclear Energy Research and Development; Weapons Activities; Verification and Control Technology; Basic Energy Sciences; Fossil Energy Research and Development; Civilian Radioactive Waste; Fusion Energy; Nuclear Safeguards and Security; Materials Production; Biological and Environmental Research (Environmental Research and Development); and Nuclear Physics.

Primary Computer Resources: 5 - Cray Y-MP, 1 - Cray X-MP, 3 - Thinking Machine Corporation computers, 2 - CM-200, 1 - CM-5, 1 - CDC Cyber 855, 50+ - DEC VAX, and 1 - IBM 3090/200.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: operating systems include UNICOS, CTSS, MVS/XA, VMS, SUN

Telecommunications Support: Leased CENTRON voice service; secure SACNET and facsimile; Integrated Computing Network (ICN); FDDI network; high volume wide band data links for shared supercomputing capability; trunked radio system; secure and unclassified video conference capability; and a token bus system.

A.24 Massachusetts Institute of Technology, 77 Massachusetts Ave., Cambridge, MA 02139

Function: The Laboratory for Nuclear Science was established in 1946 to do research in nuclear and particle physics. The latest activities of the Laboratory concentrate on theoretical and experimental studies of nuclear structure and reactions, the fusion and fission of nuclei, and the properties and interactions of the elementary particle of nature. The primary experimental programs are in three areas: intermediate energy nuclear physics, high energy particles physics, and heavy ion physics.

Programs: High Energy Physics and Nuclear Physics.

Primary Computer Resources: 3 - DEC VAX 11/780, 1 - DEC VAX 8820, 2 - DEC VAX 6220, 1 - IBM 4361, and 1 - IBM 3090 (CERN).

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: ORACLE

Telecommunications Support: All support provided by MIT.

A.25 Morgantown Energy Technology Center, P.O. Box 880, Morgantown, WV 26505

Function: The Morgantown Energy Technology Center is responsible for fostering continuity and competence in the advancement of fossil energy technology. The Center performs research and development activities for coal, petroleum, and gas technologies. They pursue technology base development and provide commercialization assistance.

Programs: Fossil Energy Research and Development.

Primary Computer Resources: 1 - DEC VAX 6610 and 1 - DEC VAX 6250 with dual vector processors.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: DEC Relational Data Base Management System (RDB), SQL, SmartStar, and DRS
Largest Software Applications: METC Inhouse Payroll, Total Maintenance System, Management System

Telecommunications Support: Voice services provided by leased Centrex; unclassified TWX, TELEX, and facsimile service; LANs, dedicated circuits, and hardwiring provide data communications support; radio paging.

A.26 Mound Facility, P.O. Box 3000, Miamisburg, OH 45343

Function: The EG&G Mound Applied Technologies, Inc., operates the Mound Facility under a management and operating contract and supports weapons and energy-related programs. Mound carries out an integrated research, development, and production operation with special emphasis on explosives and nuclear technology. Mound has developed an expertise in the science of precise measurement of heat. They are recognized as the world's leading researcher for the separation of stable gas isotopes and the worldwide sales of a large number of non-radioactive isotopes. In performing these mission assignments, Mound monitors every aspect of the environment. This includes the air and water in and around the facility as well as the soil and vegetation.

Programs: Weapons Activities; Nuclear Energy Research and Development; and Environmental Restoration and Waste Management.

Primary Computer Resources: 1 - IBM 3090/200E, 1 - IBM 3090/120E, 1 - IBM 4381, 1 - DEC VAX 6520, 1 - DEC VAX 8550, 2 - DEC VAX 6410, 2 - DEC VAX 6310, 1 - DEC VAX 8810, 1 - DEC VAX 6420, 2 - COMPAQ SYSTEM PRO 486 Servers

Telecommunications Support: Voice service provided by the purchased ROLM 9751-Model 70 system; data communications service provided by baseband and broadband LAN technology through two redundant cable systems; WBCN site; secure SACNET terminal and facsimile; VHF and UHF radio system including a plantwide radio paging system, support security and administrative services.

A.27 National Energy Research Supercomputer Center, Lawrence Livermore National Laboratory, P.O. Box 5509, Livermore, CA 94550

Function: The National Energy Research Supercomputer Center (NERSC) is the principal supplier of production high performance computing and networking services to the Science and Technology Programs community. The NERSC currently serves over 4,500 users worldwide. This support is provided through the centralized supercomputer facility located at the Lawrence Livermore National Laboratory (LLNL), and an international communications network developed at NERSC, the Energy Sciences Network (ESNET). An additional mission of NERSC is support of the National Education Supercomputer Program. The LLNL is responsible for the operation of the NERSC.

