# ANL Site Response for the DOE FY1994 Information Resources Management Long-Range Plan

Argonne National Laboratory, with facilities in the states of Illinois and Idaho, is owned by the United States government, and operated by The University of Chicago under the provisions of a contract with the Department of Energy.

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By

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March 1992

Acknowledgments

Many participants throughout the Laboratory have contributed time and materials necessary to complete the *ANL Site Response for the DOE FY1994 Information Resources Management Long-Range Plan.* The Computing Policy Committee, representatives of the Associate Laboratory Directors, the Strategic Planning Office and many members of Computing and Telecommunications provided extensive reviews and valuable comments.

Representatives of all divisions and programs, the Associate Laboratory Directors, the Chief Financial Officer, and the Chief Operations Officer provided the majority of the program narrative and statistics.

The Computing Policy Committee provided overall comments and direction relative to the strategy for computing and telecommunications at Argonne National Laboratory. The Strategic Planning Office reviewed the *Site Response* for consistency with the *ANL Institutional Plan.*

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Section A

Site Introduction

Argonne National Laboratory's *ANL Site Response for the DOE FY1994 Information Resources Management (IRM) Long-Range Plan* (ANL/TM 500) is one of many contributions to the DOE information resources management long-range planning process and, as such, is an integral part of the DOE policy and program planning system. The Laboratory has constructed this response according to instructions in a Call issued in September 1991 by the DOE Office of IRM Policy, Plans and Oversight.

As one of a continuing series, this *Site Response* is an update and extension of the Laboratory's previous submissions. The response contains both narrative and tabular material. It covers an eight-year period consisting of the base year (FY1991), the current year (FY1992), the budget year (FY1993), the plan year (FY1994), and the out years (FY1995-FY1998). This *Site Response* was compiled by Argonne National Laboratory's Computing and Telecommunications Division (CTD), which has the responsibility to provide leadership in optimizing computing and information services and disseminating computer-related technologies throughout the Laboratory.

The *Site Response* consists of four parts. Part 1, "Site Overview," describes the ANL mission, overall organization structure, the strategic approach to meet information resource needs, the planning process, major issues, and points of contact. Part 2A, "Software Plan for DOE Contractors," defines the current and planned automated information systems associated with the management of ANL, the stewardship of its resources, and the provision of day-to-day general operations and services. (Part 2B, "Software Plan for DOE Organizations," and Part 2C, "FMS Plan for DOE Organizations," do not apply to Argonne National Laboratory.) Part 3, "Computing Resources," defines the requirements, resources, acquisitions, and budget for computing at ANL for FY1991 through FY1998. Part 4, "Telecommunications," documents the existing and planned telecommunications resources required at ANL from FY1991 through FY1998. Part 5, "Printing and Publishing," updates the ANL Printing and Publishing Activities Plan (FY1993-FY1995) and contains the FY1991 Printing Activities Reports.

The ANL-W facility is located at the Idaho National Engineering Laboratory (INEL), which is administered by DOE-ID. As the landlord of the INEL, DOE-ID through its prime contractor EG&G provides local voice telephone and radio communications facilities at the INEL, and these items are reported in the INEL *Information Resources Management Long-Range Plan*. The computing resources used by ANL-W are included in this *Site Response* as well as all inter-Laboratory data communication between ANL-E and ANL-W.

The Computing and Telecommunications Division prepared this report with the assistance and cooperation of the many Laboratory organizations that are involved with planning, acquiring, and providing information resources. The Computing Policy Committee, Associate Laboratory Directors, Division Directors, and Program Managers supplied data for the computing requirements sections. Additional information required in the total plan preparation came from a variety of sources, including computer use and billing records, the Laboratory-wide equipment inventory list, acquisition plans, and information from knowledgeable people in Computing and Telecommunications Division and other Laboratory organizations. The report provides data related to all aspects of information resources management at the Laboratory.

Section B

Site Profile and Missions Supported

SITE PROFILE

Argonne National Laboratory is a large multiprogram laboratory conducting basic and technology-directed research at two sites owned by the U.S. Department of Energy. Argonne-East is located on a 1700-acre site in DuPage County, Illinois, about 25 miles southwest of Chicago. Argonne-West is located on an 800-acre tract within the Idaho National Engineering Laboratory, about 35 miles west of Idaho Falls, Idaho. Exhibit 2.1 depicts the organization of the Laboratory.

Exhibit 2.1: ANL Organization Chart
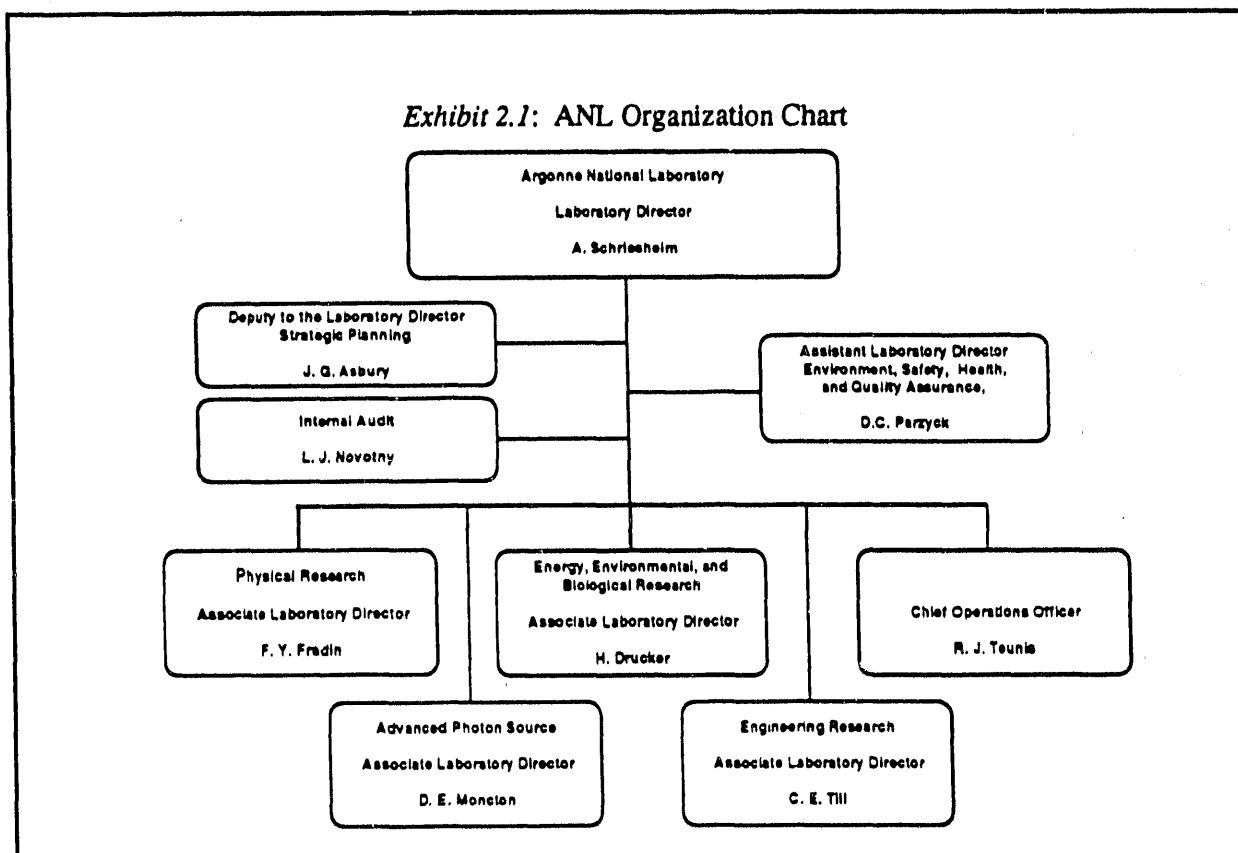
Argonne-East

Activities at Argonne-East support the full range of missions for Argonne National Laboratory. Major facilities at the site include the Intense Pulsed Neutron Source, the Argonne Superconducting Tandem Linear Accelerator System (ATLAS), and the High-Voltage Electron Microscope. All these facilities are heavily used by researchers outside Argonne. Construction of the Advanced Photon Source began on June 4, 1990.

Argonne-East also houses a full spectrum of administrative and technical support organizations as well as the DOE Chicago Operations Office and the New Brunswick Laboratory, both of which use facilities operated and maintained by Argonne.

Altogether, Argonne-East houses roughly 5,300 persons, of whom about 3,800 are regular Argonne employees. The Argonne-East site includes 131 buildings with 3.7 million total square feet of floor space. Almost all buildings and site infrastructure were built between 1948 and 1986, with most construction during the 1950s and early 1960s. In addition, the Laboratory is leasing 94,000 square feet of office space in a commercial park near the Argonne-East site to alleviate a temporary space shortage during construction of the Advanced Photon Source. The replacement value of existing facilities at Argonne-East is estimated at $1.1 billion.

Argonne-West

Argonne-West accommodates major national experimental facilities designed for studying a broad range of issues important for developing advanced fission reactors, usually designs incorporating cooling by liquid metal. Major facilities at the site are the Experimental Breeder Reactor II (EBR-II), a small, sodium-cooled, pool-type fast reactor with a power plant rated at 20 MWe; the Fuel Manufacturing Facility, used to fabricate nonplutonium-bearing metal fuel assemblies for EBR-II; the Transient Reactor Test Facility, a reactor designed for high-power-transient safety tests on both thermal-reactor and fast-reactor fuels; the Zero Power Physics Reactor, a zero-power, split-core assembly that provides full-size physics mockups of fast-reactor cores up to 1,000 MWe in size; the Hot Fuel Examination Facility, a hot-cell facility with an argon atmosphere cell designed for handling and examining large experiments containing sodium and plutonium; and, the Fuel Cycle Facility (FCF), originally used for on-site reprocessing and refabrication of metallic fuel for EBR-II. Current plans call for modifying the FCF in order to demonstrate the pyrometallurgical fuel cycle of the Integral Fast Reactor (IFR) concept in a cost-effective manner. A full array of shops, warehouses, laboratories, offices, and utility systems supports these major facilities.

Argonne-West houses approximately 765 full-time employees plus 50 consultants and students. The site has 33 buildings with 600,000 square feet of floor space. The buildings and other infrastructure were built between 1958 and 1986 with most construction during the mid to late 1960s. Replacement value of the existing facilities at Argonne-West is estimated at $285 million.

SITE MISSIONS

The Laboratory's mission is basic and applied research that supports the development of energy-related technologies.

National Research Facilities

- Development and operation of national facilities for use by university, industry, and national laboratory groups in research on basic and technology-related problems; development of advanced instruments and methods for facilities-centered research. Argonne operates several major national user facilities; notably the Intense Pulsed Neutron Source, the Argonne Tandem Linear Accelerator System, and the Advanced Computing Research Facility. The Laboratory is constructing the Advanced Photon Source, the world's most brilliant source of X-rays for use in forefront research in science and technology.

Basic Research

- Experimental and theoretical research on fundamental problems in the physical, life, and environmental sciences to advance scientific understanding in general and to support development of energy technologies. Major research thrusts include advanced techniques using synchrotron radiation for research in the physical and life sciences, algorithms and tools for massively parallel computers, studies of the human genome, synthesis of advanced materials, and detector systems for the Superconducting Super Collider.

Technology-Directed Research

- Conceptualization, design, and testing of advanced fission-reactors, especially liquid metal reactors, and other technologies for power applications in the civilian and defense sectors; supporting research to overcome materials, chemical, and electrochemical barriers to the development of these technologies. The Laboratory's core competencies in these areas are focused on the Integral Fast Reactor, advanced batteries and fuel cells, thermal sciences, biotechnology, materials and components that are superconducting at relatively high temperatures, and advanced coal technology.

Technical Evaluation

- Characterization and evaluation of nationally important projects and technology options in terms of their environmental, cost, or other implications. Laboratory activities in this area include site-specific environmental impact and remediation studies, evaluation of advanced energy technologies, and assessments of environmental regulatory policy.

Technology Transfer

- Transfer of Laboratory technologies to the private sector for commercialization through cooperative research and development agreements, sponsored research, staff exchanges, the licensing of intellectual property, and the formation of new firms. The ARCH Development Corporation licenses technology and, where appropriate, organizes new firms.

In carrying out its missions, Argonne conducts work for each of DOE's program secretarial offices. A large proportion of its work is, however, concentrated in two areas: basic energy sciences, where the Advanced Photon Source and associated facilities are prominent, and advanced reactor technology, where development of the Integral Fast Reactor is the focus. Basic energy sciences and advanced reactor technology currently constitute half of all Argonne research.

Argonne's policy in conducting its missions is that environment, safety, and health receive the highest priority in the Laboratory's operations. All research and operational programs are conducted so that first consideration is given to worker and public safety and protection of the environment.

Argonne works closely with colleges and universities. Participation by faculty and students in Laboratory programs brings their talents to bear on important research problems and contributes to the education of future scientists and engineers. The Laboratory also conducts many programs for precollege students and faculty to enhance mathematics and science education. A particular purpose of these programs is to encourage members of underrepresented societal groups to enter careers in science and engineering.

GOALS AND OBJECTIVES

The Laboratory's goals for addressing five national research and development policy objectives are as follows:

Energy Technology

To develop, test and carry to proof-of-concept technologies that can substantially improve the safety and reduce the costs of fission energy systems. To conduct base-technology research to understand and remove barriers to the development of other advanced energy technologies.

Science And Technology

To maintain the excellence of existing programs, while developing initiatives at scientific frontiers that will lead to development of advanced energy technologies. To develop and operate user facilities that support the advancement of science and technology across a wide range of disciplines. To develop innovative experimental concepts and instrumentation.

Environmental Quality

To continue to strengthen existing programs and broad capabilities in environmental sciences and technology, while undertaking research that contributes significantly to the solution of major national problems.

Industrial Competitiveness

By strengthening associations with industry, to establish and accomplish research objectives that will improve the competitiveness of U.S. industries that depend on energy-related technologies and manufacturing processes.

National Security

To apply the Laboratory's unique technical resources to define and solve problems encountered in the development of advanced defense technologies.

The specific research initiatives to support the Laboratory goals identified above are more fully described and documented in the *ANL Institutional Plan, FY1992-FY1997*, December 1991.

Research in both the physical and life sciences will increase. A substantial part of the expanded work in Energy Research involves activities needed to construct and operate the APS and associated research centers and facilities.

Work in Nuclear Energy will expand over the next five years, as the Laboratory proceeds with testing and evaluation of the complete IFR fuel cycle and undertakes a major program to develop an actinide recycling technology for spent fuel from light-water reactors. Overall effort in the areas of Fossil Energy and energy conservation is expected to remain roughly stable.

Support for New Production Reactors will trend downward as work on the environmental impact statement is completed and engineering development issues are resolved.

Activity for Environmental Restoration and Waste Management will expand greatly because of cleanups at the Argonne sites and research and development and technical support for cleanups at other major DOE sites. (FY1990 activity is represented as zero because it was funded through other secretarial offices under obsolete Budgeting and Reporting codes.)

The Department of Energy will continue to fund well over 80 percent of Argonne research. Industrial participation will increase across all major program areas, but private funding will remain less than 5 percent of the Laboratory total. Support of defense-related work by sponsors other than DOE will not exceed 10 percent.

FUNDING SOURCES

Argonne is anticipating an operating budget of approximately $392 million ($BA) for FY1992. The Laboratory employs approximately 4,500 persons, including approximately 2,400 scientists and engineers. More detailed information on the Laboratory's budget for FY1992 appears in Exhibit 2.2 in the various DOE Assistant Secretary categories as well as Work for Others.

Exhibit 2.2: ANL FY1992 Laboratory Funding

(By Secretarial Office -- Estimated Operating Funds -- $Million-BA)

Argonne National Laboratory Institutional Plan FY1992-FY1997, November 1991
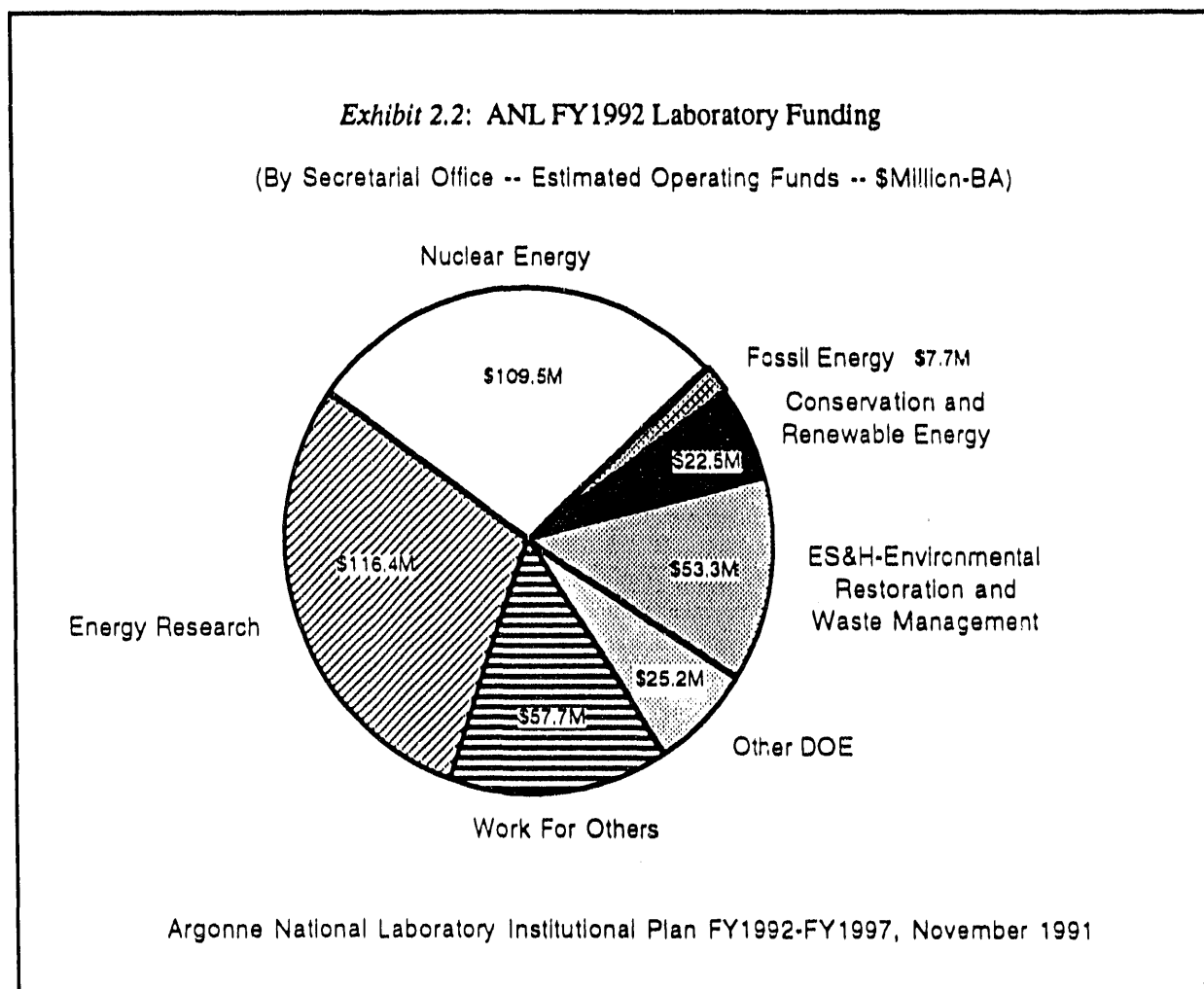
Section C

Site Information Resources Management Strategic Overview

The Role of Information Resource Management Organizations

The success of virtually all major Argonne and DOE programs depends heavily on easy access to computing and telecommunication resources. The role of the information resource management organizations of the Laboratory is to plan for and guide the acquisition of resources required by the programs of the Laboratory. The organizational structure of the Laboratory's information resources management appears in Exhibit 3.1

The *Laboratory Management Council* consists of the Laboratory Director, the programmatic Associate Laboratory Directors, the Chief Operations Officer, the Assistant Laboratory Director for Environment, Safety and Health/Quality Assurance Oversight, the Chief Financial Officer, and the Deputy to the Laboratory Director. It is the Laboratory body which formally approves all Laboratory policies and procedures. The Management Council reviews and approves long-term computing resource development strategy.

The *Chief Operations Officer* has responsibility for coordinating the overall planning and implementation of information resources management, for executing Laboratory-wide computing policies and procedures, and for recommending approval of new policies and procedures to the Laboratory Management Council.

The *Computing Policy Committee* is responsible for formulating ANL's overall computing policy and plans for scientific and administrative computing for departments and for Argonne as a whole. It also recommends to Laboratory management equitable policies for allocation of the Laboratory's shared computational resources and addresses such issues as internal standardization of computing hardware and software.

The *Administrative Data Processing Oversight Committee* (ADPO) is charged with overseeing implementation of the Laboratory's long-range administrative data processing strategy. ADPO reviews, evaluates, and ranks candidate projects for new development and enhancements of administrative management information systems and recommends levels of funding and scheduling to the Laboratory's Chief Operations Officer. The Computing and Telecommunications Division drafts plans and prepares recommendations for ADPO and works with ANL divisions, departments, user groups, and Laboratory management to identify specific needs and opportunities.

The *Computing and Telecommunications Division* has primary responsibility for planning the computing and telecommunications environment necessary to achieve the goals of Argonne's scientific and technical programs and administrative organizations. The Computing and Telecommunications Division and the Electronics, Procurement, and Materials and Services Departments of the Laboratory provide planning, acquisition, inventory assistance and services to the programs of the Laboratory.