Programs: Fusion Energy and Basic Energy Sciences.

Primary Computer Resources: Cray X-MP 1/8 (dedicated to NESP); Cray-2S 4/128, Cray-2S 8/128, Cray-C90 16/268, and an IBM 4381 system (supporting file storage systems).

Telecommunications Support: Voice services provided by LLNL; wideband services to users through ESNET.

A.28 Naval Petroleum Reserves in California, P.O. Box 11, Tupman, CA 93276

Function: The Naval Petroleum Reserves in California (NPRC) manages and produces crude oil and liquid fuel from Elk Hills and Buena Vista Hills petroleum reserves for both military and commercial use. The management and operating contractor is Bechtel Petroleum Operations, Inc.

NPRC is mandated by Congress to produce the Petroleum Reserves at the Maximum Efficient Rate (MER). As defined by Congress, "The Maximum Efficient Rate means the maximum sustainable daily oil and gas rate from a reservoir which will permit economic development and depletion of that reservoir without detriment to the ultimate recovery."

Bechtel Petroleum Operations Inc. (BPOI) is the operating contractor at NPRC, providing services to produce and deliver oil and gas products for sale, provide engineering support to DOE in establishing the MER, develop enhanced oil recovery programs, implement exploratory and development programs to help maximize ultimate recovery, protect the oil, gas, and all other property to minimize loss, waste, and costs, perform operations in a manner that will protect the natural environment, the health and safety of workers and the public, and comply with all applicable health, safety, and environmental laws and regulations. Achieve all project objectives in the most efficient manner to minimize costs and maximize net revenues to the Government.

Programs: Fossil Energy Research and Development and Environment, Safety and Health.

Primary Computer Resource: 1 - IBM 4381, 1 - DEC VAX 6210, 3 - IBM RS 6000.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: DATACOM/DB
Largest Software Applications: DOE Engineering Management Information System

Telecommunications Support: Leased voice services; unclassified facsimile service; data communications provided through onsite dedicated circuits and to offsite resources via dialup; radio system supports operations, emergency, and security functions.

A.29 Nevada Complex, P.O. Box 98518, Las Vegas, NV 89193

Function: The Nevada Operations Office (NV), headquartered in Las Vegas, oversees a wide range of activities at the Nevada Test Site (NTS). The NTS, located 65 miles northwest of Las Vegas, is this nation's only facility for testing nuclear weapons. The United States is currently in a testing moratorium that will be in effect until July 1993. The following is a list of other activities the Nevada Operations Office is responsible for.

- Radiological Emergencies. The Nevada Operations Office has the lead federal role in maintaining the capability to respond to certain kinds of national emergencies. NV provides the leadership when a Federal Radiological Monitoring and Assessment Center is established, either in response to a radiological emergency or as a preventive measure, as in the Kennedy Space Center launch of the nuclear-powered Galileo and Ulysses space probes.

- The Nuclear Emergency Search Team is a cadre of highly-trained DOE and contractor radiological specialists who can be mobilized in case of accidents

involving radioactive materials or if there were a terrorist threat involving nuclear weapons.

- Liquefied Gaseous Fuels Spill Test Facility (LGFSTF). The LGFSTF is a relatively new program at NTS. It was completed in 1986 and is operated on a fee basis for commercial users as a test facility to evaluate the effectiveness of various foams and fire retardants for use in accidents involving chemicals and hazardous materials.

- Pacific Area Support Office (PASO). PASO, based in Honolulu, provides oversight for NV interests and activities in the Pacific. NV has responsibility for radiological support of the Enewetak cleanup and radiological surveillance of other areas in the Northern Marshall Islands that were impacted by the atmospheric testing of the 1940s and 1950s. NV will be turning over a major portion of its Pacific work on Johnston Atoll to the Department of Defense within the next couple of years.

- Research Park. The Nevada Test Site has just been designated a DOE National Environmental Research Park. By enabling NTS scientists to link into the existing ParkNet computerized data system, the extensive accumulation of environmental research collected over the history of the Test Site will be available to students and scientists throughout the world.

Other contractors of NV include:

- EG&G Energy Measurements (EG&G/EM) plans, designs, fabricates and operates highly complex timing and firing instrumentation. This includes hardware and software systems for data acquisition and analysis which aid in the development of radiation detection equipment used in the Aerial Measuring System aircraft. The aircraft maps low-level background radiation around nuclear power plants. EG&G/EM also conducts ecological field studies to obtain data on the plant and animal life of the Yucca Mountain Site and vicinity.

- Reynolds Electrical and Engineering Company, the largest contractor in the Nevada Complex under a management and operating contract, provides services such as drilling and mining; radiological monitoring; and housing, feeding, and supplies.

- Raytheon Services Nevada operates under a management and operating contract as the NTS architect-engineer.

- Computer Sciences Corporation provides technical support to DOE/NV for computer and telecommunications services.

- Wackenhut Services, Inc., provides security at the Nevada Complex.
- Science Applications International Corporation manages the high-level nuclear waste geologic repository program.
- Other contractors include URS/John Blume & Associates, and the Desert Research Institute of the University of Nevada.
- Federal Agencies associated with the Nevada Test Site are the Environmental Protection Agency, the Department of Defense, the Defense Nuclear Agency, U.S. Geological Survey, and the National Oceanographic and Atmospheric Administration's Weather Service Nuclear Support Office.

Programs: General Administration; Weapons Activities; Civilian Radioactive Waste; and Environmental Restoration and Waste Management.

Primary Computer Resources: 1 - HP 3000, 1 - DEC VAX 6210, 1 - DEC VAX 6320, 1 - DEC VAX 3400 (NV); 7 - DG MV 1000, 1 - DG MV 4000, 1 - DG MV 7800 (WSNSO); 2 - DEC VAX 8350, 1 - DEC VAX 6000, 4 - HP 9000 (RSN); 2 - DEC VAX 8650, 1 - DEC VAX 6410, 1 - DEC VAX 8700, 1 - DEC VAX 8550, 2 - DEC VAX 8530, 5 - DEC VAX 11/750 (REECO); 6 - DEC VAX 11/750, 3 - DEC VAX 11/780, 3 - DEC VAX 8530, 1 - DEC VAX 8350, 1 - DEC VAX 8650, 1 - DEC VAX 6330 (EG&G).

Primary Computer Software:

Data Base Management Systems:

Admin/Bus/Manufacturing: Dayflow Tracker, INGRES

Scientific/Engineering: GEODES, Postscript, DataFlex, Datatrieve, Remote Environmental Monitoring System, Thermoluminescent Dosimetry

Largest Software Applications (Nevada Operations Office only): Defense Low-Level Waste Inventory System, Area 27 Security System, Sample Tracking Data Management System

Telecommunications Support: Voice services provided through central switching center under a 10-year lease contract; significant microwave and other radio services for Test Site support; secure SACNET Replacement Terminal and facsimile; most data communications provided through LANs, microcomputer networks, distributed processing networks, and radio networks; VHF and UHF radio systems provide administrative, operations, emergency, and security support.

A.30 Oak Ridge Complex, P.O. Box 2009, Oak Ridge, TN 37831

Function: Martin Marietta Energy Systems serves as the prime contractor to the Department of Energy for the management of five facilities: three in Oak Ridge, Tennessee; one near Paducah, KY; and one near Portsmouth, OH. These facilities comprise four strategic business units that represent the four components of the Energy Systems mission. Energy research and development is conducted at the Oak Ridge National Laboratory (ORNL), Weapons Component Production capability exists at the Oak Ridge Y-12 Plant, and Uranium Enrichment is conducted at the Paducah Gaseous Diffusion Plant and the Portsmouth Gaseous Diffusion Plant. Environment restoration, waste management, decontamination and decommissioning, and technology development activities are based at and supported by the K-25 Site.

ORNL, managed by Martin Marietta Energy Systems for DOE, is one of the nation's premier research institutions. The primary mission of the Laboratory is to perform leading-edge research and development in support of the non-weapons roles of DOE. Especially important elements of ORNL's mission are to perform basic and applied research of importance to the nation, to provide the scientific and technical community with unique national user facilities, and to partner with universities and industry to improve the nation's competitiveness through technology development and transfer and through contributions to the national initiative to improve science and math education.

The Y-12 Plant serves as a key manufacturing technology center for the development and demonstration of unique materials, components, and services of importance to DOE and the nation. The Y-12 mission is accomplished through reclaiming and storing nuclear materials, manufacturing components for the nation's defense capability, and providing services to other customers as approved by DOE.

The mission of the Environmental Restoration and Waste Management Programs Organization is to restore the environment and manage DOE wastes through leadership and central management of the environmental restoration waste management and technology development programs in support of DOE; DOE sites operated by Martin Marietta Energy Systems; other elements of the Federal Government; and the public.

The Uranium Enrichment mission is to manage the nation's enrichment facilities to ensure that production commitments are met in a cost-effective manner while protecting UE employees, the public, and the environment; to develop improved enrichment technologies; to assist DOE in creating new enrichment business opportunities; and to provide commercially oriented enrichment services. The recent passage of the Energy Bill requires that Uranium Enrichment be

converted to a government corporation in July of 1993 and therefore will no longer be a part of DOE.