The *Computer Users Group* and its subcommittees are forums where interested users of the Computing and Telecommunications Division (representing programs throughout the Laboratory) meet on a regular basis to discuss problems, suggestions for improvement, and other important issues concerning Laboratory information resources management.

Exhibit 3.1: Information Resource Management Organization

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                    │   Argonne National  │
                    │  Laboratory Director│
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              ┌────────────────┴────────────────┐
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    │Associate Laboratory│            │ Chief Operations│
    │Director for Physical│           │    Officer      │
    │    Research     │              └────────┬────────┘
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    │  Computing and  │      │Computing Policy│ │ Administrative Data│
    │Telecommunications│     │  Committee   │  │Processing Oversight│
    │    Division     │      │              │  │    Committee     │
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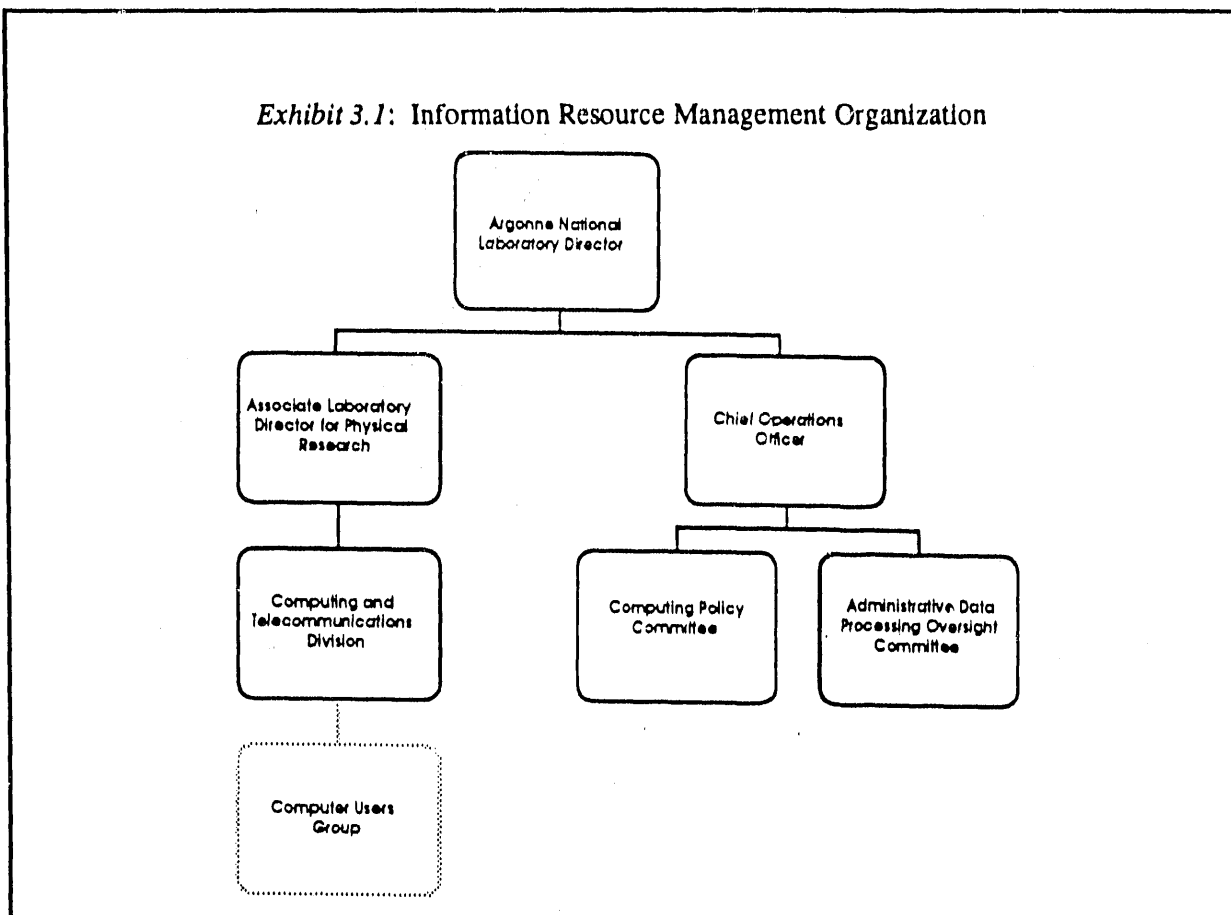
Strategic Overview

The scientific, engineering, and administrative activities of the Laboratory are heavily dependent upon the availability of computing and telecommunications resources. Furthermore, this dependence and the importance of computing and telecommunications to the Laboratory's programs will grow substantially in the future. Because of the crucial importance of computing and telecommunications resources, the Laboratory continues to pursue a long-term information resource management strategy that encompasses a complete integrated hierarchy of computing capabilities: supercomputers, centralized general purpose computers, multipurpose minicomputers, scientific and engineering workstations, and computing workstations and office automation support systems--all coupled together through an effective communications network. The most critical element of this strategy is the availability of advanced high-speed computers, which will provide new programmatic computational opportunities for Argonne researchers. With such a hierarchy available through an effective network, individual researchers will have transparent and easy access to the specific level of computing resources they require to pursue their activities.

Supercomputing

One of the more critical strategic needs of ANL's research programs is access to substantial supercomputer resources. The latent demand for access to supercomputing by ANL researchers has been demonstrat-

ed by the programs funded by Energy Research (ER). Annually, ANL Energy Research and Fusion Power researchers develop proposals requesting a significant portion of the available resources of the computing center at the National Energy Research Supercomputer Center (NERSC). The actual allocation of time in past years has only partially satisfied this demand. Other major segments of the Laboratory's programmatic activities (e.g., the Reactor Program) also require access to the highest speed computers available, but they do not have similar opportunities for access to substantial allocations of external supercomputing resources.

To meet the expanding needs of computational scientists, the Laboratory's strategy is to provide substantial onsite supercomputing capability based upon state-of-the-art vector supercomputers, to provide access to offsite supercomputing centers available to ANL scientists, and to develop advanced computational resources based on parallel processing. Closely coupled in this strategy are the development and implementation of high-speed networking capabilities and scientific visualization resources to meet the computational demands of real-time, interactive scientific computing. Our strategy is to allow users to access the local and remote supercomputing resources from their normal computing environment. This has been accomplished by providing users access from the central IBM computers as well as distributed DECnet and TCP/IP based local area networks.

An important step in the modernization and upgrading of the Laboratory's central computers was taken with installation of a Cray X-MP/14 supercomputer in FY1988. This computer provides five times the processing capability of the Laboratory's IBM 3084QX computer for scientific and engineering computations. This high performance computer has sufficient capacity and capability to satisfy a substantial portion of the demand for high-speed onsite computing resources. The memory size of the Cray was increased to eight megawords in FY1991.

The Laboratory may consider replacement opportunities for the Cray X-MP/18. Advances in microprocessors developed since Argonne's acquisition of the Cray X-MP may permit a more cost effective high performance computing platform to be obtained for the Laboratory. A replacement could offer larger memory and so permit the solution of problems with greater geometric detail, finer physical resolution, or increased numbers of phenomenological variables. Additionally, a replacement could offer multiple processors and so the capability for parallel processing and greater throughput.

In the area of offsite supercomputing access, Argonne National Laboratory has joined several leading U.S. research institutions to form the Concurrent Supercomputing Consortium (CSC). Through the CSC, Argonne researchers have access to the Touchstone DELTA System. The DELTA, currently the world's fastest computer with a peak speed of 32 gigaflops, will enable researchers to start tackling the Grand Challenges in science and engineering. Argonne is also actively pursuing the establishment of a High-Performance Computing Research Center. The center will be the focus for Argonne's high-performance computing activities and will provide the environment for development and evaluation of software, tools, and methods for parallel computing. The center will have two types of hardware· full-sized systems, supported by extensive networking, visualization, and data systems infrastructure; and modest-scale experimental or research prototypes. ANL is also continuing development of its capability to utilize effectively the ER supercomputing resources allocated to ANL. ANL has worked closely with NERSC and ER to establish a major ESnet network node at ANL, to serve not only ANL but also Midwest universities, which are heavy users of the NERSC facilities.

In the long term, ANL will continue to pursue initiatives to meet the Laboratory's growing computing resource requirements by using parallel supercomputer architectures and networks of distributed workstations working concurrently. Current research activities in this area are being conducted by several scientific divisions, as well as the Mathematics and Computer Science Division, the Computing and Telecommunications Division, and the Environmental Assessment and Information Sciences Division.

Centralized General Purpose Computing

The Laboratory's general-purpose computing requirements are met primarily by centrally maintained and operated IBM and VAX processors. These resources include an IBM 3084QX and a DEC VAX Cluster (VAX 8700 and VAX 6410). The IBM 3084QX is used for both scientific and administrative computing. IBM-compatible computing capability continues to be an essential Laboratory-wide resource relative to 1) cost-effective sharing of expensive input/output devices; 2) maintaining Laboratory-wide databases; 3) providing front-end processing for the Cray X-MP/18; 4) performing scientific work that cannot be cost effectively performed on the Cray X-MP/18; 5) serving administrative systems; and 6) providing some scientific time sharing functions, particularly for text editors and graphics.

IBM-compatible cycles must be provided for administrative computing, as the Laboratory has made substantial investments in developing and acquiring approximately one million lines of code. The Laboratory is pursuing a strategy that encourages the purchase of software rather than in-house development, thus leveraging our maintenance dollars with other purchases of software. The greatest selection of powerful administrative application software is currently on IBM compatible hardware. The Laboratory has purchased three major IBM-based applications: payroll, personnel, and financial systems. During the next few years, the Laboratory will study major materials applications. It is likely that the Laboratory's major materials applications will be replaced with applications that will run on the centralized computer mainframes or on local area network servers with Laboratory-wide access provided through the central computer mainframes.

The Digital Equipment Corporation VAX 8700 and VAX 6410 computer systems with the VMS operating system provide shared, general-purpose, interactive computing services. The VAX cluster is a flexible, full-featured computing system that enables the Computing and Telecommunications Division to provide a broad range of computer-based services. A vector processor, additional memory, and additional disk storage are planned for FY1992.

The clustered VAX service provides front-end processing capability for the Cray X-MP/18. Front-end capacity is necessary for job preparation and review of output as well as for the communications services necessary to transport data to and from the Cray-X-MP/18. In addition, the VAX Cluster is available to extend and improve the cost effectiveness and utility of the Laboratory's distributed VAX minicomputers. It improves and extends the IBM-based computing services and it provides new computing tools and services for the Argonne community. The cluster configuration serves as a focal point for the implementation of improved Laboratory-wide data communications services, giving Argonne users improved access to both internal and external computing network resources.

The Laboratory has purchased and installed the BASIS/TECHLIB system software for use on the VAX 8700. This software is used by the ANL Technical Information Service (TIS) to provide online access and bibliographic search capabilities for the Laboratory's researchers and library staff.

Multipurpose Minicomputers

The primary need for such computers has been for division or facility real-time data acquisition and analysis capabilities. However, workstations are supplanting multipurpose minicomputers, a trend that will result in a continued decrease in the minicomputer population. The Computing Policy Committee critically reviews all proposed procurements of minicomputers to ensure their effectiveness in this important complementary role. For those cases where a sizable use of a proposed minicomputer involves interactive or batch computing, the Computing Policy Committee conducts a detailed assessment to ensure that such use and acquisition represent a cost-effective approach to providing such capabilities as compared to use of the Laboratory's centralized computers.

Scientific and Engineering Workstations

Currently, several types of high performance scientific and engineering workstations are in use at Argonne. Predominantly, researchers are using Sun workstations, DEC RISCstations, IBM RISCstations, Silicon Graphics workstations, and workstations with Unix operating systems and TCP/IP communications for mathematical software programming and scientific and engineering applications. ANL has experienced increasing interest in this class of computing workstation for specific scientific and engineering applications. The computational power, graphics, and windowing capabilities of scientific workstations will provide scientists a popular platform for preparing work for and reviewing results from supercomputers and parallel processors.

The workstation environment at ANL is becoming increasingly more important to scientific computing. Workstations now are commonly used to conduct interactive sessions on remote computers with graphics and windowing capabilities. With emerging distributed file systems such as NFS and AlisaTalk, workstations are positioned to replace certain functions previously carried out by multi-user interactive systems. These functions include interactive file editing, review of output, communicating via electronic mail, and file management.

We expect that the acquisition of low-cost scientific workstations will continue at a brisk pace. To a lesser degree, scientists will acquire high-performance workstations for conducting computation-intensive calculations. Some production computing will move to high performance workstations and consume background CPU cycles or otherwise unused evening and weekend cycles. Many production codes, however, cannot easily be accommodated by this type of computing.

We expect the biggest benefit of workstations will occur as a result of increased distributed processing. Movement to standards like TCP/IP, Unix, NFS and X Windows enables increased workstation capabilities for interactive graphics display, graphics postprocessing, visualization, concurrent sessions on multiple hosts, and interactive debugging of supercomputer and mainframe applications.

CTD's strategy is to promote central capabilities and services that integrate well with workstations to create an effective distributed computing environment. Representative activities include providing X Window drivers for the DISSPLA graphics library, promoting the UNICOS cdbx interactive debugger with X Window capability, providing communications libraries for programming distributed applications, and providing IEEE data conversion routines for the Cray.

These and other activities will move workstations, supercomputers and related services closer to the notion of seamless computing (i.e., where the cooperative processing between workstation and supercomputer maximizes use of computer resources without significant user effort or awareness).

Computing Workstations and Office Automation Support Systems

Personal computers are being used for a wide range of activities including digital instrumentation, business applications, and scientific programming. The long history of digital instrumentation and the large number of experimenters provided a climate for the rapid introduction of personal computers into the Laboratory. The availability of electronic spreadsheets and database software is responsible for converting budget planning and other administrative activities to personal computers. As personal computers continue to increase in capability, capacity, and speed, they are given more consideration for scientific programming applications.

One of the growing uses of personal computers at Argonne is for computer-aided design stations for two-dimensional drafting. With the addition of the appropriate commercial software, personal computer-based workstations can provide some of the capability of larger minicomputer based and mainframe based computer-aided design (CAD) systems. In addition to IBM-based systems, a number of staff are using Macintosh computers as drafting and design stations. This use of personal computers as design stations is expected to increase in the future.

The Laboratory acquires workstations, personal computers, and office automation support systems in a cost-effective manner in accordance with the DOE-CH approved *ANL Statement of Site Strategy for Computing Workstations* (ANL/TM 458, Revision 3). The Laboratory has established basic goals for acquiring and installing computing workstations that integrate with and communicate with the other levels of the Argonne computing hierarchy.

PBX-based Digital Telecommunications System

Extensive telecommunications capabilities are essential to ANL's computing strategy. A key element in ANL's long-range planning is the PBX-based digital telecommunications system. This system, which is discussed in detail in Part 4, has been installed and was operational at the end of FY1987. The system benefits Argonne and DOE operations at the Illinois site through superior voice communication, improved flexibility to adapt to changes in operations, and improved scientific and administrative data communications. Argonne has a flexible system that is easily adaptable to changes within the Laboratory, and the Laboratory is in a much better position to take advantage of advances in communications for computing and in the entire sphere of automated information handling.

The PBX system at Argonne provides new capabilities for site-wide communication among terminals and computers. With a maximum bandwidth of 56 Kbaud at each telephone station, terminals and computing workstations scattered throughout the site are able to communicate at their full bandwidth (9,600 or 19,200 bits per second). In addition, the PBX has the capability of emulating a high-speed local area network. This capability provides a Laboratory-wide Ethernet and allows computers and workstations to communicate across the site.

Argonne has added a voice processing system to the PBX. The system is fully integrated with the PBX and has a present capacity for 1600 voice mailboxes and already has 1300 subscribers.

Fiber Distributed Data Interface (FDDI)

There exists a current and growing demand at Argonne for better interoperability between computers. This demand is dictated by the need to transfer large quantities of information between systems. Scientific visualization, Network File System (NFS) support, diskless workstation support, and the need for cooperative computing between computing systems are all examples of applications requiring high performance networking. These needs translate into a demand for networks that are faster and more reliable and span greater distances, making it imperative that the implementation of FDDI technology at Argonne proceed at an accelerated pace.

FDDI, the Fiber Distributed Data Interface, is an international networking standard. As such, it will become as important to the area of networking as the Ethernet standard is today. FDDI uses dual, counter rotating, token passing, fiber optic rings as its communication medium. This configuration provides an extremely reliable network which will continue to operate if part of the ring is physically broken. The data rate on the ring is 100 M bits per second (10 times Ethernet) and is capable of 80 percent efficiency (Ethernet performance begins to decrease at 35 percent capacity). Because of the dual ring configuration, it is possible to transmit data on both rings, thus doubling the 100 M bits per second data rate.

Argonne has Investigated FDDI, installed and tested a prototype FDDI network, and implemented a limited production FDDI network that serves several divisions. In the near future, Argonne plans to expand this prototype network to a production backbone network which runs throughout the Laboratory. General Physical Plant funds have been requested to install the fiber optic cable plant necessary for this expansion. Once the physical plant is in place, Ethernet LANs can connect to the FDDI backbone through Ethernet/FDDI routers. Hosts such as the Cray X-MP and Sun workstations are connected directly to the FDDI cable plant in order to use the full available bandwidth of FDDI. These types of connections will accommodate the applications mentioned above such as scientific visualization, NFS, diskless workstation support, and cooperative computing.

National and International Network Connections

The Laboratory maintains national and international network connections to provide file transfer, interactive access, and electronic mail capabilities to a large number of professional peers and potential collaborators. There are connections between the Internet and Laboratory computers that link major universities and laboratories together. The Laboratory's central IBM computers and DEC VAX computers also participate in BITnet, an international university file transfer network interconnecting over three thousand computers. The Laboratory is connected to ESnet, a T1 national network funded by DOE's Energy research program; ESnet provides a communications backbone for both HEPnet and the Internet. ESnet runs the DECnet and TCP/IP protocols. The Laboratory participates in the dedicated computer network for High Energy Physics Research (HEPnet) through the ESnet, interoperated with major High Energy Physics laboratories and university collaborators. The Laboratory's DECnet and TCP/IP based networks are linked to CICnet, a T1 regional network. A T3 National Science Foundation network (NSFnet) node was installed at Argonne in 1991. NSFnet runs the TCP/IP protocol. The Laboratory is represented on the CICnet Board of Directors, the HEPnet Technical Coordinating Committee, and the ESnet Technical Steering Committee.

Scientific Visualization

Scientific visualization is essential to effective use of supercomputing and computational science. It is widely recognized that visual methods are required to improve the timeliness and effectiveness of data analysis. Visual techniques must be developed to analyze the increasing volume of data generated by supercomputers and data acquisition systems. ANL scientists have begun to increase their reliance on images in addition to ordinary computer print output. The use of color and motion takes advantage of the human visual system for interpretation. Color establishes or emphasizes differences in data; animation reveals subtle change.

CTD visualization staff continue to collaborate with scientific researchers to visualize the results of scientific computations. CTD is considering alternatives for high-speed networking at rates of gigabits per second for transmitting video images for interactive visualization. CTD is establishing a scientific visualization facility which provides visualization services to the scientific community and conducts research in specialized visualization applications.

CTD is also working to establish a distributed computing environment where visual analysis tools are common. The effective combination of staff, networks, graphics standards, and workstations will speed the use and acceptance of scientific visualization. The capabilities that researchers need include a) easy to use generic tools to visualize data, b) capabilities to display images from computation-intensive applications in real time and to interact with the computation, c) the capability to review results of computations in animated sequences, and d) the capability to record animation sequences for archive or presentation. CTD expects that much of the capability of this computing environment will be accessible to researchers

at the workstations in their offices. Examples below describe hardware and software tools for visualization that CTD is pursuing.

ANL researchers have a large investment in Fortran codes that use the Disspla graphics library. To preserve that investment and yet give users new capabilities, CTD has developed an X Windows graphics driver for Disspla. The X driver permits users to generate images on the Cray X-MP/18 computer and display those images on workstations that use X Windows. The result is interactive animation of computational-intensive calculations.

CTD promotes the NCSA Image tool program for Macintosh and SUN workstations for data analysis. CTD provides classes to instruct users on how to modify Fortran programs to create multiple files of 2-D images that can be transferred for viewing to Macintosh or SUN workstations.

With the increase in population of SUN and Microvax workstations, CTD is evaluating capabilities of visualization packages for those systems. Precision Visuals PV-wave, AVS, and SUNVISION are products that enable the creation, display, and manipulation of 3-dimensional graphics.

In FY1990, CTD acquired specialized video recording equipment for stop-frame animation. A scan converter and an Abekas A60 digital disk recorder enable the recording of animations from workstations such as the Apple Macintosh, SUN, SGI and Stardent Titan. In FY1991, CTD established a Laboratory-wide service to provide video recording for users on a routine basis.

Section D

Site Information Resources Management Planning Process

Planning for information resources management at Argonne is a continuous process throughout the year, with heightened activity from October through January to prepare the formal annual Plan for the Department of Energy. This Laboratory-wide planning activity involves individual divisions and programs as well as the top Laboratory management. Principal responsibility for coordinating the Laboratory's effort and preparing the annual plan is vested in the Computing and Telecommunications Division.

Throughout the year, several standing Laboratory committees (Computing Policy Committee, Administrative Data Processing Oversight Committee, Computer Users Group, etc.) as well as special *ad hoc* committees meet to discuss, plan, and review computing and telecommunications strategies for the Laboratory.

The membership of these committees includes principal users of the resources as well as management personnel of the Laboratory. The Computing Policy Committee consists of 16 members and is currently chaired by the Deputy to the Laboratory Director. The committee includes the Chief Financial Officer, the Director of the Computing and Telecommunications Division, and staff members and management from the major scientific and engineering divisions. The Administrative Data Processing Oversight Committee, chaired by the Chief Financial Officer, consists of representatives of the major operations support organizations, the Director of the Computing and Telecommunications Division, and staff members and management from the programmatic divisions.

The Administrative Data Processing Oversight Committee (ADPO) issues a call each year to the appropriate Laboratory organizations for proposals to develop or enhance administrative computing and management information systems for the coming fiscal year. Prior to each fiscal year, ADPO reviews proposals and develops a ranked list of recommendations to the Laboratory's Chief Operations Officer. The Computing and Telecommunications Division prepares the management information systems plan and submits it to the Administrative Data Processing Oversight committee for review and approval. After approval by the Administrative Data Processing Oversight Committee, the management information systems plan and a letter of approval from the Administrative Data Processing Oversight Committee go to the Chief Operations Officer for review and concurrence.

ANL continues to develop a planning process based on the planning activities of the divisions and programs of the Laboratory. The Computing Policy Committee provides general guidance relating to broad Laboratory computing and telecommunications goals and objectives and reviews the formal submission of the *ANL Site Response to the DOE FY1994 Information Resources Management Long-Range Plan* to the Department of Energy. Each Associate Laboratory Director has appointed staff representatives to work closely with the Computing and Telecommunications Division in preparing the annual computing resources plan. Additionally, divisional and programmatic representatives are enlisted to develop the computing requirement projections for each individual program activity, as well as to provide the needed justifications and program narratives. The Computing Policy Committee critically reviews and approves drafts of the computing resources plan. Following this review, the Computing and Telecommunications Division submits the computing resources plan to the Chief Operations Officer for review and approval.

The Computing and Telecommunications Division prepares the Telecommunications Part of the *Site Response* after detailed analysis of the Laboratory's telecommunications needs. This analysis is based upon historical trends as well as detailed assessment of individual organizational needs. The Computing

and Telecommunications Division then submits the telecommunications part of the *Site Response* to the Chief Operations Officer for review and approval.

The Media Services and Technical Information Services Departments of the Information and Publishing Division prepare and submit Part 5, Printing and Publishing, of the *Site Response* to the DOE Argonne Area Office on behalf of the Chief Operations Officer.

The Chief Operations Officer receives all parts of the *Site Response* after review and approval by the appropriate Laboratory standing committees. After review and approval by the Chief Operations Officer, the *Site Response* is submitted to the DOE Argonne Area Office.

Section E

Discussion of General Comments/Major Issues

Section F

Points of Contact

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*Primary individual with respect to questions concerning the contents of the *FY1994 Information Resources Management Long Range Plan.*

Section G

Special Areas of Interest

A.   GOSIP Transition Plan

Argonne National Laboratory is committed to a transition to using Open System Interconnect (OSI) products as they become available in the market place. Argonne acquisitions will be compliant with the Government OSI Profile (GOSIP) as specified in the Federal Information Processing Standard Publication (FIPS PUB 146). It is the goal of the Laboratory to achieve interoperability between the Argonne site and other DOE sites by October 1, 1995, using GOSIP protocols.

The strategy that Argonne will use to effect the GOSIP transition is based on a number of activities:

*   Participation on DOE GOSIP committees,

*   Early prototyping and experimentation with GOSIP products,

*   Participation in the transport of OSI packets on national networks, and

*   Construction of gateways between GOSIP and other network protocols.

ANL Network Environment--The network environment at Argonne is described in detail in Parts 3 and 4 of the Site Response. Generally, the environment is heterogeneous in that the Laboratory has acquired computers and computing equipment from most of the major vendors (Cray, IBM, DEC, SUN, etc. to name a few). External network connections are also numerous and heterogeneous in nature--ESnet, HEPnet, BITnet, NSFnet, and CICNet. Network protocols in use include TCP/IP, DECnet, SNA, XNS, AppleTalk, etc. Any transition to new network protocols must thus protect the existing investment in computing and networking hardware and software. New systems and major upgrades to existing systems can clearly justify early use of GOSIP products; other systems will require gateways between the existing networks and the new GOSIP compliant networks.

GOSIP Accomplishments--Argonne has been an early supporter of GOSIP activities. It has members on both the DOE GOSIP Council and the DOE GOSIP Migration Working Group and thus has been active in helping DOE plan a smooth transition to the use of GOSIP in DOE and at contractor sites. Argonne is also involved with a number of other GOSIP activities, including:

ISODE--Argonne has OSI applications running on top of IP using ISODE on SUN Sparc workstations.

SUNLINK OSI--Argonne has OSI applications running on CLNS using SUNLINK OSI on a SUN workstation.

ESnet--An ESnet/OSI Working Group has been formed of which Argonne is a member. The Working Group has as its goal the transport of OSI CTLS packets.

EDWG--We are participating in the Energy Sciences DECnet working group responsible for planning and implementing DECnet/OSI.

CICnet Technical Committee--Argonne is chairing the CICNet Technical Committee that has as its goal the transport of OSI CLNS packets on the CICNet regional network on which Argonne has a node.

GOSIP Migration Plans--The GOSIP transition activities at Argonne follow the GOSIP transition strategy outlined above. Argonne personnel will continue to be represented on the DOE GOSIP Council and the DOE GOSIP Migration Working Group. Argonne will also continue to interact with the CICNet Technical Committee, the ESnet OSI Working Group, and the IETF OSI Operations Working Group. The following represent the activities and milestones that comprise the plan:

X.400/ISODE--This application is currently running on a SUN workstation. It is not fully GOSIP compliant because it uses IP at the lower levels. Argonne expects to continue testing X.400 by using this product as a part of the IETF OSI Operations Working Group activities in FY1992.

X.400/OSI--Argonne plans to test fully compliant products by using both IBM developed software for IBM RISC platforms and SUNLINK OSI for SUN platforms. Argonne will be testing interoperability between the ANL X.400 implementation and X.400 implementations at other sites by using the OSI routing capabilities of CICNet, ESnet, and NSFnet. These are all activities that were initiated in FY1991 and are expected to be completed in FY1992.

X.500/ISODE--Argonne currently has X.500 configured for a SUN workstation. A test database for the system was built and made operational in the summer of 1991.

X.500/OSI--As yet Argonne is unaware of any commercial X.500 implementations that are fully GOSIP compliant. Argonne expects such implementations to be available well before August 1993 when Version III of GOSIP will require X.500 to be functional.

VT/ISODE--Argonne currently has the virtual terminal application configured on a SUN platform by using IP at the lower levels. Argonne does not plan extensive testing of this application until late FY1992.

VT/OSI--Fully GOSIP compliant virtual terminal products will not be required until GOSIP Version II is approved in March 1992. Argonne does not expect to have virtual terminal software available for testing before the spring of 1992.

FTAM/ISODE--Argonne currently has the file transfer protocol (FTAM) configured on a SUN platform by using IP at the lower levels. We plan to test this product along with the testing of the X.400/ISODE application in FY1991.

FTAM/OSI--Argonne plans to test fully compliant FTAM by using both the IBM developed software for the RISC platforms and the SUNLINK OSI software for SUN platforms. This activity was initiated in early FY1991 and will be completed in early FY1992.

FTAM/FTP--Argonne plans to test the IBM and SUNLINK OSI software described above and choose one to build a FTAM to FTP application gateway. We expect this gateway to be operational by August of 1992.

X.400/SMTP--Argonne plans to build a X.400 to SMTP mail gateway. We expect this gateway to be operational in FY1992.

FTS2000 X.25/OSI--Argonne plans to build a FTS2000 X.25 to OSI gateway that will allow mail and file transfer between the FTS2000 X.25 packet switch network and the Internet.

DECnet/OSI--It is expected that the Digital Equipment Corporation developed DECnet/OSI software will be fully GOSIP compliant and initially provide X.400 and FTAM OSI services. The DEC X.500 directory services product will be used in the DECnet/OSI implementation. The software availability has been delayed by DEC recently on several occasions. Our best estimate is that it will be available in the fall of 1992. Argonne plans to acquire and utilize DECnet/OSI shortly after it becomes available. Argonne will run a DEC station 5000 Ultrix name server for DECnet/OSI and plan to begin testing the name server in the third quarter of FY1992.

FDDI--Argonne has installed the first phase of a Laboratory-wide FDDI network connecting Buildings 221, 308, 362 and 900. We have plans in FY1992 to complete the Laboratory-wide FDDI backbone.

Network Management/CMIP--Argonne currently makes extensive use of SNMP based network management products. We plan to test the CMIP products as they become available.

GOSIP Procurement Strategies--Argonne procurement personnel have developed strategies for ensuring that procurements are compliant with GOSIP. User presentations have been prepared to inform users about GOSIP. A questionnaire has been prepared that users must fill out when obtaining communications equipment, software, or services. FIPS PUB 146 has been made available to interested users as have selected documents prepared by the DOE GOSIP Migration Working Group. A short document containing a description of the GOSIP requirement and answers to frequently asked questions has been prepared and distributed.

GOSIP Authorities--The following Argonne National Laboratory GOSIP Authorities are:

Acquisition Authority	Bernell Bohlmann	708-252-7137
Addressing Authority	Linda Winkler	708-252-7236
Registration Authority	Linda Winkler	708-252-7236
Protection Authority	Jean Troyer	708-252-7440

B.   E-MAIL RESOURCES

Argonne National Laboratory   E-Mail Resources   Schedule 1-1

1. Site Name: ARGONNE NATIONAL LABORATORY

2. E-Mail System Used: CMS NOTE   X.400 [ ]

3. System Location: LOCAL [ ]   OTHER

4. System Service Area: LOCAL [X]   NATIONWIDE [X]   INTERNATIONAL [X]

5. Number of Subscribers: 1000

6. System To System Interconnection:

7. Future Plans for E-Mail Upgrade or Acquisition:

8. System Administrator: RAYMOND CARLSON

9. FTS Number: 252-5805

10. Commercial Number: 708-252-7805

11. Address:

Argonne National Laboratory   E-Mail Resources   Schedule 1-1

1. Site Name: ARGONNE NATIONAL LABORATORY

2. E-Mail System Used: VMS MAIL   X.400 ☐

3. System Location: LOCAL ☐   OTHER

4. System Service Area: LOCAL ☒   NATIONWIDE ☒   INTERNATIONAL ☒

5. Number of Subscribers: 600

6. System To System Interconnection: MULTINET TCP/IP CONNECTS VMS MAIL TO INTERNET

7. Future Plans for E-Mail Upgrade or Acquisition:

8. System Administrator: RICHARD RAFFENETTI

9. FTS Number: 252-8497

10. Commercial Number: 708-252-8497

11. Address:

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Argonne National Laboratory　　　　　**E-Mail Resources**　　　　　Schedule 1-1

1. **Site Name:**　ARGONNE NATIONAL LABORATORY

2. **E-Mail System Used:**　CC:MAIL　　　　　　　　　　　　　　　　　X.4CC☐

3. **System Location:**　　　LOCAL☐　　　　OTHER

4. **System Service Area:**　　　LOCAL ☒　　　NATIONWIDE ☒　　　INTERNATIONAL ☒

5. **Number of Subscribers:**　30

6. **System To System Interconnection:**　SMTP GATEWAY CONNECTS CC:MAIL TO INTERNET

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7. **Future Plans for E-Mail Upgrade or Acquisition:**

8. **System Administrator:**　JAMES REGULA

9. **FTS Number:**　252-7622

10. **Commercial Number:**　708-252-7622

11. **Address:**

Argonne National Laboratory   E-Mail Resources   Schedule 1-1

1. Site Name: ARGONNE NATIONAL LABORATORY

2. E-Mail System Used: QUICKMAIL   X.400 ☐

3. System Location: LOCAL ☐   OTHER

4. System Service Area: LOCAL ☒   NATIONWIDE ☒   INTERNATIONAL ☒

5. Number of Subscribers: 400

6. System To System Interconnection: APPLETALK; SMTP GATEWAY CONNECTS QUICKMAIL
   TO INTERNET

7. Future Plans for E-Mail Upgrade or Acquisition:

8. System Administrator: DAVID LIFKA

9. FTS Number: 252-3251

10. Commercial Number: 708-252-3251

11. Address:

Argonne National Laboratory   E-Mail Resources   Schedule 1-1

1. Site Name: ARGONNE NATIONAL LABORATORY

2. E-Mail System Used: UNIX MAIL   X.400 ☐

3. System Location: LOCAL ☐   OTHER

4. System Service Area: LOCAL ☒   NATIONWIDE ☒   INTERNATIONAL ☒

5. Number of Subscribers: 300

6. System To System Interconnection:

7. Future Plans for E-Mail Upgrade or Acquisition:

8. System Administrator: RICHARD CARLSON

9. FTS Number: 252-7289

10. Commercial Number: 708-252-7289

11. Address:

Argonne National Laboratory   E-Mail Resources   Schedule 1-1

1. Site Name: ARGONNE NATIONAL LABORATORY

2. E-Mail System Used: PROFS   X.400 ☐

3. System Location: LOCAL ☐   OTHER

4. System Service Area: LOCAL ☒   NATIONWIDE ☒   INTERNATIONAL ☒

5. Number of Subscribers: 143

6. System To System Interconnection: PROFS EXTENDED MAIL GATEWAY TO INTERNET

7. Future Plans for E-Mail Upgrade or Acquisition:

8. System Administrator: FRAN CARNAGHI

9. FTS Number: 252-5425

10. Commercial Number: 708-252-5425

11. Address:

Part 2

Software Plans (Parts 2A, 2B, and 2C)

Section A

Software Plan for DOE Contractors

Administrative computing at the Laboratory has been primarily concerned with building computer systems to automate operational tasks within the non-programmatic business units. Today's challenge is to get information into the hands of the decision-makers of the Laboratory when they need it and in a form they can easily use.

The Administrative Data Processing Oversight Committee was formed by the Chief Operations Officer in October 1982 for the purposes of:

*   Advising Laboratory management and the Computing Policy Committee regarding administrative computing issues.

*   Formulating policy for administrative computing.

*   Acting as an advocate for the establishment of administrative computing policy.

*   Recommending funding and schedules for new equipment, new software development, and enhancements for all administrative computing systems.

The Committee's recommendations for the allocation of Laboratory resources for administrative computing projects are based on an analysis of benefits and costs as well as on the extent to which such projects can enable the Laboratory to achieve the following goals:

*   Manage information as a Laboratory resource.

*   Provide integrated business systems.

*   Develop an integrated infrastructure for administrative systems.

*   Promote standard business practices.

*   Promote user self-sufficiency.

*   Serve as advisors to builders of unofficial systems.

*   Develop more effective systems.

*   Provide expertise in developing and managing systems.

The systems identified in Section C of Part 2A are the major planned, developmental, and operational management Information Systems (IS) of Argonne National Laboratory that meet the criteria for being reported in the *ANL Site Response to the DOE FY1994 Information Resources Management Long Range Plan*. Additional detail on these systems appears in *A Plan For Administrative Computing At ANL FY1992 Through FY1994* (ANL/TM 489), November 1991.

A.   Software Management Plans and Strategies

Software Management

In anticipation of the formal implementation of DOE Order 1330.1C, Argonne has incorporated formal Software Management practices and activities in the charter of the Administrative Data Processing Oversight (ADPO) Committee.

The Administrative Data Processing Oversight Committee includes in its purview the planning, funding, and development of all official Laboratory business systems. Unofficial administrative systems that serve only an internal purpose for an organization are subject to review by the Committee if they meet any of the following criteria:

1.   Require more than $25,000 in purchased hardware and/or software.

2.   Require more than four months of technical effort.

3.   Interface with an existing official administrative system by transferring data between the systems.

4.   Manage information that is used by Laboratory personnel in another organization.

Developing information systems is an expensive process which consumes Laboratory resources. The Laboratory must have the assurance that development of business systems occurs in the most effective manner, that planned business systems do not duplicate existing systems, and that planned systems contain the proper interfaces to official systems. Management Information Systems (MIS) of the Computing and Telecommunications Division (CTD) acts as a resource for the Administrative Data Processing Oversight Committee for knowledge of computing resources and expertise in ANL's operating system. The area staff collects, distributes, and recommends priorities for proposals which affect administrative data processing and the Argonne computing environment.

The Administrative Data Processing Oversight Committee reviews proposed administrative computing projects at either regularly scheduled or special meetings. The proposal submissions cover the following points:

•   Statement of the Problem and Proposed Solution

•   Information Resource Issues and Technical Review

•   Participants and Schedule of Deliverables

•   Success Factors and Risks

•   Costs and Benefits

The full format for proposals to the Administrative Data Processing Oversight Committee appears in Appendix D of *Plan for Administrative Computing at ANL, FY1992-FY1994* with forms for cost and benefit analysis and examples of quantifiable and non-quantifiable aspects of the proposal. The cost benefit section of the proposal was modified to provide greater detail in accordance with Analysis of Benefits and Costs (ABC).

One of the responsibilities of the Administrative Data Processing Oversight Committee is to review proposals for administrative system projects and to recommend funding through the Laboratory General Expense Budget for those that provide a tangible cost benefit to the Laboratory, that are necessary to the continuing operation of the Laboratory, or that enhance the way the Laboratory performs its business functions. In addition, because of the limited resources available for administrative computing projects, the Committee sets priorities on projects that best fulfill the goals of administrative computing. The Committee may assign a priority to a project based on the goals for administrative computing and other management considerations, or the Committee may not recommend funding for the proposed project.

Projects reviewed by the Administrative Data Processing Oversight Committee vary in size and complexity. As necessary, the Committee requests assistance in the technical assessment of proposed projects from Computing and Telecommunications associate directors, section heads, and group managers. Generally, Computing Policy Committee approval is necessary for hardware acquisition. The Administrative Data Processing Oversight Committee submits a funding recommendation to the Chief Operations Officer for the approved projects. This funding recommendation is for the next fiscal year but proposals address mortgages for future fiscal years.

During the lifetime of an approved administrative computing project, the Administrative Data Processing Oversight Committee reviews the status of the project on a regularly scheduled basis, recommends redirection when necessary, reviews and approves major changes in project direction, and reports the findings to the Chief Operations Officer. Projects under review will utilize the following format for presentations:

- Statement of project charter and scope as approved

- Chart of major milestones as originally approved

- Narrative review of status of each milestone

- Anticipated and actual deviations from plan

- Potential problems and opportunities

As appropriate, the Committee will forward recommendations or the results of the review of a project to the Chief Operations Officer or the Computing Policy Committee.

In most cases, users initiate the request for the development of new applications and the enhancement or maintenance of existing applications written by the Laboratory. The initiating request for service may result from:

- an individual user organization, which perceives a specific need and communicates with a CTD analyst.

- MIS, which perceives a Laboratory-wide need, perhaps across functional areas, and communicates to Laboratory management through the Administrative Data Processing Oversight Committee.

Once a proposed project has become a reality and for as long as it is funded, MIS monitors the application throughout its existence from inception to replacement. The application undergoes development in phases, occupies a sensitivity rank, and is evaluated in the light of risk assessment, disaster recovery, and quality assurance. After the Chief Operations Officer has approved funding for a service request, the CTD staff has historically used a phased approach to proceed with the application. One of the established methods has been the use of SDM/70, a standard approach used for new application development and major enhancements to existing applications. It involves a series of chronological, well-structured, and well-documented phases. The eight SDM/70 phases fall into three major categories: analysis, design, and construction.

At the end of each phase, the requesting division or committee makes a decision on whether it is feasible to continue the development process. With the completion of each phase, the user's ability to estimate the benefits and costs of the application has improved, because the specifications for the application have become progressively more explicit. In the traditional structure of design phases, documentation of specifications accumulates until the final preparation and circulation of a formal document subject to review and approval by all involved parties. However, this structured phased appproach has proved to be a costly and time-consuming activity, so as part of its software management policies and procedures, CTD-MIS is documenting other approved techniques more recently available. For major applications, such as the Automated Materials/Payables System or the Integrated Financial System, representatives from the affected areas form steering committees to review and approve phases of the project. For all administrative data systems, the Administrative Data Processing Oversight Committee has a major role in defining administrative policies. A rewrite of software management policies and procedures will be completed and published during FY1992.

B. Software Initiatives and Resource Requirements

MIS performs business analysis, gathers the systems requirements, defines and examines the alternative solutions, and then designs and implements new official administrative computing systems for the Laboratory. MIS is responsible for the publication of *A Plan For Administrative Computing at ANL FY1992 Through FY1994*. In addition, the staff of Management Information Systems manage, enhance, and maintain approximately fifty-four administrative software applications. Expertise is provided in the areas of business analysis, feasibility studies, commercial software evaluation, systems design, database design, programming, and project management in both the IBM and Hewlett-Packard computing environments. Although the administrative divisions of the Laboratory are the principal customers of the Section, programmatic divisions also purchase services from MIS.

Contract analysts and programmers supplement the permanent staff when a large project requires a temporary expansion in effort. No subcontractors are currently scheduled to be used by Management Information Systems.

The personnel resources associated with administrative/business software are described in detail in *A Plan For Administrative Computing At ANL FY1992 Through FY1994*. The Computing and Telecommunications Division within Physical Research is organized into separate areas of responsibility in accord with the mission of the division. Management Information Systems constitutes a significant segment of the division's mission and is the responsibility of an Associate Division Director.