Programs: Nuclear Energy Research and Development; Uranium Enrichment; Weapons Activities; Nuclear Safeguards and Security; Basic Energy Sciences; Fusion Energy; Biological and Environmental Research; Environmental Restoration and Waste Management; Nuclear Physics; Fossil Energy Research and Development; Energy Efficiency and Renewable Energy; and Environment, Safety and Health (Environmental Research and Development).

Primary Computer Resources: 1 - IBM 3090-150E, 5 - DEC KL10, 3 - DEC Dual VAX 8650, 1 - DEC 6420, 1 - DEC VAX 5810, 1 - Intel Paragon L35, 1 - Kendall Square 64 Processor System (ORNL); 1 - IBM 3090-300J, 1 - IBM 3083, 2 - DEC VAX 9210s, 2 - DEC VAX 8820s, 1 - DEC VAX 6620, 1 - DEC VAX 8550, 1 - DEC VAX 6310, 1 - DEC VAX 6410, 1 - DEC VAX 6420 (K-25 Site); 2 - DEC VAX 6420s, 2 - DEC VAX 6510s, 6 - DEC VAX 8650s, 4 - DEC VAX 8700s, 1 - DEC VAX 8800, 4 - DEC VAX 9210s, 1 - DEC VAX 11/785, 1 - HDS AS/EX 30, 1 - HDS AS/EX 50, 1 - HDS AS/EX 60 (Y-12 Plant); 1 - DEC VAX 11/785, 1 - DEC VAX 8800 (Paducah Plant); 3 - PDP 10s, 9 - PDP, 2 - DEC VAX 6310s, 2 - DEC VAX 6410s, 2 - DEC VAX 11/780s (Portsmouth Plant).

Primary Computer Software:

Data Base Management Systems:

Admin/Bus/Manufacturing: System 1022, Flow Gemini, VAX DBMS, VAX RDB, Datatrieve, SAS, OS/VS RPG II, DBMS - 10, IMAGE, HPSQL, ORACLE, Computer Associates: DB/VAX System 1032, IDMS CENTRAL VERSION, IDMS, DB2, Inquire/Text Data Base Management, Ingres DATABASE, Application Development System, BASIS

Scientific/Engineering: DB/VAX, System 1032,IDMS CENTRAL VERSION, IDMS, DB2, Inquire/Text Data Base Management, Ingres DATABASE, Application Development System, BASIS

Telecommunications Support: Leased voice services shared with city of Oak Ridge; secure SACNET Replacement Terminal and facsimile; secure and unclassified local and wide area networks for broadband data services; local radio networks support security and administrative services; DOE Communications Network satellite node.

A.31 Oak Ridge Operations Office, P.O. Box 2001, Oak Ridge, TN 37831

Function: The Oak Ridge Operations Office is responsible for managing projects for a number of Department of Energy Program Offices. The principal responsibilities are:

- Dismantling nuclear weapons components and managing the nations highly enriched uranium inventory.
- Conducting a diversified research and development program on a variety of energy technologies.
- Conducting extensive environmental restoration and waste management activities including managing the national Formerly Utilized Sites Remedial Action Program.
- Producing enriched uranium for fueling domestic and foreign nuclear power stations.
- Administering about 1,000 grants and contracts with colleges, universities, and private organizations for conducting research, development, and educational programs.
- Providing education and training in support of DOE programs for public, vocational, professional, and technical groups.

Oak Ridge Operation Office administers the operation of major U.S. Government facilities and provides policy and program direction to the following facilities:

- Martin Marietta Energy Systems, Inc.:

  Oak Ridge Complex consisting of the K-25 Site, Y-12 Plant, and the Oak Ridge National Laboratory;

  Portsmouth Gaseous Diffusion Plant in Portsmouth, OH;

  Paducah Gaseous Diffusion Plant in Paducah, KY;

- Oak Ridge Institute of Science and Education;
- MK-Ferguson, which provides construction support;

- Johnson Controls, which provides maintenance support;
- Continuous Electron Beam Accelerator Facility in Newport News, VA.

In addition, Oak Ridge Operation Office administers contracts with prime contractors, colleges, universities, and private organizations for research, development, demonstration, and educational programs.

Programs: General Administration

Primary Computer Resources: 1 - HP 3000/950, 1 - DEC VAX 6410/780 Cluster, 3 - MicroVax II, 10 - DEC LANServer 3100.

Primary Computer Software:
Largest Software Applications: OR Document Accountability System, Safeguards and Security System, Fin Plan System.