Within Management Information Systems, the staff, consisting of 23 full-time analysts and 4 operators, forms four groups: Financial Systems, Human Resource Systems, Information and Production Services, and Materials and Plant Systems. The Financial Systems implements and maintains the accounting and business systems of the Laboratory. The Human Resource Systems maintains the Laboratory's people-related systems, including personnel and payroll. Information and Production Services schedules most of the administrative batch computing on the IBM and Hewlett-Packard computers, submits jobs, verifies the results, and manages the output. This section also provides training and information for administrative computing users. Materials and Plant Systems develops and maintains those computer systems which order, track, and report the status of materials Laboratory-wide and those systems that record and report the various aspects of the Laboratory's physical plant.

The following administrative/business systems are worthy of special note:

- Argonne Material Order System (AMOS)

  AMOS is an integrated system for requisitioning, receiving and invoicing of commonly used materials held in selected vendor's warehouses rather than held in stock warehouses at the Laboratory.

- Automated Materials Payable System (AMPS)

  AMPS is an integrated Purchasing and Accounts Payable system that manages purchase orders from requisition to payment.

- Integrated Financial System (IFS)

  The Integrated Financial System (IFS) is a multi-year project that is replacing all financial software with commercial systems, where feasible. General Ledger, Financial Controller and Information Expert were put into production in mid-FY1989. Other aspects of the project include implementation of BrightView, Budgeting, Accounts Payable for CheckWriting, Purchasing for Internal Purchasing, and Budgetary Control.

- Integrated Payroll and Personnel System

  The Personnel and Payroll System is part of the Laboratory's Human Resource Management System with which it shares common data. The personnel components assist in the Laboratory's personnel record keeping and reporting activities. Terminals at the ANL East and West sites provide for update and review of employee records. The payroll components provide real time updating of data, produce payroll checks, and process retirement, absence, bond, overtime and benefits data.

- Automated Requisition Tracking

  The planned Argonne Requisition and Tracking System (ARTS) represents a first phase of improving the Laboratory's procurement and material system. ARTS will provide a CICS-based online requisitioning and inquiry capability for purchase requisitions. It will allow user organizations to use a system that is accessible Laboratory-wide to enter their purchase requisitions, route their requisitions for approval, and track their purchases both before and after the requisition is passed to the AMPS system.

- **Stock Tracker System (STS)**

  STS keeps track of material supplied through storerooms at ANL East and ANL-West. STS generates requisitions for stock replenishment and keeps track of inventory.

With respect to operating system software, the Computing and Telecommunications Operations component of CTD has primary responsibility for installing, maintaining, and protecting the integrity of central Cray, IBM, and VAX operating systems. The 12 to 16 systems programmers responsible for operating systems (including network operating systems) also work with and assist administrators of Sun and VAX distributed systems throughout the site.

Scientific/Engineering software is acquired, developed, and maintained by individual researchers and scientists in the programmatic divisions. Some of the more notable activities and developments in the area of scientific/engineering software are described in Section G of Part I and Section G of Part III of the *ANL Site Response to the DOE FY1994 Information Resources Management Long-Range Plan*. Additionally, scientific/engineering software of potential use and impact to other DOE organizations and sites are formally transmitted to and maintained for distribution by the National Energy Software Center, (NESC) as required by DOE Order.

The most significant ANL use or planned use of manufacturing oriented or computer-assisted-manufacturing applications (CAM) is within the Central Shops Department of the Support Services Division. Central Shops intends to acquire and use several manufacturing oriented software packages. Personnel resources to evaluate, support, and install such systems are provided by Management Information Systems. Additional detail on the manufacturing-oriented systems and plans of Central Shops is contained in *A Plan for Administrative Computing at ANL FY1992 through FY1994*.

C.   Software Reporting Requirements

No software development projects have a direct external impact or cost more than one million dollars to develop and implement.

Section B

Software Plan for DOE Organizations

None of the sections of Part 2B, SOFTWARE PLAN FOR DOE ORGANIZATIONS apply to Argonne National Laboratory.

Section A. Software Management Plans and Strategies

Section B. Software Initiatives

Section C. Personnel Resources Required

Section D. Software Reporting Requirement

Section E. Prior Year Software Accomplishments

Section F. Unmet Data Requirements and Software Changes

Section C

FMS Plans for DOE Organizations

None of the sections of Part 2C, FMS PLANS FOR DOE ORGANIZATIONS apply to Argonne National Laboratory.

Part 3

Computing Resources Plan

Section A

Requirements

A.   ADP Requirements Schedule

Part 1, the Site Overview, of the *Argonne National Laboratory Site Response to the DOE FY1994 Information Resources Management Long-Range Plan* describes the programmatic activities of the Laboratory with particular emphasis on the development of new major program areas. The Laboratory's continuing research programs and the new initiatives (either directly or through ancillary supporting programs) will necessitate additional increases in future computing resources at the Laboratory. These resources must cover the entire hierarchy of computer systems including supercomputers, centralized general purpose computers, multipurpose minicomputers, scientific and engineering workstations, personal computing workstations, and office automation support systems.

Part 3, the Computing Resources Plan, identifies the requirements for computing at ANL, the existing general purpose computers, and ANL plans to meet computing resource needs. The combination of these factors has prompted efforts at ANL for the modernization of ANL's computing resources. The focus of ANL activities addressing the future large-scale scientific and engineering computing at the Laboratory is the *ANL Site Response to the DOE FY1994 Information Resources Management Long-Range Plan.* This plan documents ANL initiatives 1) to expand the Laboratory's supercomputing capability to meet programmatic needs and opportunities, 2) to modernize the Laboratory's current central computers, 3) to gain increased access to offsite supercomputing resources to complement existing ANL computer resources, and 4) to develop production computing capability using state-of-the-art parallel processor computers and workstations.

Argonne has, during the past several years, undergone a number of substantial changes in its programmatic activities, with particular emphasis on development of major new programs which are of national scope and importance. The Laboratory operates two major national user facilities in the area of materials research--the Intense Pulsed-Neutron Source (IPNS) and the High Voltage Electron Microscope (HVEM) Facility. In nuclear physics, the Argonne Tandem-Linac Accelerator System (ATLAS) began operation in FY1985 as a national users' facility for heavy-ion physics research. The Integral Fast Reactor (IFR) design study has led to a major new thrust in the U. S. breeder reactor program. In addition to these relatively new activities, Argonne is planning other initiatives in accelerator design and construction, fossil energy research, fusion, and physical and biological research.

Schedule 3A-1 identifies the program requirements for computing resources for the planning period as identified by the respective programs. The justification and documentation of the requirements defined for programs of the Laboratory are contained in the narrative of this section. RCUs (Relative Capacity Units) are used by the Department of Energy to express computing requirements and installed computing capacity. They allow headquarters staff to aggregate the requirements and capacity of whole programs, program areas, or even the entire Department, independently of the specific computing systems involved. The RCU is used to identify the following categories of computers:

- •   Category P (consisting of minicomputers and superminis)

- •   Category Q (consisting of mainframe computers)

- Category R (consisting of supercomputers)

The primary assumptions which underlie these forecasts of requirements are:

- There are a number of important problems which researchers throughout the Laboratory have deferred due to the lack of access to very fast computing (capability) or lack of adequate machine cycles (capacity) or both.

- Argonne programs continue to request allocation of additional resources from the ER-funded computers at the National Energy Research Supercomputer Center (NERSC) and the Supercomputing Research Institute (SCRI) at Florida State University.

- The introduction and use of high performance workstations will increase substantially, as well as the need for considerably expanded data communications capabilities.

- The modernization of the central computing resources at the Laboratory will result in identification of additional requirements (latent demand) which have not been previously identified.

- The operation of the Advanced Photon Source as a national research facility will necessitate a significant increase in computing resource requirements.

Argonne has been designated as the site for the new Advanced Photon Light Source. Construction was initiated in FY1990. This is a major facility which will support 15 beam lines initially and be expandable to at least 70 beam lines. Intensities will be six orders of magnitude higher than existing synchrotron radiation sources. A data analysis computer facility which can meet the needs of most users is proposed as part of this project. The proposed facility includes a cluster of multiple computers with an aggregate theoretical capacity in excess of 20.0 P RCUs, at least 4 gigabytes of disk storage, and 50 workstations. The computer facility will expand as the number of beam lines and users of the facility increase. The Advanced Photon Source (APS) computer facility will be linked to the Argonne central computers and provide access to the centralized Cray X-MP/18, IBM 3084QX, the VAX Cluster, specialized graphics devices, and high capacity disk storage devices. Construction of this facility is also expected to stimulate theoretical work in support of the measurements made at the facility. Much of this theoretical work will be carried out on the Cray X-MP/18 or at ER supercomputer facilities which can be accessed through the Energy Sciences network (ESnet).

Exhibits 1.1 through 1.3 depict the forecast of requirements of ANL programs in Schedule 3A-1 expressed in RCUs. The differences between the forecast requirements of the program areas and the capacity projections are more fully described in individual program narratives in this section. The differences are in large measure attributable to the need for high performance computing resources. These needs as described in this plan and the shortfall in capacity will be met through the planning period with the Laboratory's Cray X-MP/18 computer and by expanding use of and access to offsite supercomputers like those available at National Energy Research Supercomputer Center (NERSC) and Florida State University (see Schedule C1).

The major changes in the requirements section of the ANL *Site Response* for FY1994 are the result of increased scientific computational demands associated with initiatives of the Laboratory and the APS.

Requirements for Category P
Relative Capacity Units (RCUs)
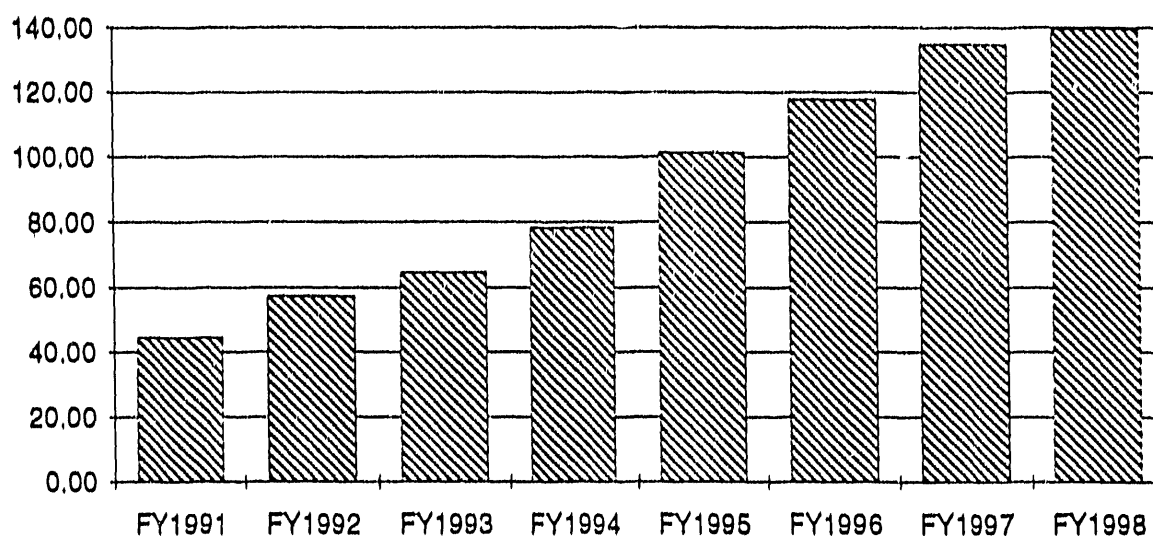
Requirements for Category Q
Relative Capacity Units (RCUs)
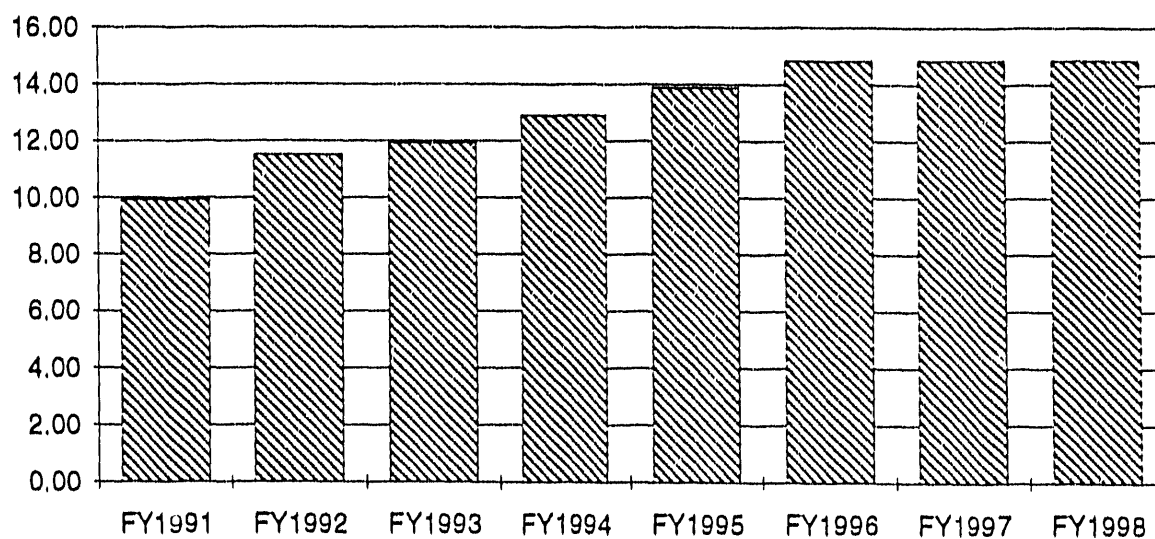
Exhibit 1.3: Category R Requirements
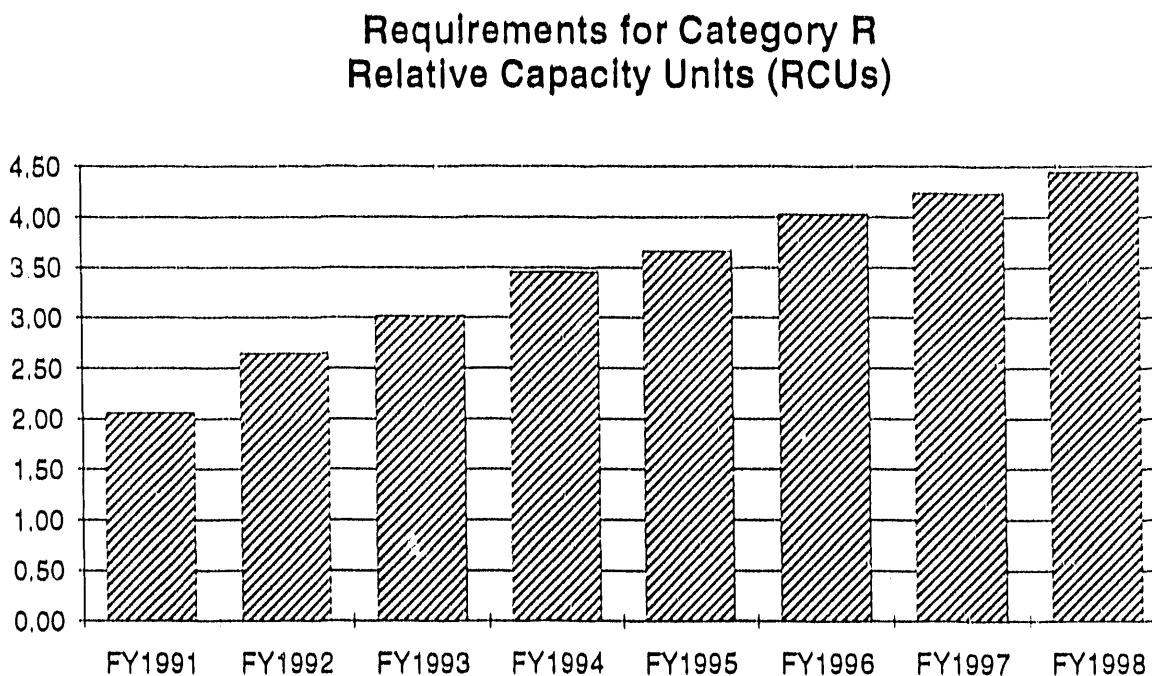
Requirements for Category R
Relative Capacity Units (RCUs)

Schedule 1.1: Schedule 3A-1 ADP Requirements

Site: Argonne National Laboratory - ANL   ADP Requirements (RCU's)   Schedule 3A-1
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B and R Code	Program		Past FY1991	Current FY1992	Budget FY1993	Plan FY1994	Outyears			
							FY1995	FY1996	FY1997	FY1998
AA	Coal	Category P	0.69 P	0.75 P	0.82 P	0.82 P	0.82 P	0.82 P	0.82 P	0.82 P
		Category Q	0.12 Q	0.11 Q	0.09 Q	0.09 Q	0.09 Q	0.09 Q	0.10 Q	0.10 Q
		Category R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R
AF	Civilian Reactor	Category P	3.45 P	3.64 P	3.64 P	3.64 P	4.27 P	4.27 P	4.27 P	4.28 P
	Development	Category Q	1.99 Q	1.99 Q	1.99 Q	1.99 Q	1.99 Q	1.99 Q	1.99 Q	1.99 Q
		Category R	0.20 R	0.20 R	0.20 R	0.20 R	0.20 R	0.20 R	0.20 R	0.20 R
AT	Magnetic Fusion	Category P	1.74 P	2.00 P	2.00 P	2.00 P	2.69 P*	2.69 P	2.69 P	2.69 P
		Category Q	0.03 Q	0.03 Q	0.03 Q	0.03 Q	0.03 Q	0.03 Q	0.03 Q	0.03 Q
		Category R	0.04 R	0.04 R	0.04 R	0.04 R	0.04 R	0.04 R	0.04 R	0.04 R
KP	Biological and	Category P	0.28 P	0.28 P	0.28 P	0.28 P	0.28 P	0.28 P	0.28 P	0.28 P
	Environmental	Category Q	0.15 Q	0.14 Q	0.14 Q	0.14 Q	0.14 Q	0.14 Q	0.14 Q	0.14 Q
	Research	Category R	0.01 R	0.01 R	0.04 R*	0.04 R	0.04 R	0.04 R	0.04 R	0.04 R
KA	High Energy	Category P	0.30 P	0.30 P	0.35 P	0.35 P	0.40 P	0.40 P	0.40 P	0.40 P
	Physics	Category Q	0.12 Q	0.12 Q	0.11 Q	0.10 Q	0.09 Q	0.06 Q	0.06 Q	0.06 Q
		Category R	0.08 R	0.11 R*	0.14 R	0.15 R	0.15 R	0.20 R*	0.30 R*	0.50 R*
KB	Nuclear Physics	Category P	4.36 P	4.86 P	4.86 P	4.86 P	4.86 P	4.86 P	4.86 P	4.86 P
		Category Q	0.11 Q	0.19 Q*	0.17 Q	0.17 Q	0.17 Q	0.17 Q	0.17 Q	0.17 Q
		Category R	0.30 R	0.50 R*	0.55 R	0.65 R	0.70 R	0.80 R	0.90 R	0.90 R
KC	Basic Energy	Category P	27.26 P	38.59 P*	45.89 P	59.69 P*	80.03 P*	96.53 P	113.54 P	118.54 P
	Sciences	Category Q	6.45 Q	7.96 Q	8.47 Q	9.47 Q	10.47 Q	11.47 Q	11.47 Q	11.47 Q
		Category R	1.26 R	1.63 R	1.95 R	2.29 R	2.45 R	2.66 R	2.67 R	2.68 R
		Category P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P
		Category Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q
		Category R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R
		Category P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P
		Category Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q
		Category R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R
Other Programs(AH,AK,AL,AR,		Category P	5.57 P	6.04 P	5.84 P	5.74 P	6.99 P	6.89 P	6.89 P	6.89 P
DB,EB,EC,ED,EE,EG,GB,		Category Q	0.82 Q	0.82 Q	0.79 Q	0.77 Q	0.75 Q	0.74 Q	0.74 Q	0.74 Q
GC,GE,HA01,KE,NA,PE,VP)		Category R	0.16 R	0.15 R	0.09 R	0.08 R	0.08 R	0.08 R	0.08 R	0.08 R

*Requirements for this program increase or decrease by 30% or more in a category and by at least 1.0P RCU or more over the previous year's program requirements or for the same year of last year's Plan (Brief explanations of the reasons for such increase/decrease follow Schedule 3A-1).   2/26/92

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B and R Code Program		Past FY1991	Current FY1992	Budget FY1993	Plan FY1994	Outyears			
						FY1995	FY1996	FY1997	FY1998
Reimbursables	Category P	0.04 P	0.04 P	0.04 P	0.04 P	0.04 P	0.04 P	0.04 P	0.04 P
DOE - Fermilab, Meto, Others	Category Q	0.06 Q	0.06 Q	0.06 Q	0.06 Q	0.06 Q	0.06 Q	0.06 Q	0.06 Q
	Category R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R
Reimbursables	Category P	0.02 P	0.02 P	0.02 P	0.02 P	0.02 P	0.02 P	0.02 P	0.02 P
NRC Internal	Category Q	0.02 Q	0.02 Q	0.02 Q	0.02 Q	0.02 Q	0.02 Q	0.02 Q	0.02 Q
	Category R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R
Reimbursables	Category P	0.52 P	0.42 P	0.42 P	0.32 P	0.22 P	0.22 P	0.22 P	0.22 P
DOD External	Category Q	0.03 Q	0.03 Q	0.03 Q	0.03 Q	0.03 Q	0.03 Q	0.03 Q	0.03 Q
	Category R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R
Reimbursables	Category P	0.03 P	0.03 P	0.03 P	0.03 P	0.03 P	0.03 P	0.03 P	0.03 P
DOD Internal	Category Q	0.04 Q	0.04 Q	0.04 Q	0.04 Q	0.04 Q	0.04 Q	0.04 Q	0.04 Q
	Category R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R
Reimbursables	Category P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P
Other Executive Internal	Category Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q
(DOO,DOT,EPA,NASA,DHHR)	Category R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R
Reimbursables	Category P	0.53 P	0.61 P	0.67 P	0.61 P	0.82 P*	0.82 P	0.82 P	0.82 P
Other Internal	Category Q	0.01 Q	0.01 Q	0.01 Q	0.01 Q	0.01 Q	0.01 Q	0.01 Q	0.01 Q
	Category R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R
	Category P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P	0.00 P
	Category Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q	0.00 Q
	Category R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R	0.00 R
DOE Program Requirements	Category P	43.64 P	56.45 P	63.67 P	77.37 P	100.33 P	116.73 P	133.74 P	138.75 P
(Subtotals)	Category Q	9.79 Q	11.36 Q	11.79 Q	12.76 Q	13.73 Q	14.69 Q	14.70 Q	14.70 Q
	Category R	2.06 R	2.65 R	3.02 R	3.46 R	3.67 R	4.03 R	4.24 R	4.45 R
Reimbursables	Category P	1.13 P	1.11 P	1.17 P	1.01 P	1.12 P	1.12 P	1.12 P	1.12 P
(Subtotals)	Category Q	0.16 Q	0.16 Q	0.16 Q	0.16 Q	0.16 Q	0.16 Q	0.16 Q	0.16 Q
	Category R	0.01 R	0.01 R	0.01 R	0.01 R	0.01 R	0.01 R	0.01 R	0.01 R
Totals	Category P	44.77 P	57.56 P	64.84 P	78.38 P	101.45 P	117.85 P	134.86 P	139.87 P
	Category Q	9.95 Q	11.52 Q	11.95 Q	12.92 Q	13.89 Q	14.85 Q	14.86 Q	14.86 Q
	Category R	2.06 R	2.65 R	3.02 R	3.46 R	3.67 R	4.03 R	4.24 R	4.45 R

*Requirements for this program increase or decrease by 30% or more in a category and by at least 1.0P RCU or more over the previous year's program requirements or for the same year of last year's Plan (Brief explanations of the reasons for such increase/decrease follow Schedule 3A-1).   2/26/92

Section B

Computing Resources

A.   Computing Resources

1.   Capacity Projections

All general management computers with a theoretical capacity in excess of 1.0P RCUs appear on Schedule 3B-1. The listed capacities are determined as follows:

- Theoretical capacity: The theoretical capacities are identical to the nominal capacities multiplied by the percentage of the year that each system is installed for use.

- Practical Capacity: The available capacity after reductions have been made to reflect learning and usage patterns.

RCUs are used by the Department of Energy to express computing requirements and installed computing capacity. They allow headquarters staff to aggregate the requirements and capacity of whole programs, program areas, or even the entire Department, independently of the specific computing systems involved. The RCU is used to identify the following categories of computers:

- Category P (consisting of minicomputers and superminis)

- Category Q (consisting of mainframe computers)

- Category R (consisting of supercomputers)

Schedule 2.1: Schedule 3B-1 Capacity Projections

Site: Argonne National Laboratory - ANL   ADPE Capacity (RCU's)   Schedule 3B-1
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Unit/System or MIE No.	ADPE System	Past FY1991	Current FY1992	Budget FY1993	Plan FY1994	Outyears FY1995	FY1996	FY1997	FY1998
Computing and Telecommunications Division									
601/49	Cray X-MP/18 (0.50R)								
	• Theoretical	0.50 R	0.50 R	0.50 R	0.50 R	0.50 R	0.50 R	0.50 R	0.50 R
	• Practical	0.40 R	0.40 R	0.40 R	0.40 R	0.40 R	0.40 R	0.40 R	0.40 R
601/49	VAX Cluster(14.20P)								
	• Theoretical	7.20 P	14.20 P	14.20 P	14.20 P	14.20 P	14.20 P	14.20 P	14.20 P
	• Practical	6.00 P	10.00 P	11.00 P	11.00 P	11.00 P	11.00 P	11.00 P	11.00 P
601/49	IBM 3084QX-96								
	• Theoretical	5.40 Q	5.40 Q	5.40 Q	5.40 Q	5.40 Q	5.40 Q	5.40 Q	5.40 Q
	• Practical	3.00 Q	4.00 Q	4.00 Q	4.00 Q	4.50 Q	4.50 Q	4.50 Q	4.50 Q
	Other Network Capacity (Two HP 3000/44) (1.0P)								
	• Theoretical	1.00 P	1.00 P	1.00 P	1.00 P				
	• Practical	0.75 P	0.75 P	0.75 P	0.75 P				
High Energy Physics									
601/R4	VAX Cluster (7.0P)								
	• Theoretical	7.00 P	10.00 P	13.00 P	15.00 P	17.00 P	17.00 P	17.00 P	17.00 P
	• Practical	5.60 P	8.00 P	11.20 P	12.00 P	13.60 P	13.60 P	13.60 P	13.60 P
Advanced Photon Source									
601/XXX	2-VAX Cluster (14.4P)								
	• Theoretical					20.00 P	20.00 P	20.00 P	20.00 P
	• Practical					7.20 P	10.00 P	15.00 P	16.00 P
Chemical Technology									
601/XXX	VAX 6220 (6.6P)	7.80 P	9.00 P	9.00 P	9.00 P	9.00 P	13.00 P	13.00 P	13.00 P
		7.00 P	8.00 P	8.00 P	8.00 P	8.00 P	12.00 P	12.00 P	12.00 P
	Other Network Capacity (4.0P) *								
	• Theoretical	12.70 P	14.20 P	14.20 P	14.20 P	14.20 P	18.00 P	18.00 P	18.00 P
	• Practical	10.20 P	11.40 P	11.40 P	11.40 P	11.40 P	16.00 P	16.00 P	16.00 P
Intense Pulsed Neutron Source									
601/XXX	MicroVAX 3500 Cluster (3.6P)								
	• Theoretical	6.00 P	6.00 P	24.00 P	24.00 P	24.00 P	48.00 P	48.00 P	48.00 P
	• Practical	5.00 P	5.00 P	20.00 P	20.00 P	20.00 P	40.00 P	40.00 P	40.00 P
	Other Network Capacity (VAXServer/Microvaxes) *								
	• Theoretical	4.10 P	14.10 P	14.10 P	24.10 P	24.10 P	44.10 P	44.10 P	44.10 P
	• Practical	2.00 P	9.40 P	11.70 P	17.70 P	20.00 P	32.00 P	32.00 P	36.60 P

* Other Network Capability described in detail in Sections B1 and B3.

2/26/92

Site: Argonne National Laboratory - ANL   ADPE Capacity (RCU's)   Schedule 3B-1
Page 2 Of 2

Unit/System or MIE No.	ADPE System	Past FY1991	Current FY1992	Budget FY1993	Plan FY1994	Outyears FY1995	FY1996	FY1997	FY1998
Physics									
601/S3	VAX Cluster (7.0P)								
	• Theoretical	7.20 P	7.20 P	7.20 P	7.20 P	7.20 P	7.20 P	7.20 P	7.20 P
	• Practical	5.60 P	5.60 P	5.60 P	5.60 P	5.60 P	5.60 P	5.60 P	5.60 P
	Other Network Capacity (4.8P) *								
	• Theoretical	34.00 P	37.00 P	41.00 P	45.00 P	50.00 P	55.00 P	60.00 P	66.00 P
	• Practical	27.00 P	30.00 P	33.00 P	36.00 P	40.00 P	44.00 P	48.00 P	53.00 P
Chemistry									
601/S5	VAX Cluster (2.8P)								
	• Theoretical	2.80 P	7.00 P	7.00 P	7.00 P	7.00 P	7.00 P	7.00 P	7.00 P
	• Practical	2.40 P	2.50 P	3.00 P	3.20 P	3.80 P	4.60 P	5.60 P	6.00 P
	Alliant/12 Processors (12.0Q)								
	• Theoretical	3.00 Q	12.00 Q	12.00 Q	12.00 Q	12.00 Q	12.00 Q	12.00 Q	12.00 Q
	• Practical	2.50 Q	6.00 Q	7.50 Q	8.00 Q	9.00 Q	10.00 Q	11.00 Q	11.00 Q
	Other Network Capacity (3.1P) *								
	• Theoretical	6.30 P	5.40 P	6.00 P	6.00 P	7.30 P	9.50 P	11.70 P	13.90 P
	• Practical	5.00 P	5.20 P	5.40 P	5.60 P	6.80 P	8.00 P	9.00 P	9.90 P

Total Capacity									
Category P	• Theoretical	96.10 P	125.10 P	150.70 P	166.70 P	194.00 P	253.00 P	260.20 P	268.40 P
	• Practical	76.55 P	95.85 P	121.05 P	131.25 P	147.40 P	196.80 P	207.80 P	219.70 P
Category Q	• Theoretical	8.40 Q	17.40 Q	17.40 Q	17.40 Q	17.40 Q	17.40 Q	17.40 Q	17.40 Q
	• Practical	5.50 Q	10.00 Q	11.50 Q	12.00 Q	13.50 Q	14.50 Q	15.50 Q	15.50 Q
Category R	• Theoretical	0.50 R	0.50 R	0.50 R	0.50 R	0.50 R	0.50 R	0.50 R	0.50 R
	• Practical	0.40 R	0.40 R	0.40 R	0.40 R	0.40 R	0.40 R	0.40 R	0.40 R

* Other Network Capability described in detail in Sections B1 and B3.   2/26/92

The following paragraphs describe capacity projections for computing systems identified in Schedule 3B-1.

Computing and Telecommunications (CTD)

The 3.0 Q RCUs associated with the IBM 3033s and reported in previous ANL submissions were replaced in August 1990 with an IBM 3084QX, thereby increasing theoretical capacity to 5.4 Q RCUs. The increasing practical capacity of 3.0 and 4.0 Q RCUs for FY1991 and FY1992 reflect the learning curve for this new system, migration to the IBM VM/XA and MVS/XA operating systems, and performance timing.

The theoretical capacity of the central VAX Cluster was increased to 14.2 P RCUs during FY1991 to reflect the midyear acquisition of a DEC VAX 6410 processor that provides roughly the same capacity as the existing VAX 8700. The increase in practical capacity for 8.0 P RCUs in FY1991 to 11.0 P RCUs in FY1993 is the result of the learning curve for new system as well as performance timing of the VAX Cluster as a whole.

High Energy Physics (HEP)

The VAX 780 and 750s were decommissioned in FY1990. Local computing is now accomplished with a distributed systems of workstations and other microcomputers. Both VMS and UNIX operating systems are used. Additional microcomputers as well as disks and other peripherals are to be acquired as needed.

Chemical Technology Division (CMT)

The VAX 6220's theoretical capacity is estimated at 6.6P RSUs. Because the system runs 24 hours a day, 365 days a year, the practical capacity is estimated to be close to the theoretical capacity (6.0P). This system has been upgraded to a VAX 6320 (9.0P theoretical capacity/8.0P practical capacity). A VAXstation 3100/38 (4.2P/3.4P) is used to support general PC networking activities. Other systems utilized by CMT in the Basic Energy Sciences program (KC) include a VAXStation 3200 (3.0P/2.4P), VAXstation 3100/76 (6.04P/4.8P), and a MicroVAX-II (1.0P/0.8P).

Advanced Photon Source (APS)

The increased theoretical capacity of type P RCUs in FY1994 is the result of acquisition and installation of two clustered RISC processors to support the data acquisition and reduction requirements of the Advanced Photon Source. These computers complement and enhance the existing MicroVAXes, VAX workstations, and RISC workstations in use.

2.   Not Applicable

3.   Installed Computer Systems

General Management Computer Systems

The configuration and networking diagrams relating to these general management computer systems appear in Exhibit 2.1 and Exhibit 2.2

0601-49 Computing and Telecommunications Division (CTD)

The central computing needs of Argonne National Laboratory are served primarily by:

*   A Cray X-MP/18 with the UNICOS operating system.

*   An IBM 3084QX-96 with MVS/JES3 and VM operating systems.

*   A VAX 8700 and VAX 6410 with VAX/VMS.

*   Connections to an array of onsite computer networks and connections to offsite networks (e.g., ESnet, NSFnet, Internet, etc.)

CTD also operates two Hewlett Packard computers that are used for administrative systems. Section B.4, Computing Environment, describes the ANL central computing resources in greater detail.

0601-XX Mathematics and Computer Science Division (MCS)

MCS operates a distributed network environment based on scientific workstations linked to each other, to machines in the ACRF, to the central computing resources of Argonne, and to other facilities via the national networks.

0601-R4 High Energy Physics Division (HEP)

The High Energy Physics Division has replaced its VAX 780 and 750 cluster with a new MicroVAX cluster and new disk and tape subsystems. Three MicroVAX 3400 systems and three workstations have been installed and share a total of 9.6 gigabytes of disk storage capacity. Large capacity helical scan tape drives are installed on each MicroVAX system which provide approximately 2.0 gigabytes of capacity per cartridge. Additionally, a number of Unix workstations have been acquired. Expansions of computing are expected to emphasize distributed Unix- based computing systems/servers.

0601-R6 Chemical Technology Division (CMT)

The Chemical Technology Division VAX-6220 System has 64 megabytes of memory, a floating-point accelerator, 6.0 gigabytes of disk storage, one 6250 bpi tape drive, 20 printers and plotters, 16 terminal lines and four 32-line terminal servers. A FAXCOMM communications processor and formatter permits direct transmittal of word processing documents

from the 6220 to Group-III compatible facsimile machines. Additional capacity includes a general purpose VAXstation 3100/30 with 32 megabytes of memory, 2.0 gigabytes of disk storage, a 600 megabyte CDROM, and two 4mm DAT tape drives; a clustered microVAX-II with 7 megabytes of memory, 1.0 gigabytes of magnetic disk storage, a dual 625 megabyte erasable optical disk subsystem, and a TK50 tape drive; a clustered VAXstation 3200 with 16 megabytes of memory, 380 megabytes of disk storage, and a VHS-format (2.5 gigabyte capacity) tape drive; and a clustered BES VAXstation 3100/38 with 16 megabytes of memory, 1.2 gigabytes of disk storage, and a 600 megabyte CDROM.

The VAX 6220 is used primarily as a general purpose time-sharing facility during prime shifts. Applications include word processing, graphics, scientific and engineering calculations, data reduction and other office automation applications, e.g., calendar and facility management, and business database systems. The 6220 also provides network disk, file and print services to IBM PCs running DEC's PCSA software and to Macintosh PCs using Alisatalk software. The system operates in a protected, air-conditioned environment. During off-peak periods, the system primarily provides computing cycles for batch scientific codes as well. The VAXstation 3100, 3200, and MicroVAX-II are used almost exclusively in batch mode for large scientific code production runs.

0601-S5 Chemistry Division (CHM)

The Chemistry Division VAX Cluster consists of a VAX 11/780, five MicroVAX IIs and a VAXstation 2000, with a total of 42 megabytes of memory, ten disk drives (FUJ 2331s, RA81s, RP07), two mag tape drives (TU77, TU78), one printer/plotter (LXY-11, 300 lpm), one printer (LP26, 600 lpm), and 140 terminal lines. The other VAXes on the Division's network are two MicroVAX IIs. A building-wide Ethernet interconnects the VAXes and supports four remotely located LSI 11/73 data acquisition computers and two MicroVAXes used for data analysis and code development. Nine terminal servers on the local Ethernet provide another 96 terminal connections. Two terminal servers (16 lines) are connected to PBX 16 ADI-101 data lines, a connection which provides dial-in service from any ANL ADI-100 equipped telephone at speeds up to 19.6 Kbaud. A PDP-11/34 computer serves as a bridge between the low-speed DECnet communication (9600 baud) and our Ethernet, for 13 remotely located LSI 11/23 computers that control experiments and acquire experimental data. A 12-processor Alliant computer has replaced the 4-processor Alliant computer for the performance of theoretical computations.

0601-S3 Physics Division (PHY)

The Physics Division has two VAX 3300s, three VAX-11/750s, two microVAX IIs, three VAXstation 3200s, and five VAXstation 3100s. The two VAX 3300s are the hub of the division network with connections to the site-wide Ethernet and through ANL routers to national and international networks. An Equinox DSS-5 terminal switch provides for terminal access to all of the VAXes as well as central computing resources. The terminal switch is connected to an Ethernet terminal server, providing access to all VAX computers in the Division, site-wide connections to VAX with LAT support, and to Internet via TELNET. The VAX-11/780 was decommissioned in FY1991. Unix machines include an IBM RS6000/320 and two SUN IPCs.

0601-XX Advanced Photon Source (APS)

The Advanced Photon Source (APS) is being designed as a national user facility for research involving synchrotron radiation. The APS will consist of a chain of three injection accelerators and a 7 GeV positron storage ring. The control of these accelerators and storage ring will require an elaborate system of computers and workstations. A VAX 3600, a VAXstation 3200 workstation, and two VAXstation 2000s are the first members of this system. The predominant use of this initial set of computers is to test control system concepts and to develop control software. An additional use during the design phase of the APS will be to support general design activities. The system in its final form and mission will be totally dedicated to the control and monitoring of the APS accelerator and storage ring systems. During FY1989 a microVAX 3600 and project management software were added.

A data analysis computer facility which would meet the needs of most users is proposed as part of this project. The proposed data analysis facility will include a cluster of multiple computers with an aggregate theoretical capacity in excess of 20.0 P RCUs, at least 4 gigabytes of disk storage, and 50 workstations. The APS computer facility would be linked to the Argonne central computers to provide access to the centralized computing and telecommunications resources at ANL.

0601-XX Environmental Assessment and Information Sciences Division (EID)

In FY1991, EID relocated its entire division (over 400 people) to a new offsite facility approximately 3 cable miles from its high-performance computing facility on the main campus. This was a major undertaking which involved planning and installation of fiber optic communications between facilities over railroad, gas and highway right-of-ways; designing and implementing interoffice fiber optic and twisted pair networks and subnetworks; de-installation, relocation, and re-installation of approximately 800 electronic devices, including workstations, file servers, microcomputers, printers, routers, and various communications components; establishing various special purpose electronically-based rooms including central computing, prototyping, workstation, high-performance graphics, and multi-media presentation rooms.

In FY1992, EID will relocate its large-scale, parallel processing, mini- supercomputer facility from the main campus to its new offsite facility. In addition, file servers will be upgraded to include a parallel processor; older workstations will be upgraded to current RISC architectures; and new file servers, peripherals, and other electronic devices will be added to provide additional resources to meet the continuing increase in need for expanded, high-performance, distributed computing systems. Additionally, EID will install dedicated 56kbps communications lines to ANL offices in Washington, DC, and Denver, as well as to the United States Central Command (USCENTCOM) Headquarters at MacDill Air Force Base.

Exhibit 2.1: Configuration Diagram for Central IBM computer system

TCP/IP Terminal Servers

Sungate

FDDI Ring

Cray X-MP/18
UNICOS

Cisco routers

Sun 4/490 server

Disks
20.8 billion bytes

InfoServer 100

CD ROM
3 billion bytes

VAX 6410
VAX/VMS

Tapes

DEC Terminal Servers

Disks
21.2 billion bytes

VAX 8700
VAX/VMS

Tape Storage

CICnet

ESnet

NSFnet

IBM 3084QX9

Disks
60 billion bytes

CISCO routers

VM/XA Operating System
(CMS)

MVS and JES3 Operating System

Batch Computing

TSO

CICS

Wylbur

BITnet

Lab-wide Ethernet

Interactive Terminals

Exhibit 2.2: ANL Intecom S/80 LANmark Ethernet
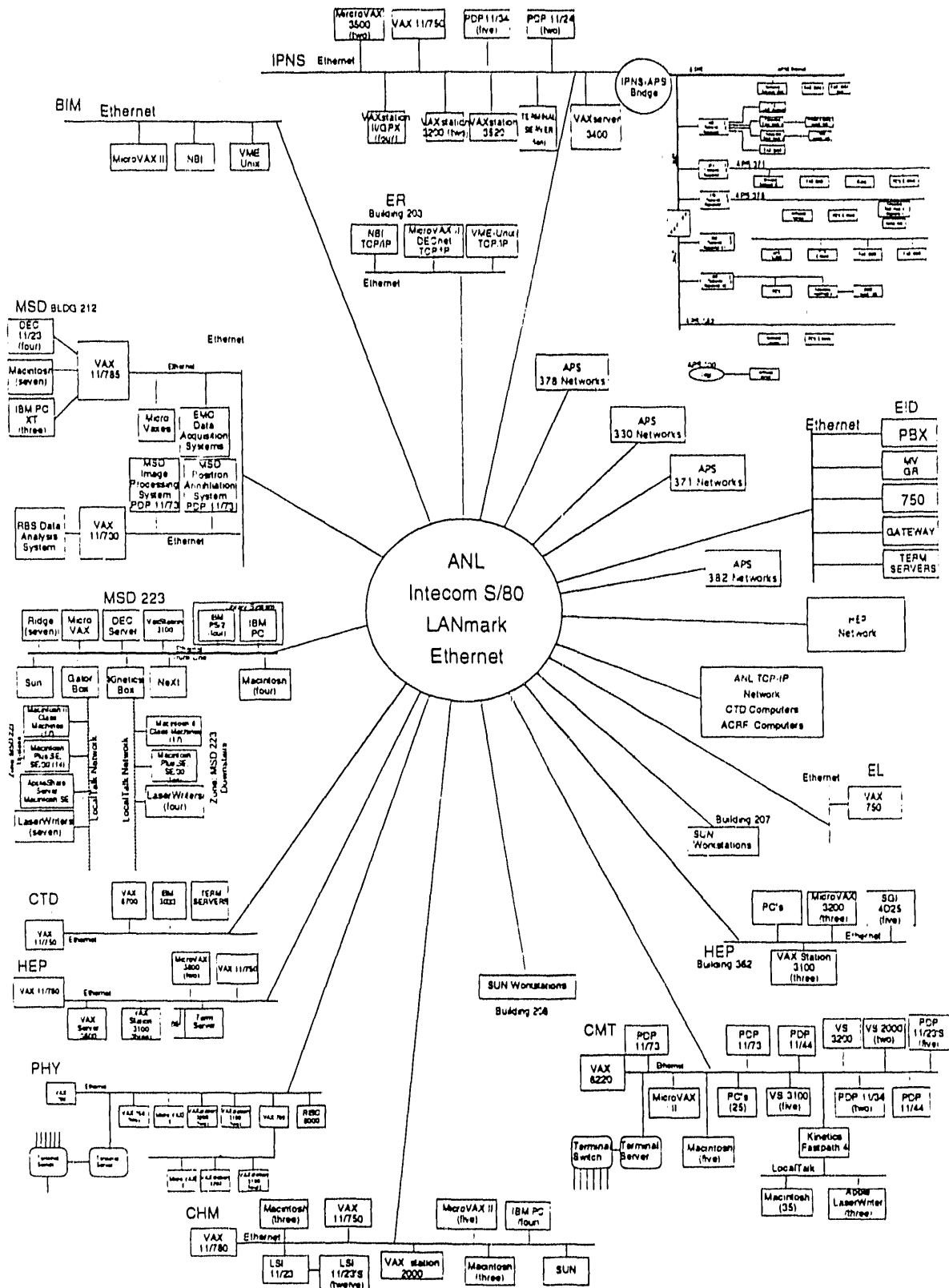
Special Management Computer Systems

0601-08

The TYCHO II system is a computer system operated by the BIM Protein Mapping Group to handle the analysis of large sets of two-dimensional electrophoretic protein separations. The hardware system is a cluster consisting of a VAX 11/780 and two VAXstations. The VAX-11/780 has attached two FPS 120B array processors, a Gould Imaging IP8500 image analysis and display system, an Optronics P1000 film scanner, and an Eikonix 785 2048-element scanner. An Eikonix 1412 4096-element CCD scanner is connected to one of the workstations. The VAX-11/780 is being phased out with software being converted to run on workstations alone.