Telecommunications Support: Oak Ridge Operations Office is served by the Official Oak Ridge Telephone System (OORTS). This system provides administrative telephone service to DOE, DOE contractors, and other government agencies in the Oak Ridge area. OR also utilizes secure SACNET Replacement Terminal and facsimile; dialup secure narrative service to contractor sites; high frequency radio service to contractor sites; and unclassified facsimile.

A.32 Department of Energy, Office of Scientific and Technical Information, P.O. Box 62, Oak Ridge, TN 37831

Function: The mission of the DOE Office of Scientific and Technical Information (OSTI) is to provide information management support and direction for the Department of Energy's scientific and technical information program, including a centralized information management capability to assist Departmental elements in accomplishing DOE's missions related to economic growth, national security, and environmental protection.

Programs: General Administration.

Primary Computer Resources: 1 - DEC VAX 8600, 1 - DEC VAX 8650, 1 - DEC VAX 11/780, 1 - DEC VAX 11/785, 1 - DEC VAX 6420, and 1 - DEC VAX 6210.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: S1032, BASIS, ShareBase, Freeform
Largest Software Applications: Records Processing System, OSTI Automated Retrieval System

Telecommunications Support: OSTI is a tenant of the DOE Oak Ridge Operations Office telephone facilities; data communications supported by LANs, and dialup service.

A.33 Pantex Plant, P.O. Box 30020, Amarillo, TX 79177

Function: Mason and Hanger-Silas Mason Co., Inc., under management and operating contract, operates the Pantex Plant which fabricates high explosives and assembles and disassembles nuclear weapons components. They also conduct new materials laboratory testing and produce weapon support assemblies and components.

Program: Weapons Activities.

Primary Computer Resources: 1 - IBM 9021/580 and 1 - IBM 9121/210.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: Total, IDMS/DB
Scientific/Engineering: Total, IDMS/DB

Telecommunications Support: Leased Dimension 2000 switch provides voice service and dialup communications; secure SACNET Replacement Terminal and facsimile; token ring and ETHERNET LANs; broadband LAN; electronic mail; WBCN site; cellular phones; local networks for security and administrative services.

A.34 Pinellas Plant, P.O. Box 2908, Largo, FL 34649

Function: The Pinellas Plant was constructed for the purpose of manufacturing neutron generators for the initiation of nuclear weapons. Today, other weapons components are produced at Pinellas, as well as specialized electronic test equipment. The management and operating contractor is Martin Marietta Speciality Components, Inc.

Program: Weapons Activities.

Primary Computer Resources: 1 - IBM 3090/180J, 2 - HP 3000, 1 - IBM 4381, 2 - DEC VAX 8650, 1 - DEC VAX 8350, 1 - DEC VAX 8300, 1 - DEC VAX 8800, 1 - DEC VAX 8600, 2 - DEC VAX 6310, 2 - DEC VAX 6510, 1 - HP 955, and 1 - HP 855.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: IDMS, IMAGE/3000, Ingres, ORACLE
Scientific/Engineering: CALMA-DDM, ORACLE, SDRC, Engineering and Analysis Tools and Cadence for ECAD.

Telecommunications Support: Onsite voice switching system; secure SACNET Terminal; facsimile; integrated broadband and baseband LAN technologies; electronic mail; WBCN site; cellular phones, radio systems, and networks support security and administrative functions.

A.35 Pittsburgh Energy Technology Center, P.O. Box 10904, Pittsburgh, PA 15236

Function: The Pittsburgh Energy Technology Center promotes clean energy from coal through project management support and research and development. The site is a leader in the areas of coal preparation, advanced combustion, flue gas cleanup, coal liquefaction, alternative fuel utilization, and magnetohydrodynamics. It is noted for its advance technology base, engineering/economic analysis, and scaling up of promising processes. They have also developed and maintain the national coal liquefaction technology data base.

Program: Fossil Energy Research and Development.

Primary Computer Resources: 1 - DEC VAX 9000, 1 - DEC VAX 6210, 1 -HP 3000, and 1 - Microvax II.

Primary Computer Software:

Data Base Management Systems:

Admin/Bus/Manufacturing: VMS, Decnet, Dectype, 2020, Blast, CA-DISSPLA, C, Datatrieve, DBMS, DECPS, FMS Fortran, HPCOPY, HPPRINT, Lockout, Ostat, Plot10, SAS, WordPerfect, Vaxshadow, Aspenplus, CDD, Cobal 2780/3780

Scientific/Engineering: Datatrieve

Largest Software Applications: PETC Coal Technology Data Base

Telecommunications Support: Voice services provided by Dimension 2000 PBX supporting 1283 lines/sets, which is owned by Department of Interior; unclassified TWX, TELEX, and facsimile service; a Novell LAN, support data communication functions, radio systems provide coordination of site activities and supports security functions.