0601-S4

The Intense Pulsed Neutron Source (IPNS) is a national user facility for neutron scattering research. Acquisition and analysis of the data from this facility requires considerable computational resources. Data acquisition is handled by dedicated microcomputer systems coupled with PDP-11 and VAX station computers. The data acquisition computer systems are connected through Ethernet to two VAX computers for data analysis. The primary computer for data analysis is a DEC VAX 11/780 with a floating point accelerator, 16 megabytes of main memory, and 1200 megabytes of disk storage. The other computers for data analysis are a DEC VAX 11/750 with a floating point accelerator, six megabytes of main memory, and 750 megabytes of disk storage, and a VAX station 3200. Each VAX has two tape drives, with one capable of reading and writing at 6250 bpi. The VAX 11/750 is also used for word processing with MASS11 software with various printers for output. The number of experiments in IPNS has increased significantly in the past five years. IPNS has installed an enriched uranium target that gives three times as many neutrons, resulting in a large increase in data production rate. The VAX 11/780 was purchased in 1980 and requires a great deal of space, power, and hardware maintenance. It should be replaced with a more efficient processor within the next year.

IPNS is in the process of converting from the use of PDP-11 computers to VAXstations for data acquisition and display. These systems will also be able to do more data reduction than the PDP-11 systems and the effort required to support the systems and develop new code will be reduced. Replacement of all the PDP-11 computers should be completed over a three-year period.

Personal Computers, Microcomputers, And Word Processors

Personal computers are being used for a wide range of activities including digital instrumentation, business applications, and scientific programming. The long history of digital instrumentation and the large number of experimenters has provided a climate for the rapid introduction of personal computers into the Laboratory. The availability of electronic spreadsheets and database software is responsible for converting budget planning and other administrative activities to personal computers. As personal computers continue to increase in capability, capacity, and speed, they are given more consideration for scientific programming applications. Word processors continue to be a dominant tool in the preparation of correspondence and reports.

Personal computers at Argonne are increasingly useful as computer-aided design (CAD) stations for two dimensional drafting. With the addition of the appropriate commercial software, personal computer-based workstations can provide some of the capability of larger mini-computer based and main-frame based (CAD) systems. The main limiting factor in acquiring more stations to increase both design and drafting efficiency is the cost involved and the operating time needed to train staff on the systems. In addition to IBM-based systems, a number of staff are using Macintosh computers as drafting and design stations. This use of personal computers as design stations is expected to increase in the future.

The widespread practice at Argonne is to purchase rather than develop software. However, in the areas of digital instrumentation and scientific programming, software may be tailored for a specific scientific application.

Personal/Microcomputer/Word Processor Data

Site: Argonne National Laboratory   Schedule 3B-3.1

PC Cost Summary			
	Cost as of 9/30/91	Estimate FY1992	Estimate FY1993
Hardware	$17,015,742	$2,000,000	$2,000,000
Software	$5,104,723	$600,000	$600,000

Installed Personal, Microcomputer, and Word Processors
as of September 30, 1991

Site: Argonne National Laboratory   Schedule 3B-3.2

Manufacturer	Model	Quantity Personal Computers	Word Processors
IBM	PC/XT/AT/PS2	1,317	
Apple	Macintosh*	1,120	
Compaq		296	
Club American		91	
Sun		193	
Digital		65	
AST Research		93	
Zenith		58	
PC Limited		23	
Standard Brands		18	
Toshiba		50	
Leading Edge		13	
Dell		87	
Nec		19	
Epson		49	
Next		66	
Hewlett-Packard		70	
Gateway		299	
Other		350	
Exxon/Vydec			6
IBM			27
NBI			116
Silver Reed			11
Wang			4
Other			8
Total		4,277	172

* Includes Apple II/IIe/III and Lisa

2/25/92

4. Computing Environment

Argonne's scientific, engineering, and administrative activities depend increasingly heavily on the Laboratory's computing resources. The overall ANL computing and telecommunications strategy is to develop a complete, integrated hierarchy of computing capabilities that includes supercomputers, centralized general purpose computers, multipurpose minicomputers, scientific and engineering workstations, and computing workstations and office automation support systems--all coupled together through an effective communications network (see Exhibit 2.5). The most critical element of this strategy is the availability of advanced, high-speed network access to high performance computing systems.

For computational-intensive applications, Argonne researchers have on-site access to vector processing computers, multiprocessor parallel architectures, medium-scale central computers, and associated scientific visualization tools. High-speed networking and fiber-optic technology allow transmission of scientific data over a variety of local, regional, national, and international networks that let users transfer files, exploit interactive access, send electronic mail, and run application programs on possibly distant computing systems. In general, this hierarchy and networking of facilities increasingly give Argonne researchers convenient access to the type of computing they need.

The computing resources provided at Argonne National Laboratory are generally available to all members of the Laboratory. DOE and other U.S. Government agencies are served by arrangement. In addition, other organizations may apply for permission to use these services. Some computing services are available in limited quantities or only to certain users, either for technical or contractual reasons.

Only those with active computer accounts may use the central Argonne computers, and these users are charged through these accounts for the computing resources they use. Computing rates reflect shift differentials and include service premiums and discounts. Argonne National Laboratory adds an overhead surcharge for general and administrative services used by non-ANL organizations; DOE adds administrative and depreciation surcharges for services used by non-DOE organizations. Rate changes appear in the *Argonne Computing Newsletter*, and a list of current rates is available at the CTD Document Distribution Counter (Building 221, Room A-134) or through the mail (by calling (708) 252-5405 and requesting a copy). Extensive documentation is available for purchase at the Document Distribution Center to assist computer users with available computing resources.

Exhibit 2.5: Computing and Telecommunications Activities
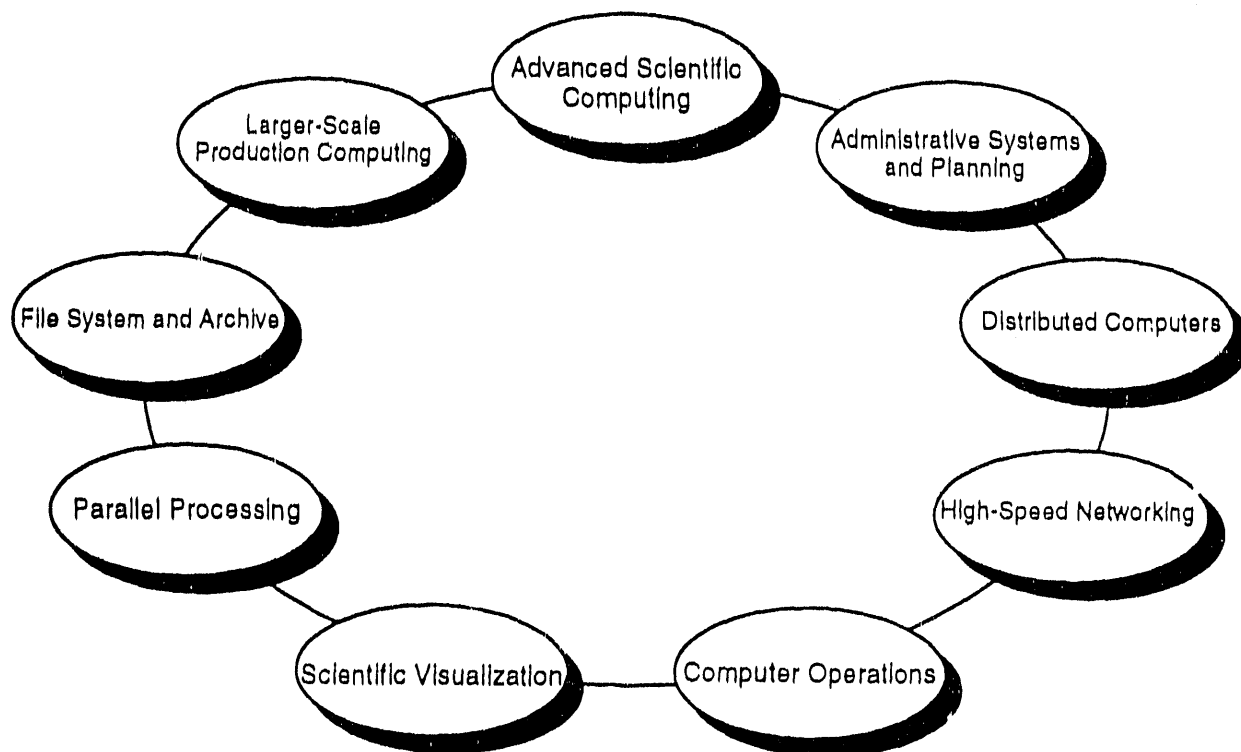
Cray X-MP/18--Argonne National Laboratory operates a Cray X-MP/18 computer with eight megawords of memory, an 8.5 nanosecond cycle time, the complete X-MP vector instruction set including the compressed-index scatter-gather vector instructions, and two vector logical units. The theoretical peak performance of the Cray X-MP floating point unit is 235 million floating point operations per second for overlapped multiply and add instructions.

Online disk storage for the Cray X-MP computer consists of a DS-40 disk subsystem with 20 gigabytes of storage capacity, capable of transferring data into and out of the Cray X-MP memory at nearly 40 megabytes per second. Additionally, the Cray X-MP has access to four IBM 3420-8 tape drives that permit data transfer at 1.25 megabytes per second with 1600/6250 bpi tapes and access to eight STK 4480 cartridge drives that permit data transfer up to 4.5 megabytes per second.

Access to the Cray X-MP/18 batch system for IBM MVS and VM/CMS users is possible through NJE via a Cray-supplied MVS front-end station installed on the IBM 3084 computer. Job submission to the Cray and the indirect processors is provided by this MVS front-end station. DEC VAX and Unix users can use TCP/IP to access the Cray X-MP. The Cray X-MP/18 is also physically connected over a Cray-provided SUN FEI-3 connection to a central SUN 3/280 TCP/IP gateway computer and to NSC FDDI interface. The SUN gateway and FDDI interface provide the links between the Cray UNICOS operating system and the ANL TCP/IP network.

The Cray X-MP computer system runs the UNICOS Release 6.0.1 operating system with the NQS batch job scheduler. UNICOS derives from the AT&T System V Unix operating system and also includes many of the Berkeley Unix extensions. This system provides users with a complement of programming languages necessary for high performance computing. Both the CFT and CFT77 Fortran 77 compilers are available for scientific and engineering programming; a C language compiler and the CAL assembler are also available. These programming languages enable users to access all the features of the Cray architecture. ANL has also made the Network File System (NFS) available to Cray X-MP users. NFS allows users with Unix workstations to access data stored on the Cray disks as if the data were locally attached to the user's workstation.

A large selection of subroutine libraries provided by Cray Research, Inc., is available with UNICOS. These libraries contain basic intrinsic mathematical routines and the EISPACK and LINPACK packages of Fortran subroutines. Cray-supplied UNICOS software libraries include:

- A library of routines for Fortran-specific features (libf)

- A library of mathematical functions (libm)

- A library of I/O routines (libio)

- A library of scientific application routines (libsci)

- A utilities library (libu)

- X-Windows Release 11.4 for graphics

Additionally, Argonne has installed several other software libraries:

*   Disspla (a graphics library from Computer Associates International, Inc.)

*   IMSL (a mathematical and statistical library from IMSL, Inc.)

*   NAG (a mathematical library from the Numerical Algorithm Group)

*   SLATEC (a mathematical library distributed by the National Energy Software Center)

Cray X-MP computing resources are accessible to offsite users via the NSFnet, ESnet, BIT-net, HEPnet, CICnet, and Milnet computer networks. Users of the Cray must have valid accounts on a batch or interactive service with CTD.

Batch users can submit UNICOS jobs from the Cray MVS front-end station or any BITnet node including most of the DEC VAXes. The front-end station submits UNICOS jobs to the Cray X-MP system and returns the printed output to the origin of the job, unless users supply network commands to redirect output to another site. Batch Cray usage is preferable to interactive Cray usage to ensure that resources are available for long running production jobs, although Argonne encourages interactive use of the Cray for debugging and interactive graphics.

The Cray is connected to the Laboratory-wide TCP/IP network by an interface to a Sun gate-way computer and a NSC FDDI interface. These TCP/IP interfaces provide interactive access and file transfer capabilities (including NFS) to the Cray from Unix-based computers and other computers which support the TCP/IP network protocol, including most of the DEC VAXes, PCs and Macintoshes. National TCP/IP-based networks such as NSFnet are able to transfer files to any ANL TCP/IP host, including the UNICOS system and its front-end stations.

Advanced Computing Research Facility--The Mathematics and Computer Science Division operates the Advanced Computing Research Facility (ACRF) as part of a continuing emphasis on advanced computing. The facility currently contains nine computers with diverse advanced (parallel and vector-parallel) architectures. The following computers are research tools for Argonne scientists and for qualified researchers from other institutions:

*   An Active Memory Technology DAP-510-8 with 1024 single-bit processors, each with eight kilobytes of memory.

*   An Alliant FX/8 system with eight high-speed vector processors sharing 128 mega-bytes of memory.

*   A Stardent Titan graphics supercomputer, with four processors and a peak performance of 64 megaflops.

*   A BBN TC2000, with 45 nodes, each having four megabytes of memory.

*   A BBN GP1000, with 96 nodes, each having four megabytes of memory.

- A Connection Machine Model 2, with 16,384 nodes, each having eight kilobytes of memory.

- An Encore Multimax, with 20 processors sharing 64 megabytes of memory.

- A Sequent Symmetry, with 26 processors sharing 32 megabytes of memory.

- An Intel iPSC/860 Gamma, with eight nodes, each having 16 megabytes of memory.

- A Solbourne, with 25 gigabytes of memory.

The ACRF also serves as the liaison through which researchers at ANL have access to the Touchstone DELTA System, located at the California Institute of Technology. The DELTA, currently the world's fastest computer with a peak speed of 32 gigaflops, will enable researchers to start tackling the so-called Grand Challenges in science and engineering. The machine was acquired by the Concurrent Supercomputing Consortium (CSC), of which Argonne is a leading participant.

Advanced Database and Analytical Model Research Center (ADAM)--The Advanced Computer Applications Center (ACAC) of the Environmental Assessment and Information Sciences Division (EID) operates the Advanced Database and Analytical Model (ADAM) Research Center to provide a national concentration of advanced architecture computing resources for developers of software for the Force, Structure, Resource, and Assessment Directorate (J-8) of the Joint Staff in the Pentagon, various Commander-in-Chief (CINC) Headquarter organizations around the world, and the Department of Energy.

ADAM also acts as a testbed for hardware, software, and communications systems to be integrated into heterogeneous, distributed computing networks at sponsor locations around the world. As such, the center undergoes continuing change. In FY1991, ADAM relocated two of its mini-supercomputers to facilities in the Pentagon and at MacDill Air Force Base. Currently installed at its main campus computer facility are:

- A A Sequent Symmetry S81, symmetric, parallel processing mini-supercomputer with 24 processors, 120 megabytes of main memory, and 10.8 gigabytes of disk storage. This system delivers 96 MIPS of processing power.

- Various communications equipment which provide accessibility by way of direct dial-up telephone, lab-wide Ethernet, and fiber optic communications networks. Telephone baud rates available include 1200, 2400 and 9600 bps.

ADAM also includes in its extension an offsite, distributed, heterogeneous, computing environment with over 100 components, including file servers, high-performance workstations, microcomputers, peripherals, and communications devices interconnected via various local and remote fiber optic and twisted pair networks and subnetworks which provide the computing and communications needs for over 65 people in ACAC alone. Additionally, ADAM maintains a dedicated 56kbps communications line to USCENTCOM Headquarters at Mac-Dill Air Force Base.

Centralized General Purpose Computers--The central computing needs of Argonne National Laboratory are served primarily by:

- An IBM 3084QX computer with the MVS/XA-JES3 and VM/XA operating systems.

- Clustered VAX 8700 and VAX 6410 computers with VAX/VMS.

- Connections to onsite computer networks (e.g., TCP/IP) and offsite networks (e.g., the National Energy Research Supercomputing Center Network).

These computers and their associated peripheral equipment provide over 92 billion bytes of online disk storage, 18 magnetic tape drives, many remote job-entry stations, and extensive libraries of mathematical, statistical, and graphical programs and subroutines. Users access these computers from remote job-entry terminals and from interactive terminals via dedicated and dial-up ports and network connections.

Centralized Network Resources

The Computing and Telecommunications Division (CTD) provides centralized voice and data communications services and a Laboratory-wide Ethernet that interconnects the TCP/IP network, the DECnet, the AppleTalk network, and the XNS network. CTD also maintains a Laboratory-wide NJE network that enables distributed computers to access the central complex and its many resources and services (e.g., graphics, specialized software, microfilm, databases, and fast printers).

Centralized networking activities of CTD also include maintenance of national and international network connections to provide file transfer, interactive access, and electronic mail capabilities to a large number of professional peers and potential collaborators. There are connections between the Internet and Laboratory computers that link major universities and laboratories together. The Laborat ry's central IBM computers and DEC VAX computers also participate in BITnet, an international university file transfer network interconnecting over three thousand computers. The Laboratory is connected to ESnet, a T1 national network funded by DOE's Energy research program; ESnet provides a communications backbone for both HEPnet and the Internet. ESnet runs the DECnet and TCP/IP protocols. The Laboratory participates in the dedicated computer network for High Energy Physics Research (HEPnet) through the ESnet, interoperated with major High Energy Physics laboratories and university collaborators. The Laboratory's Decnet and TCP/IP based networks are linked to CICnet, a T1 regional network. A T3 National Science Foundation network (NSFnet) node was installed at Argonne in 1991. NSFnet runs the TCP/IP protocol. The Laboratory is represented on the CICnet Board of Directors, the HEPnet Technical Coordinating Committee and the ESnet Technical Steering Committee.

Multi-Purpose Minicomputers

DEC VAX distributed multi-purpose minicomputer centers are located in several of the major divisions at ANL and provide a significant number of general interactive computing services for individual scientific organizations. The computing capacity of the distributed centers continues to expand with the addition of numerous MicroVAXes to the existing VAX clusters. Multinet allows these distributed VAX/VMS systems to participate in TCP/IP networking.

There are several hundred identifiable minicomputers deployed in laboratories to record and control experiments, with numerous additional minicomputers and microcomputers imbedded in experimental equipment. Digital Equipment Corporation is the dominant supplier of digital instrumentation computers, but there is a diverse population of other equipment.

ANL also has two Hewlett-Packard 3000 minicomputers in Building 201 for the Automated Materials/Payables System (AMPS), the Stock Tracker System, and the Maintenance Control and Reporting System (MCRS). Access to these computers is limited (by dedicated connections) to Information Systems analysts and to the users of these applications.

Scientific and Engineering Workstations

Scientific and Engineering workstations comprise a significant computing capability at ANL. While vendors vary (e.g. SUN, Silicon Graphics, IBM, Digital), there are uniform capabilities that define the standard scientific workstation environment. These capabilities include:

*   Unix operating system

*   TCP/IP Ethernet Networking

*   Network File System Data Access

*   X Windows graphics

Increasing speeds of RISC processors enable workstations to function in much the same manner as minicomputers did several years ago, i.e., serving multiple simultaneous users. The maturity and robustness of scientific workstations makes them effective for a wide range of applications. Increasing processing speeds enable running applications previously suited for mainframes. The sizable population will enjoy continued growth. The standard graphics capabilities of most workstations obviate the need for special graphics terminals. Even lower-end Macintosh and PC-based workstations are widely used for emulating graphics terminals to access applications on mainframes and supercomputers.