A.36 Princeton Plasma Physics Laboratory, P.O. Box 451, Princeton, NJ 08543

Function: The Princeton Plasma Physics Laboratory, operated under a management and operating contract, was established in 1951 to conduct plasma physics research in magnetic fusion energy. They are currently concentrating on the development of a plasma confinement system that will meet the requirements of an economically and environmentally attractive fusion power plant for generating

electricity. The Laboratory has some of the largest, most flexible scientific devices for the detailed study of plasma behavior in the world.

Program: Fusion Energy.

Primary Computer Resources: 2 - DEC VAX 8600, 2 - DEC VAX 11/785, and a Network of 17 - GOULD/SEL, 1 - DEC VAX 8700, 1 - DEC VAX 6420, and 1 - IBM 4381.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: FOCUS, RAMIS, BASIS
Scientific/Engineering: Ingres

Telecommunications Support: Leased voice services; data communications provided through dedicated and dialup lines; facsimile service; UHF radio services support physics research, safety services, and maintenance functions.

A.37 Rocky Flats Office, P.O. Box 928, Golden, CO 80402-0928

Function: The Rocky Flats Office is charged with management and oversight responsibilities for two independent management and operating contractors (M&Os), EG&G Rocky Flats, Inc. and Wackenhut Services Inc. The M&Os operate within the Government-owned facility known as the Rocky Flats Plant (RFP) and are under contract with the Department of Energy.

The mission definition for the RFP has changed from that of a key player in the nuclear weapons production complex in support of DOE Defense Programs to that of a key player in the Environmental Restoration and Waste Management Program supporting DOE missions and objectives.

The RFP is operated by EG&G. The DOE administers the EG&G contract and inspects components for final acceptance prior to shipment to the next user. As the prime M&O, EG&G provides information resources support and computing and telecommunications operations services.

Program: Weapons Activities and Environmental Restoration and Waste Management

Primary Computer Resources: 1 - IBM 3090/200S, 1 - IBM 3090/200J, 1 - CDC Cyber 860, 2 - DEC VAX 9410, 1 - DEC VAX 11/785, 2 - DEC VAX 8800, and 2 - DEC VAX 6350.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: SUPRA, TOTAL, ULTRA, MARK IV, BASIS, ORACLE, DB2
Scientific/Engineering: IMF, RIM, DB2

Telecommunications Support: Voice services via a switched intraplant telephone service, including voice messaging, telephone answering; local and long distance calling services provided by an AT&T DEFINITY G-2 PBX. Two broad band coaxial cable local area networks. Data communications using a variety of protocols and interfaces, such as TCP/IO, DECnet, and Appletalk. GOSIP protocols are provided at layers 1 an 2 of the Open System Interconnection model. Networked AT&T AUDIX Voice Messaging System. SACNET, WBCN, other off-site communications facilities and facsimile services.

A.38 Sandia National Laboratories, Albuquerque, P.O. Box 5800, Albuquerque, NM 87185

Sandia National Laboratories, Livermore, P.O. Box 969, Livermore, CA 94550

Function: Sandia National Laboratories were established in 1947 at Albuquerque and in 1956 at Livermore to manage nuclear weapons program responsibilities. Their primary mission is to develop non-nuclear components for nuclear weapons. The Sandia Corporation, a subsidiary of AT&T Technologies, is the management and operating contractor. At Sandia, research is conducted on new weapon concepts, safety and reliability, and protection of nuclear materials. Sandia also undertakes energy research and development programs of national importance which need the capabilities assembled for the weapons program. Sandia operates a broad range of facilities, many of them specially designed and unduplicated elsewhere in the country.

Programs: Weapons Activities; Environmental Restoration and Waste Management; Nuclear Safeguards and Security; Basic Energy Sciences; Civilian Radioactive Waste; Verification and Control Technology; Fusion Energy; Energy Efficiency and Renewable Energy; Fossil Energy Research and Development; and Nuclear Energy Research and Development.

Primary Computer Resources: 1 - Univac 1100/71, 1 - Univac 1100/72, 1 - IBM 9121-190, 1 - IBM 9021-500, 1 - Cray YMP, and 1 - Convex (Albuquerque); 1 - Cray YMP, 1 - Cray X-MP, 1 - IBM 4341, and 15 - DEC VAX Systems (Livermore).

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: DM5, 1100, DB2, SQLDS, IDMS
Scientific/Engineering: NSS, DRS, Inquire, Ingress, Datatrieve, POWERHOUSE

Telecommunications Support: Albuquerque: Voice services provided through Kirtland AFB 5ESS system; secure SACNET Replacement Terminal; facsimile; integrated LANs utilizing twisted pair, coaxial cable, and fiber optic cable; wideband computer network system to SNLL; WBCN site; VHF and UHF radio networks; secure video conferencing node. Livermore: Voice and unclassified data services provided by 5ESS with ISDN capability; secure SACNET Replacement Terminal; facsimile; Site Network Center; wideband computer network to SNLA.

A.39 San Francisco Operations Office, 1333 Broadway, Oakland, CA 94612

Function: The San Francisco Operations Office administers some 740 contracts and grants nationwide. The mission of San Francisco Operation Office is to execute defense and energy-related programs and to provide input to program development and policy formulation. SF is responsible for the management coordination and support of programs and projects involving weapons research and development, basic research, research and development in all energy technologies (including fossil, geothermal, solar, conservation and renewable energies), nuclear energy development, and environmental safety and health.

The following major research and development facilities report to San Francisco Operations Office:

- Lawrence Livermore National Laboratory, Livermore, CA;
- Lawrence Berkeley Laboratory, Livermore, CA;
- Stanford Linear Accelerator Center, Stanford, CA; and
- Energy Technology Engineering Center.

Program: General Administration; Weapons Activities; Nuclear Energy Research and Development; and Environmental Restoration and Waste Management.

Primary Computer Resources: 2 - HP 3000.

Primary Computer Software:
Largest Software Applications: Departmental Integrated Standardized Core Accounting System - SAN, Contract Management Information System

A.40 Savannah River Site, Aiken, SC 29802

Function: The Savannah River Site's primary mission is the production of plutonium and tritium and other special nuclear materials for use in the nation's defense and space programs as well as other uses. The site encompasses laboratory and production plant facilities. Westinghouse Savannah River Company, under a management and operating contract, operates the site for the Government under cost plus award fee. They assumed full responsibility at the site on April 1, 1989. The site contains five heavy water moderated production reactors; two chemical separation facilities; a fuel and target fabrication facility; waste processing and storage facilities; and a multiple discipline research and development laboratory.

Major development efforts continue in the management of radioactive waste. Other major activities include weapons support and environmental studies in support of the Department of Energy Programs.

Programs: Materials Production; Environmental Restoration and Waste Management; Weapons Activities; Nuclear Energy Research and Development; and Naval Reactors.

Primary Computer Resources: 1 - IBM 3081K, 1 - IBM 3083EX, 1 - IBM 3090/400, and 1 - Cray X-MP/EA.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: ADABASE, DB2, SQL, IMSL, Knowledge Coordinator and Encyclopedia
Scientific/Engineering: DATATROE, IMSL

Telecommunications Support: Leased voice system with central electronic switch and dispersed PBXs throughout facility for continuity of service; significant radio activity supporting local security, safety, operations, construction, and administrative services; local unclassified facsimile network; broadband local and wide area networks provide data communications support.

A.41 Savannah River Operations Office, P.O. Box A, Aiken, SC 29802

Function: The Savannah River Operations Office is responsible for directing and administering programs involving plutonium, tritium, and other special nuclear materials production for use in the nation's defense. Other activities include environmental monitoring and process development support. This Office also has responsibility for the management of radioactive waste stored in waste tanks.

The following report to the DOE Savannah River Operations Office:

- Savannah River Laboratory;
- Savannah River Site; and
- Savannah River Ecology Laboratory.

Program: Materials Production and General Administration.

Primary Computer Resources: 1 - HP 3000 and support by the Savannah River Site.

Primary Computer Software:
Largest Software Applications: Safety and Health Information Management System, Departmental Integrated Standardized Core Accounting System - SR

Telecommunications Support: Shares Savannah River Site voice services; secure SACNET Replacement Terminal and facsimile; unclassified TWX, TELEX, and facsimile services; broadband connected LANs provide data communications support; significant radio activity supporting local security, safety, operations, construction, and administrative services.

A.42 Southeastern Power Administration, Samuel Elbert Building, Elberton, GA 30635-2496

Function: The Southeastern Power Administration is responsible for wholesale marketing of electric power produced by Federally-owned facilities in a 10-state region of the southeastern United States.

Program: Power Marketing.

Telecommunications Support: Administrative telephone service supporting voice and data communications requirements.