Performance Measurement

The KOMAND package from Pace Applied Technology, Inc. builds a database of resource utilization statistics for all the IBM systems. IBM's System Management Facility (SMF), with extensions from Pace, provides the information on batch, JES3, and Wylbur. An extension to the KOMAND package, called VMCI, generates data from VM/CMS for this database. Extensions to the KOMAND package written at Argonne also generate data from the VAX 8700, VAX 6410, and Cray X-MP/18 computers for the database. The SAS package from SAS Institute, Inc. generates hourly, daily, and monthly reports on service times for batch jobs from this database. The Resource Measurement Facility (RMF) (from IBM) and Look (from Advanced Data Research) perform detailed analyses of problems on MVS. VMPRF (from IBM) provides regular information on the performance of VM/CMS and the response time VM/CMS users receive. It generates a daily report of VM/CMS performance. The RTM/SF package (also distributed by IBM) does detailed studies of particular problems and provides realtime warnings of bottlenecks. The VAX Performance Advisor allows real time analysis of VAX system performance and bottlenecks.

Cray X-MP performance is monitored through the regular collection of hardware performance monitor data. These data allow the identification of applications that do not effectively use the Cray's vector architecture. CTD staff aid users in subsequently adapting their codes to vector architecture. This capability was developed at Argonne and is now incorporated into the UNICOS product. It was also the basis of a paper presented by CTD staff at the Fall 1991 Cray Users Group meeting.

In addition to identifying performance bottlenecks and measuring the results of tuning efforts, the data collected permits identification of changes in the workload, supplies much of the information for charging back system usage, and helps identify capacity problems. The response time a user experiences on an interactive system or the turnaround time for a batch job can become unacceptably long when performance problems exist, when reliability is poor, or when the workload simply exceeds the capacity of the equipment.

Computer Protection

Laboratory policy (see Appendix A) requires that managers of all computer applications determine the sensitivity of their applications. Computer Protection Program Representatives have been appointed for all divisions, programs, or departments of the Laboratory. They inventory all computer applications along with their sensitivity and forward the information to the Computer Protection Program Manager, who keeps the information on file in a database. Managers of sensitive applications prepare protection plans for their applications with the help of their Computer Protection Program Representatives, who approve each plan and keep it on file. A summary sensitive computer application checklist is prepared by the Representative and sent to the Computer Protection Program Manager, who approves it and schedules dates for updating the plan and conducting the next risk analysis.

Similarly, Assistant Computer Protection Program Managers are appointed for each sensitive computer in the Laboratory. These Assistants prepare and keep on file protection plans for the sensitive computer for which they are responsible. A summary sensitive computer system checklist is prepared and sent by the Assistant to the Computer Protection Program Manager, who approves it and schedules dates for updating the plan and conducting the next risk analysis.

Periodic training sessions are held for the Computer Protection Program Representatives and for the Assistant Computer Protection Program Managers. The Computer Protection Program Representatives hold computer security education sessions for computer users, programmers, operators, and managers in the ANL organizations they represent.

The physical security of the central computer room is assured by seals and alarms on all doors except the main access door. These seals and the alarm are routinely tested several times per day. Personnel reach the main access door only by passing through a key card or operator controlled door that is opened by the operators after the persons seeking entry have been identified as authorized to enter the main computer room. The lock on the main entrance door to the computer room is also controlled and requires a valid key card or an operator inside the computer room to open it. The door is further protected by emergency bolts that can be operated from within the computer room; activation of these bolts sends signals to the Laboratory's Security Division.

In addition to the central computers, the Laboratory has an auxiliary computing facility housing the standalone Hewlett-Packard minicomputers on which the Automated Materials Payable System and some other sensitive applications run. Locking all the doors to the computer room and sealing all except the main access door protect this facility. A cipher lock controls the main access door during working hours. At other times Security monitors the area to protect against intrusion by unauthorized personnel. All terminals connected to the Hewlett-Packards use direct connections or leased lines. There is no uncontrolled dial-up access to these systems. Passwords protect the operating system, MPE V, and each user can perform only those transactions that his or her job function requires. An operator can allow remote diagnosis of system problems by activating the modem and making the connection. The operator also can observe all commands issued and override any unauthorized actions.

Regular backup procedures minimize the inadvertent loss or alteration of computer-based data. Users who need to control access to their data can use the IBM Resource Access Control Facility (RACF) Program Product to do so. RACF controls access to data on disk and tapes. In addition, for tapes, we use the CA-1 Tape Management System, which also provides some limited protection under user control.

The operating systems require user verification passwords in addition to user identification. The MVS and VM/CMS operating system resources are protected by RACF, while the VMS and UNICOS operating systems provide their own security.

The ANL Disaster Recovery Plan for Administrative Systems (ANL/TM 456), Revision 1, has been developed and is tested annually to provide for continuity of processing of critical applications in the case of a disaster. This plan calls for using the data processing facilities at the University of Chicago. Data to be used in such processing are kept in a tape vault in a building separate from that housing the computers normally used to process the data. Weekly backups of on-line disk data are also kept in that separate tape vault. Also, computer users can request that copies of tapes containing user data of a critical nature be stored in the same tape vault.

Site Software Profile
(as of September 30, 1991)

Site: Argonne National Laboratory   Schedule 3B-4

	Administrative, Business, Manufacturing	Scientific, Engineering	Both
Operating Systems	HP MPE/V Ver. 5 HP MPE/V Ver. 1P IBM CICS	DEC Ultrix IBM AIX 3.0 Apple AUX Sun OS 4.1.1 RSX11M Cray Unicos Ver. 6	IBM VM/SP 2.1 IBM MVS 1.3.5 DEC VMS 5.3 Next 2.1 MS-DOS MS Windows
Data Base Management Systems	BASIS Inquire, Image S2000 DEC VAX RDB MS SQL Server FoxPro, FoxBase Dbase III, Dbase IV	MASS 11 Manager	Oracle Sybase DEC VAX Datatrieve Ingress
Data Dictionaries, Directories, Encyclopedia	Quiz Query		DEC VAX CDD Plus
Programmer Productivity, Computer-Assisted Software Engineering (CASE) Tools	Quiz Query Information Expert Excelerator Inquire ER win/SQL Object View CICS DBUG-AID FILE-AID	Historian	Librarian SAS VAX CMS VAX MMS Oracle Case
Computer Security Enhancement Tools			IBM RACF 1.9 COPS, Crack Disinfectant 2.5.1

2/26/92

Section C

Resource Sharing

Schedule C1, Resource Sharing, summarizes resource sharing opportunities reported by the program areas. The National Energy Research Supercomputer Center (NERSC) and Florida State University resources provide the majority of the FY1992 and FY1993 resource sharing requirements for programs AT-15, KA, KB, and KC.

ADPE System Resource Sharing (RCU's and Costs)   Schedule 3C-1
(Dollars in Thousands)

Site: Argonne National Laboratory - ANL   Point of Contact: L. M. Boxberger   FTS 972-5638
                                                                                Commercial 312-252-5638

Program B&R Code	Identification of Sharing Partner/ Nature of Service/ ADP System		Past FY1991	Current FY1992	Budget FY1993	Plan FY1994
Resource Sharing Requirements						
AF	EG&G	Category R	0.00	0.00	0.00	0.00
			$5	$0	$0	$0
AT15	NERSC	Category R	0.06	0.10	0.15	0.15
KA	NERSC & FSU	Category R	0.03	0.04	0.06	0.08
KB	NERSC	Category R	0.30	0.50	0.55	0.60
KC	NERSC & FSU	Category R	1.35	1.40	1.61	1.66
Resource Sharing Commitments						
	DOE - SSC Laboratory	Category R	0.01	0.01	0.01	0.01
			($27)	($27)	($27)	($27)
	DOE - Bechtel National	Category R	0.02	0.02	0.02	0.02
			($45)	($45)	($45)	($45)
	DOD - Navy	Category Q	0.61	0.61	0.61	0.61
			($366)	($366)	($366)	($366)
	DOD-Army	Category R	0.09	0.09	0.09	0.09
			($170)	($170)	($170)	($170)
	DOD-Air Force	Category R	0.13	0.13	0.13	0.13
			($257)	($257)	($257)	($257)
	DOD-Joint Chiefs of Staff	Category R	0.09	0.09	0.09	0.01
			($181)	($181)	($181)	($23)
	Other - Nuclear Regulatory Commission	Category Q	0.53	0.53	0.53	0.53
			($316)	($316)	($316)	($316)
	Other - Miscellaneous	Category Q	0.08	0.08	0.08	0.08
			($48)	($48)	($48)	($48)
Resource Sharing Availability						
	Cray X-MP/18 ($500/$140/$.32)*	Category R	0.20	0.40	0.40	0.40
	IBM 3084QX-96 ($300/$200/$.32)*	Category Q	2.00	2.00	2.00	2.00
	VAX Cluster 8700/6410 ($60/$0/$.32)*	Category P	0.40	2.00	2.00	2.00
	Charges are based on CPU hours used, memory usage, and input/output transfers. Additionally, offshift usage is discounted. Rates in parenthesis above are in the form of (CPU/Memory/Thousands of IOs).					

.01 R RCU = approximately $20K or 60 to 70 NERSC CRUs-----.01 Q RCU=approximately $6K   2/26/92

Section D

Commercial Services

Schedule 3D-1, ADP Commercial Services Requirements, depicts reported or anticipated use of commercial services by programs at Argonne National Laboratory. Q RCUs are estimated on the basis of approximately $25,000 per .01 Q RCU.

Schedule 4.1: Schedule 3D-1 ADP Commercial Services (RCUs And Costs)

SITE: <u>Argonne National Laboratory - ANL</u>   (Dollars in Thousands)

PROGRAM B&R CODE	IDENTIFICATION OF VENDOR/ NATURE OF SERVICE/ADP SYSTEM	PAST FY1991	CURRENT FY1992	BUDGET FY1993	PLAN FY1994
	<u>TIME</u> (RCUs and Costs)				
AF	FEDLINK Bibliographic Retrieval	.11Q ($66)	.13Q $81	.13Q $81	.13Q $81
AA	Data Resources Economic Model & Forecast Service	.12Q ($75)	12Q ($75)	.12Q ($75)	.12Q ($75)
	STN International	.04Q ($25)	.04Q ($27)	.04Q ($27)	.04Q ($27)
	Illinet/OCLC Services	.03Q $18	.03Q $20	.03Q $20	.03Q $20

Section E

Acquisitions

A.   Acquisitions

1.   Major Planned Acquisitions/Lease Continuations

The major planned acquisitions or lease continuations for Argonne National Laboratory during the planning period are defined in the following Schedule 3E-1s and accompanying justifications:

- ANL-84-1 Continuation of the Advanced Computing Research Facility

- ANL-86-1 Continuation of Lease of Cray X-MP/18

- ANL-94-1 Data Acquisition and Reduction Facility for Advanced Photon Source

Major Planned Acquisitions/Lease Continuations   Schedule 3E-1

Site: Argonne National Laboratory - ANL   MIE No.   ANL-84-1   Last MIE No.

MIE Name: Continuation of the Advanced Computing Research Facility and Start of High Performance
             Computing and Communications Program

Program B & R Code: KC07   Program Name: Advanced Computer Systems Concepts
MIE Description:

Funding Profile ($000)

ACQUISITION	CURRENT FY1992	BUDGET FY1993	PLAN FY1994	OUT-YEARS			
				FY1995	FY1996	FY1997	FY1998
Capital	$300	$8,800	$9,650	$11,750	$11,750	$11,750	$11,750
Operating	$400	$2,810	$5,540	$7,125	$7,125	$7,125	$7,125
Construction (Plant)							

NON-ACQUISITION (FOR ITEMS ACQUIRED IN FY94 AND BEYOND)

Maintenance	$260	$1,160	$2,325	$2,325	$2,325

Involves Facility Changes with Budgetary Impact   ☐ Yes   ☒ No

Installation Date (Mo/Yr)   From: Oct-93   To: Sep-99

Management Classification   ☐ GENERAL   ☐ SPECIAL   ☒ RESEARCH

Initial Purchase Equivalent Cost (all leased items)

ACQUISITION STRATEGY

☐ Purchase   ☒ LEASE FOI   4
☐ Lease with Option to Purchase; Exercise Purchase Option (Mo/Yr)
☐ Lease to Ownership; Payments to be Completed
☐ Other (Explain)

PROCUREMENT STRATEGY (For Items Not Yet Acquired)

☐ Fully Competitive   ☒ Sole Source (Explain)
☐ Limited Competition (Explain)

Explanation:

MILESTONES (For Items to be Acquired in FY92 thru FY94)

Implementation Plan   ☐ Operations Office   ☐ HQ
Solicitation Release
Contract Award

Revised
3/2/92

Justification for ANL-84-1, Continuation of the Advanced Computing Research Facility and Start of High-Performance Computing and Communications (HPCC) Program

The Advanced Computing Research Facility mission is to operate computers with innovative architectures that promise to be effective for DOE work. In FY1992 and subsequent years we expect to acquire and install one or more prototypes of massively parallel computer systems, to be used in conjunction with the HPCC program. In FY1992, we are working closely with Alliant on the feasibility of using a cluster model to make up a massively parallel system. Because we constantly monitor available or planned machines, our ideas on suitable machines change frequently. The selection of a particular machine will depend on what is available within the constraints of the budget.

A beta-test Intel SIGMA will be installed in the first half of 1992. We also plan to upgrade the memory and disc systems on several of the shared-memory multiprocessors. Finally, we intend to acquire modest-scale versions of emerging new architectures that are likely to scale to large configurations. Candidates are the Kendall Square Research UCS-1 and the MOSAIC.

Our goal for the HPCC program is to increase the total available computing power by another factor of five over the next 18 months. To accomplish this goal, we plan to acquire a system with a capacity of about 40 gigaflops. Our visualization resources will similarly be augmented to provide a completely digital postproduction environment.

Major Planned Acquisitions/Lease Continuations   Schedule 3E-1

Site: Argonne National Laboratory - ANL   MIE No.   ANL-86-1   Last MIE No.

MIE Name: Cray X-MP Memory Upgrade Lease Continuation

Program B & R Code: KC*   Program Name: Basic Energy Sciences
MIE Description:

Cray X-MP/14 lease completed 11/91.
Lease costs of 4 megaword memory upgrade to existing Cray X-MP.

Funding Profile ($000)

ACQUISITION	CURRENT FY1992	BUDGET FY1993	PLAN FY1994	OUT-YEARS FY1995	FY1996	FY1997	FY1998
Capital							
Operating*	$400	$100	$100	$100			
Construction (Plant)							

NON-ACQUISITION (FOR ITEMS ACQUIRED IN FY94 AND BEYOND)

Maintenance	$400	$400	$400	$400	$400

Involves Facility Changes with Budgetary Impact   ☐ Yes   ☒ No

Installation Date (Mo/Yr)   From: Nov-87   To: Sep-98

Management Classification   ☒ GENERAL   ☐ SPECIAL   ☐ RESEARCH

Initial Purchase Equivalent Cost (all leased items) $5.400K

ACQUISITION STRATEGY

☐ Purchase   ☐ LEASE FOR _____ YEARS
☐ Lease with Option to Purchase; Exercise Purchase Option (Mo/Yr)
☒ Lease to Ownership; Payments to be Completed   [Oct-95]
☐ Other (Explain)

PROCUREMENT STRATEGY (For Items Not Yet Acquired)

☒ Fully Competitive   ☐ Sole Source (Explain)
☐ Limited Competition (Explain)

    Explanation:

MILESTONES (For Items to be Acquired in FY92 thru FY94)

    Implementation Plan   [   ]   ☐ Operations Office   ☐ HQ
    Solicitation Release   [   ]
    Contract Award   [   ]

                                                                        [Revised
*Operating costs are distributed among users on an actual use basis.   2/25/92]

Justification for ANL-86-1 Continuation of Lease of Cray X-MP/18

Acquisition of the Cray X-MP/14 in FY1988 was an initial step in modernizing and upgrading central computing resources to meet the increasing needs for onsite resources in the most cost-effective manner possible.

During the FY1991, additional memory was added, converting the Cray X-MP/14 to a Cray X-MP/18. This upgrade has allowed for better system utilization and has opened up new opportunities for interactive graphics and debugging. During off shift hours, larger problems can also be run.

The lease of the Cray X-MP/14 was completed on November 30, 1991. The lease of the additional four megawords of memory will continue through FY1994. The total annual operating costs are distributed via central computing charge-back to users on an actual use basis.

Major Planned Acquisitions/Lease Continuations   Schedule 3E-1

Site: Argonne National Laboratory - ANL   MIE No.   ANL-95-1   Last MIE No. ANL-94-1

MIE Name: Data Acquisition and Reduction Facility for the Advanced Photon Source

Program B & R Code: KC   Program Name: Basic Energy Sciences
MIE Description:

    See accompanying justification and description

Funding Profile ($000)

ACQUISITION	CURRENT FY1992	BUDGET FY1993	PLAN FY1994	OUT-YEARS FY1995	FY1996	FY1997	FY1998
Capital				$1,900			
Operating*							
Construction							
(Plant)							

NON-ACQUISITION (FOR ITEMS ACQUIRED IN FY94 AND BEYOND)

Maintenance		$378	$378	$378	$378

Involves Facility Changes with Budgetary Impact   ☐ Yes   ☐ No

Installation Date (Mo/Yr)   From: Jan-95   To: Sep-98

Management Classification   ☒ GENERAL   ☐ SPECIAL   ☐ RESEARCH

Initial Purchase Equivalent Cost (all leased items) $1,900K

ACQUISITION STRATEGY

☒ Purchase   ☐ LEASE FOR _____ YEARS
☐ Lease with Option to Purchase; Exercise Purchase Option (Mo/Yr)
☐ Lease to Ownership; Payments to be Completed
☐ Other (Explain)

PROCUREMENT STRATEGY (For Items Not Yet Acquired)

☒ Fully Competitive   ☐ Sole Source (Explain)
☐ Limited Competition (Explain)

   Explanation:

MILESTONES (For Items to be Acquired in FY92 thru FY94)

Implementation Plan	Mar-94	☐ Operations Office	☐ HQ
Solicitation Release	Sep-94		
Contract Award	Dec-94		

Revised
2/25/92

Justification for ANL-94-1, Data Acquisition Facility for Advanced Photon Source

Argonne has been designated as the site for a new Advanced Photon Source (APS) which began construction in FY1990. This is a major facility which will support 16 beam lines initially and be expandable to at least 70 beam lines. Intensities will be six orders of magnitude higher than that of IPNS. A data analysis and experimental support facility which would meet the needs of the initial users of the facility is proposed as part of this project. The proposed facility would include a cluster of two type P RCU computers employing the Unix operating system with at least eight gigabytes of disk storage and several workstations. An extensive data communication facility based on FDDI and extending to the user experimental areas will be included. We expect the computer facility to expand as the number and needs of the APS users increase. The APS facility will be linked to the Argonne central computers to provide access to special graphics and higher performance computers. Building of the facility is also expected to stimulate theoretical work in support of the measurements made at the facility. Much of this theoretical work would be carried out by using the ANL centralized computers or at the ER supercomputer facility via ESnet.

The APS equipment will be purchased so that delivery would occur before the start of the experimental program. The procurement activity will be initiated in FY1994. The total cost of the hardware is expected to be $1.9 million with another $400,000 for software.

2. Summary of Major Planned Acquisitions/Lease Continuations

Summary of Major Planned Acquisitions/Lease Continuations
(Dollars in Thousands)

Site: Argonne National Laboratory-ANL

Schedule 3E-2

MIE No.	MIE Name	Mgmt Class	Current FY1992	Budget FY1993	Plan FY1994	Out - Years FY1995	FY1996	FY1997	FY1998
	KC - Basic Energy Sciences *								
ANL-84-1	Continuation of Advanced Computing Research Facility and Start of High Performance Computing and Communications Program	R	$300 (C) $400 (O)	$8,800 (C) $2,810 (O)	$9,650 (C) $5,540 (O)	$11,750 (C) $7,125 (O)	$11,750 (C) $7,125 (O)	$11,750 (C) $7,125 (O)	$11,750 (C) $7,125 (O)
ANL-86-1	Cray X-MP Memory Upgrade Lease	G	$400 (O)	$100 (O)	$100 (O)	$100 (O)			
ANL-95-1	Data Acquisition/Reduction Facility for the Advanced Photon Source	G				$1,900 (C)			

* Basic Energy Sciences is the program with institutional budget responsibility for General Purpose Equipment, however operating costs are programmatically shared based upon usage.

Identify the type of funds for each entry: (C) =Capital; (O)=Operating; (P)=Plant(construction)

Management Class: Enter (G)=General, (S)=Special, (R)=Research

Revised   3/2/92

3.   **Financial Alternative Analyses**

None

Section F

Reutilization Opportunities/Obsolete System Retirement

Schedule 6.1: Schedule 3F-1 ADPE System Reutilization Opportunities

None.

Section G

Examples of Programmatic Uses

During FY1991 and FY1992, the Computing and Telecommunications Division published and distributed several documents that provide excellent examples of advanced computational science and engineering applications by Argonne National Laboratory researchers and collaborators. Three such documents are:

- *Computational Science and Engineering at Argonne National Laboratory*
  (an Argonne brochure)

- *Illinois: Gateway to Advanced Computing and Communications*
  (an Illinois Coalition brochure)

- *Argonne National Laboratory Study of the Transfer of Federal Computational Technology to Manufacturing Industry in the State of Michigan*
  (ANL/TM 498)

Copies of these documents can be obtained at the Document Distribution Counter (Building 221, Room A-134), or through the mail (by calling extension 2-5405 and requesting a copy).