A.43 Southwestern Power Administration, P.O. Box 1619, Tulsa, OK 74101

Function: Southwestern Power Administration was established in 1943 to market the electric power and energy produced at 24 reservoir projects in the southwest with currently installed generating capacity of 2156 Megawatts. Southwestern markets power from hydroelectric projects located in the states of Arkansas, Missouri, Oklahoma, Texas, Kansas, and Louisiana. In its power marketing program, Southwestern must secure revenue sufficient to meet the annual costs of operation and maintenance of the generating and transmission facilities and to repay with interest all of the investment in generation and transmission facilities over a reasonable period of time.

Program: Power Marketing.

Primary Computer Resource: 1 - Prime 6150

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: MIDAS
Scientific/Engineering: MIDAS
Largest Software Applications: Integrated Financial Accounting System, Load Flow Analysis System

Telecommunications Support: Voice service provided by electronic key and microwave system; unclassified TWX, TELEX, and facsimile service; limited PC LAN.

A.44 Stanford Linear Accelerator Center, P.O. Box 4349, Stanford, CA 94309

Function: The Stanford Linear Accelerator Center (SLAC) is dedicated to research in elementary particle physics and to the development of new techniques for accelerators and experimental apparatus. SLAC also has several hundred collaborators involved in ultraviolet and x-ray synchrotron radiation research in many different scientific fields. SLAC is operated as a national facility so that scientists from universities and research centers throughout the world may participate in high energy research programs. The management and operating contractor is Stanford University.

Program: High Energy Physics.

Primary Computer Resource: 1 - IBM 9021/580 and 1 - IBM 3081K.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: SPIRES, Nomad, ORACLE
Scientific/Engineering: SPIRES, Nomad, ORACLE

Telecommunications Support: Voice and data communications services provided through several service contracts with various telecommunications providers; dedicated networks; radio systems; a high speed microwave link; and ESNET backbone support high energy physics research and administrative functions.

A.45 Strategic Petroleum Reserve Project Office, 900 Commerce Road East, New Orleans, LA 70123

Function: The Strategic Petroleum Reserve consists of underground petroleum storage facilities which are filled and/or being developed in large salt domes in Louisiana and Texas. Private industry contractors perform the bulk of the engineering, construction, and operating work involved in the reserve. The stored petroleum will be used by the commercial petroleum distribution network during a severe petroleum interruption. Boeing Petroleum Services is the management and operating contractor.

Program: Fossil Energy Research and Development.

Primary Computer Resources: 1 - IBM 3090-150E and network connecting reserve facilities and Washington.

Primary Computer Software:

Data Base Management Systems:

Admin/Bus/Manufacturing: FOCUS

Largest Software Applications: Materials Management System, Refinery Capacity System

Telecommunications Support: Integrated voice/data CBX systems in Louisiana and Texas; significant VHF radio systems supporting reserve functions; Communications interfaces with commercial pipeline communications systems; secure narrative service (including SACNET) to Washington; facsimile; cellular phone service and digital paging system.

A.46 Superconducting Super Collider Laboratory, 2550 Beckleymeade Ave., Dallas, TX 75237

Function: The Superconducting Super Collider Laboratory is a high energy physics research facilitiy established to design, build, maintain, and operate a high energy subatomic particle accelerator that will be used in basic research to learn more about the fundamental nature of matter and energy. When completed in 1999, the supercollider will be the most powerful subatomic particle accelerator in the world.

Program: High Energy Physics.

Primary Computer Resource: 2 - DEC VAX 6420, 2 - DEC VAX 3400.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: POWERHOUSE, Datatrieve
Scientific/Engineering: Sybase, INFORMIX

Telecommunications Support: Leased voice and data communication services

A.47 Western Area Power Administration, P.O. Box 3402, Golden, CO 80401

Function: The Western Area Power Administration was created by Congress in 1977 and is responsible for electric power marketing and transmission functions in 15 central and western states encompassing a 1.3-million square mile geographic area. It maintains and operates an extensive high-voltage transmission system.

Program: Power Marketing.

Primary Computer Resources: 2 - DEC VAX 11/786, 1 - DEC VAX 8810, 3 - Prime 9955, 1 - Prime 9950, 2 - Prime 2755, 5 - Prime 9955 II, 1 - Prime 6350, 2 - Prime 4150, and 1 - Prime 4050.

Primary Computer Software:
Data Base Management Systems:
Admin/Bus/Manufacturing: PRISAM, Midas plus, ORACLE, INFO, DBMS/ROAM
Scientific/Engineering: RDB
Largest Software Applications: Financial Management System, Power Billing Management Information System, Western Warehouse Inventory Management System

Telecommunications Support: Shares leased voice system with the National Renewable Energy Laboratory (NREL); unclassified TWX, TELEX, and facsimile services; electronic mail; operates distributed data network to Regional Offices in support of power distribution system; microwave radio systems support operations and maintenance of power transmission systems.

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