Section H

ADP Budget Schedules

Exhibit 8.1 identifies budgeted costs of major computer requirements and other ADP requirements for general management computers and ADP operating costs associated with general management computers. Representatives from each of the program areas of the Laboratory, the Chief Financial Officer, and the Chief Operations Officer provided the computing requirements, acquisitions, budget costs, and narrative information for all of the programs and organizations of the Laboratory. The information necessary to complete this *Site Response* was obtained at the individual program level or lower in some cases (four digit budget and reporting code), and then submitted to CTD for aggregation at the level of detail required by DOE.

Exhibit 8.1: ADP Operating Costs General Management Computers
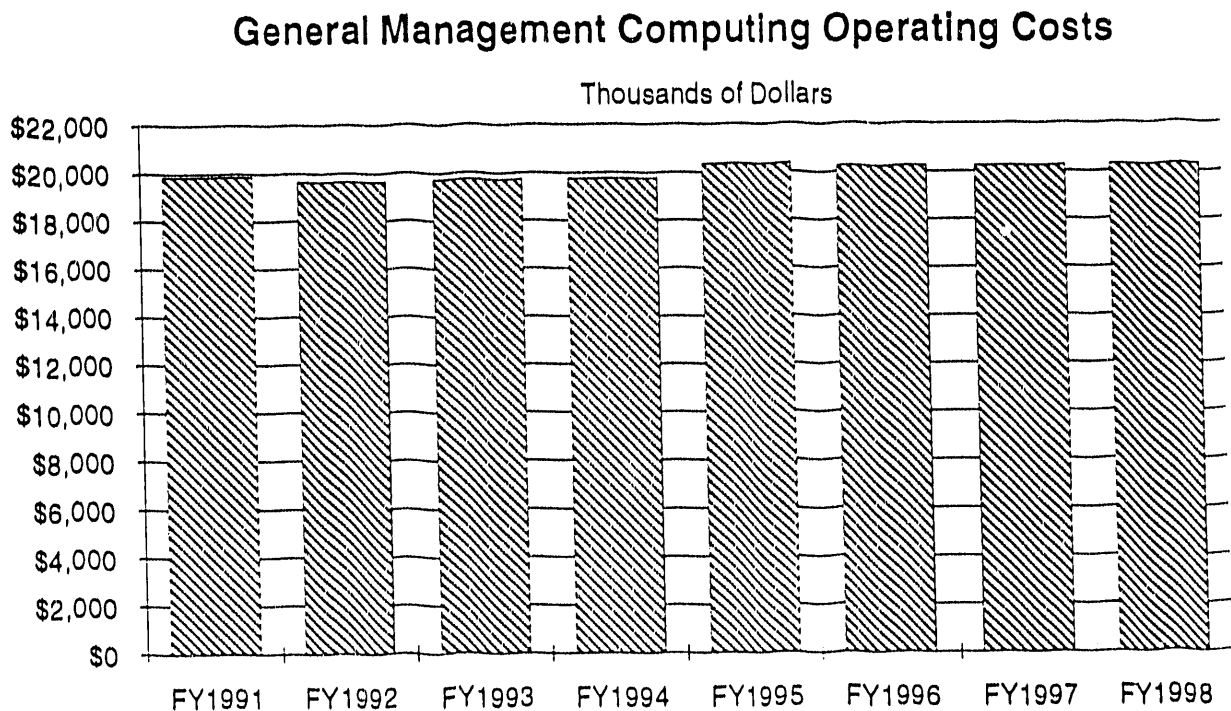
General Management Computing Operating Costs

Thousands of Dollars

Summary   Major Computing Resource Acquisitions and Other Capital Requirements
Site: Argonne National Laboratory - ANL   for General Management Computers   Schedule 3H-1
                                                       (Dollars In Thousands)

General Management Computers-Capital	FY1991	FY1992	FY1993	FY1994	FY1995	FY1996	FY1997	FY1998
					XXXXX	XXXXX	XXXXX	XXXXX
A. Major ADPE Items	$0	S0	S0	$0	XXXXX	XXXXX	XXXXX	XXXXX
B. Other ADPE	$1,411	$1,541	$1,866	$1,906	XXXXX	XXXXX	XXXXX	XXXXX
C. Software	$37	S44	S47	$49	XXXXX	XXXXX	XXXXX	XXXXX
D. Site Preparation	$0	S0	S0	$0	XXXXX	XXXXX	XXXXX	XXXXX
Total	$1,448	$1,585	$1,913	$1,955	$3,865	$1,965	$1,965	$1,965

Programmatic Distribution		FY1991	FY1992	FY1993	FY1994	FY1995	FY1996	FY1997	FY1998
AA	Coal	$5	$10	$10	$10	$10	$10	$10	$10
AF	Civilian Reactor Development	$178	$183	$181	$181	$181	$181	$181	$181
AT-15	Development and Technology	$5	$10	$10	$10	$10	$10	$10	$10
KA	High Energy Physics	$250	$300	$300	$300	$300	$300	$300	$300
KB	Nuclear Physics	$50	$50	S50	$50	$50	$50	$50	$50
KC	Basic Energy Sciences	$920	$972	$1,302	$1,344	S3,254	$1,354	$1,354	$1,354
	Other Programs	$40	$60	S60	$60	$60	$60	$60	$60
Total		$1,448	$1,585	$1,913	$1,955	$3,865	$1,965	$1,965	$1,965

Operating Costs Associated with General Management Computers

Site: Argonne National Laboratory - ANL   (Dollars In Thousands)   Schedule 3H-2

Page 1 of 2

	Past FY1991	Current FY1992	Budget FY1993	Plan FY1994	Out Years FY1995	FY1996	FY1997	FY1998
I. Operating Costs								
A. In-House Personnel					XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
1. Software	$5,189	$6,115	$6,430	$6,435	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
2. ADPE Operations	$2,032	$2,338	$2,388	$2,392	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
3. ADPE Maintenance	$677	$707	$728	$730	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
4. ADPE Studies and Other	$1,155	$1,318	$1,339	$1,339	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
5. Software Studies and Other	$993	$1,163	$1,180	$1,181	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
Subtotal In-House Personnel	$10,046	$11,641	$12,065	$12,077	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
B. Other In-House					XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
1. ADPE Purchases	$1,184	$914	$931	$951	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
2. Major ADPE Leases	$1,734	$300	$0	$0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
3. Other ADPE Leases	$16	$195	$127	$127	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
4. Space	$1,084	$1,107	$1,132	$1,134	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
5. Supplies and Other	$2,520	$2,212	$2,224	$2,225	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
5. Software Purchases	$652	$629	$631	$636	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
6. Software Studies and Other	$422	$480	$480	$480	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
Subtotal Other In-House	$7,612	$5,837	$5,525	$5,553	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
C. Commercial Services	$0	$0	$0	$0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
1. ADPE Time	$0	$0	$0	$0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
2. ADPE Maintenance	$1,451	$1,478	$1,480	$1,480	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
3. ADPE Operations	$0	$0	$0	$0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
4. Software Development/Maintenance	$758	$703	$659	$666	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
5. ADP Studies and Other	$9	$5	$5	$5	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
6. Software Studies and Other	$6	$0	$0	$0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
Subtotal Commercial Services	$2,224	$2,186	$2,144	$2,151	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
D. Noncommercial Services	$0	$0	$0	$0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
1. Other DOE Sites	$0	$0	$0	$0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
2. Other Executive Branch Agencies	$0	$0	$0	$0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
3. Other	$0	$0	$0	$0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
Subtotal Noncommercial Services	$0	$0	$0	$0	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			
Total of A, B, C, and D	$19,882	$19,664	$19,734	$19,781	$20,367	$20,266	$20,275	$20,285

Revised   2/26/92

Operating Costs Associated with General Management Computers

Site: Argonne National Laboratory - ANL

(Dollars in Thousands)

Schedule 3H-2
Page 2 of 2

		Past FY1991	Current FY1992	Budget FY1993	Plan FY1994	Out Years FY1995	FY1996	FY1997	FY1998
II. Work Years (Not Required of This Site)						XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX XXXXXXX XXXXXXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX			

III. Distribution of Funded Costs by Program

		Past FY1991	Current FY1992	Budget FY1993	Plan FY1994	FY1995	FY1996	FY1997	FY1998
AA	Coal	$1,192	$1,132	$1,190	$1,191	$1,191	$1,190	$1,190	$1,191
AF	Civilian Reactor Development	$3,881	$3,807	$3,683	$3,690	$3,691	$3,657	$3,658	$3,660
AT15	Development and Technology	$222	$212	$207	$207	$207	$206	$206	$206
KP	Biological and Environmental Research	$742	$737	$745	$749	$750	$747	$748	$749
KA	High Energy Physics	$443	$425	$405	$406	$407	$405	$405	$406
KB	Nuclear Physics	$1,033	$1,000	$983	$984	$984	$980	$980	$981
KC	Basic Energy Sciences	$3,044	$2,897	$2,837	$2,843	$3,424	$3,403	$3,406	$3,409
	Other Programs	$6,601	$6,624	$6,712	$6,719	$6,720	$6,687	$6,689	$6,691
	Reimbursables-DOE-Fermilab, METC,	$40	$40	$40	$40	$40	$40	$40	$40
	Reimbursables-NRC Internal	$285	$285	$285	$285	$285	$285	$285	$285
	Reimbursables-NRC External	$0	$0	$0	$0	$0	$0	$0	$0
	Reimbursables-DOD Internal	$1,347	$1,373	$1,477	$1,477	$1,477	$1,477	$1,477	$1,477
	Reimbursables-DOD External-Navy	$387	$387	$387	$387	$387	$387	$387	$387
	Reimbursables-Other Executive Intern	$111	$111	$111	$111	$111	$111	$111	$111
	Reimbursables-Other Executive Exterr	$0	$0	$0	$0	$0	$0	$0	$0
	Reimbursables-Other Internal	$293	$358	$384	$384	$384	$384	$384	$384
	Reimbursables-Other External	$263	$278	$288	$308	$308	$308	$308	$308
Total		$19,882	$19,664	$19,734	$19,781	$20,367	$20,266	$20,275	$20,285

Revised   2/26/92

Section I

Not Applicable

Section I is not applicable to Argonne National Laboratory.

Section J

Reconciliation

The most significant aspect of this *Site Response* and prior submissions are the changes in the working environment of the individual scientist/engineer/researcher. More and more organizations are adopting or implementing distributed local area networks of scientific workstations. More often than not they are attached to site-wide networks and generally add significant new computing capability for the site as a whole. The work performed on these distributed systems is predominantly work that was previously performed on distributed minicomputers or central mainframe computers. Additionally, new types of work are performed on these systems which in the past was done by hand or was not done at all.

The current basis for quantifying requirements and capacity, the relative capacity unit (RCU), is no longer a comprehensive measurement. The changing and new computing and network technologies including powerful distributed scientific workstations, parallel processing, and mini-supercomputers have added significant new capabilities and capacities that can no longer be accurately depicted by the relative capacity unit. Therefore, it is likely that the requirements and capacity of ANL and all sites are understated. Each year the introduction and implementation of new technologies further erode the value of the relative capacity unit and the ability to measure the total capacity and requirements of any particular site.

Part 4

Telecommunications Plan

Section A

Telecommunications

A.   Strategies and Major Accomplishments

Strategy

The digital integrated voice/data telephone system at Argonne National Laboratory forms an exceptional communications environment to facilitate Laboratory programs as well as administrative and support operations. Ancillary systems are in place to serve emergency operations.

The Laboratory strategy for improving services and controlling costs includes taking advantage of PBX hardware and software updates, adjusting trunking levels, reconfiguring FX services, taking advantage of long distance carrier discount packages, expanding voice processing applications, and improving disaster recovery posture through alternate routing and continuing disaster recovery planning.

PBX services for increasing site population and new construction projects will be accommodated through modular PBX expansion.

The Laboratory plans to expand the existing prototype Fiber Distributed Data Interface (FDDI) fiber optic network to all major buildings on the site. FDDI has become a standard for high speed (100 megabits per second) fiber optic networks. The fiber optic network will also include fibers for video application and future gigabit per second data networking.

Argonne is pursuing becoming a member of the 622 megabits per second BLANCA testbed facility which runs through the Chicago area. The BLANCA testbed will support research in distributed applications over a wide-area, high-speed network. It is proposed that linking Argonne to the BLANCA gigabit testbed will allow the demonstration of specific nuclear power applications on distributed high performance computers accessible to Argonne and researchers at the National Center for Supercomputing Applications (NCSA). The demonstration studies envisioned involve code packages from the nuclear industry with potential teraflop requirements that may eventually require the combined resources of computers distributed across the country. Specific examples of these code packages include Monte Carlo-based fuel depletion analysis codes targeted for massively parallel machines and real time accident monitoring codes which now run on the current generation of vector supercomputers.

Major Accomplishments

Laboratory PBX telephone service was expanded to a nearby offsite leased building. This required installation of 2 1/2 miles of fiber and copper cables to a remote PBX node to serve 400 telephones and provide data communications.

An Octel Maxum voice processing system was installed in 1991 and serves over 1200 voice mailbox subscribers. Special applications have already improved efficiency and productivity of service organizations.

The National Science Foundation installed a major National Science Foundation network (NSFnet) switching node at Argonne. The switching node is connected to the NSFnet backbone at 45 megabits per second transmission speed. The node serves as a major hub for Chicago area and Midwest region universities.

B.   Reconciliation to FY1992 Plan

None.

C.   Currently Utilized Services/Planned Minor Enhancements

An InteCom IBX S-80 digital PBX serves the Illinois site of Argonne National Laboratory. The PBX cutover was on Septemt 19, 1987. The lease-to-purchase contract extends to September, 1997. The PBX supports standard analog telephones, InteCom manufactured digital stations for voice, data, or simultaneous voice and data service, and LANmark local area networking. Nearly 27 percent of all PBX ports are used for digital data communications or a combination of digital data and voice.

The Telephone System consists of a main PBX node and seven distributed nodes connected to the main node by fiber optic cables. Each node serves a building or group of buildings via a copper wire and cable plant. In addition to switched PBX services, the PBX wire and cable plant provides point to point copper circuits for onsite data communications, alarm systems, control systems and audio systems. The wire and cable plant also provides for extending external private lines and miscellaneous services from the Illinois Bell interface to onsite user locations. A buried conduit system facilitates installations of new cables to all major buildings.

Approximately 6800 telephones serve the three major organizations on the Argonne site: Argonne National Laboratory, DOE Chicago Operations Office, and the New Brunswick Laboratory. Four Argonne employed operators staff the three attendant consoles in the ANL Comcenter, 17 hours per day, five days per week.

An Octel Maxum voice processing system serves over 1200 mailbox subscribers. Laboratory organizations are using special voice processing applications to improve efficiency and productivity.

A No. 1 ESS switch in the Illinois Bell central office located one mile west of the site provides Direct In Dial and Direct Out Dial commercial service with 90 DID and 53 DOD trunks. Local metropolitan area calling is provided through 18 FX lines into Chicago, four FX lines to Summit, seven FX lines to Joliet, five FX lines to Bensenville, and nine FX lines to Warrenville. There are also six tie lines connecting Argonne to Fermilab on a microwave link primarily used for data communications. Connection to FTS 2000 consists of 36 trunks in two land-based T1s. ANL has four interstate 800 Service lines to be used in lieu of collect and credit card calls relative to matters of employment, employee benefits, and official travel. One interstate and four intrastate 800 service lines are used to provide information on hazardous materials to state and local emergency organizations. MCI provides direct access long distance service via T1 microwave from the Laboratory to the MCI office in Downers Grove, Illinois. MCI overflow calls are provided by AT&T via equal access. The MCI microwave link has a capacity of three DS3s and provides both voice and data service. Exhibit 1.1 depicts the current voice network serving the Laboratory.

Exhibit 1.1: ANL Voice Network

```
┌─────────────────────────┐
│  Illinois Bell          │
│  Lemont North           │──────────────▶  FTS 2000····2 T1s
│  Central Office         │
│                         │──────────────▶  Local Area FX····16 Lines
│  ─────────────   ▲      │
│                  │      │──────────────▶  800 Service····9 Lines
└─────────────────────────┘
      │            ▲
   90 DID       93 DOD
      ▼            │
┌─────────────────────────┐
│  Argonne National       │◀────────▶  Fermi Lab Tie lines
│  Laboratory             │            via microwave····6 Lines
│                         │
│  InteCom S-80           │
│  Digital PBX            │─────────▶  MCI Long Distance via
│                         │            Microwave····3 T1s
│  6800 Lines             │
└─────────────────────────┘
```
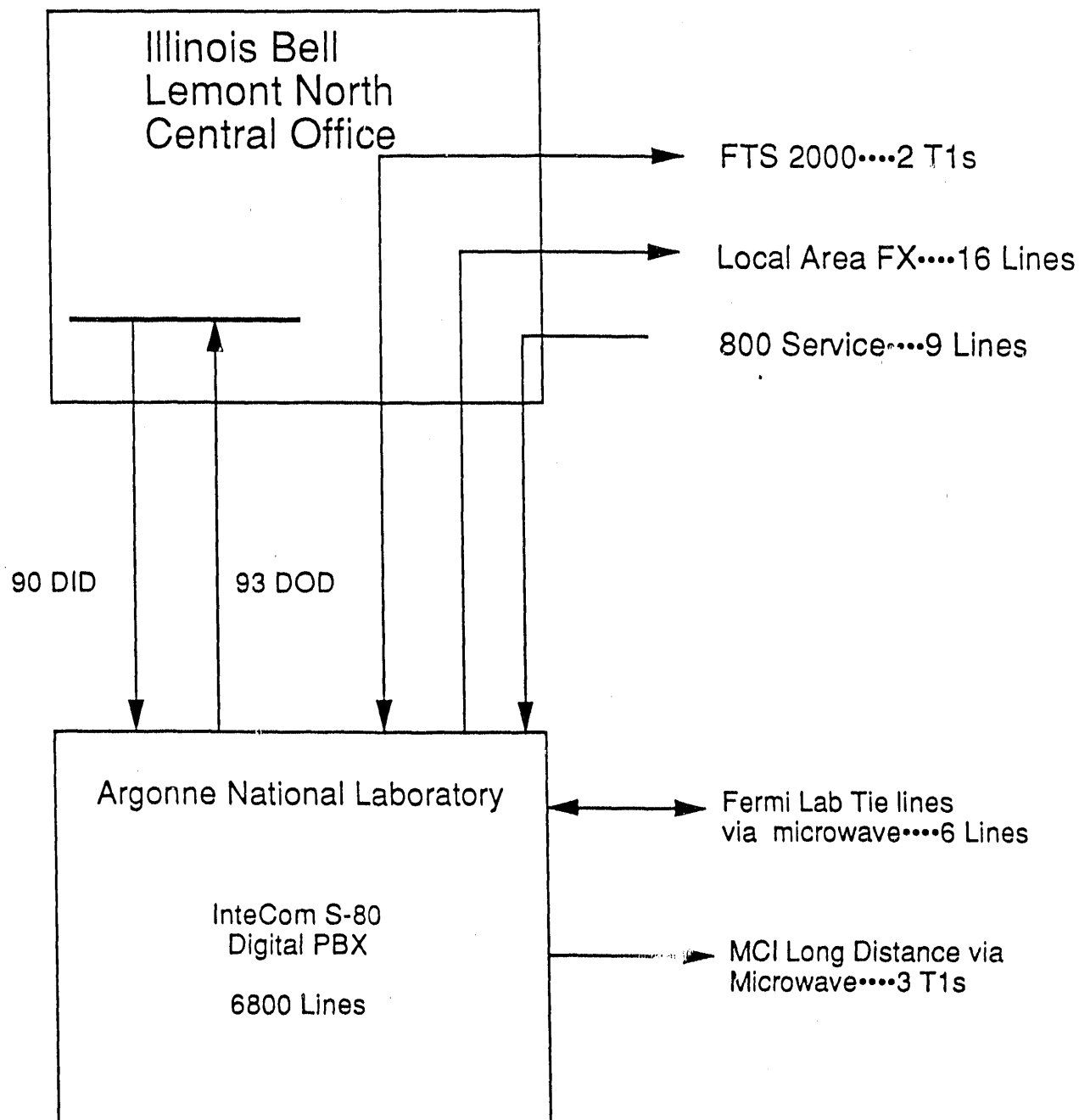
Bell Atlanticom, the vendor who installed the PBX, and Argonne personnel perform all of the physical moves, changes, and installations. The maintenance contract with Bell Atlanticom is renewed on an annual basis.

Laboratory Telephone Service personnel perform administrative moves and changes via data terminals linked to the PBX.

Five mobile cellular telephones and forty transportable cellular telephone units are in operation and use commercial radio frequencies and services. In addition to normal use, all units are available for providing enhanced communications capabilities for emergency operations.

Thirteen non-PBX business lines served from an offsite telephone exchange provide backup in the event of PBX switch failure. Other emergency communications include a separate forty-station Laboratory-owned dial intercom and conferencing system and a sitewide public address system.

Argonne computer users have access to an extensive variety of communication capabilities, including both onsite and remote access to local, Laboratory-wide, national, and international networks. These capabilities involve a wide range of telecommunications technologies, from simple point-to-point data communications links to sophisticated networks with complex software and hardware configurations (e.g., network bridges, gateways, routers, and servers).

Argonne networks include the Transmission Control Protocol/Internet Protocol (TCP/IP), the Digital Equipment Corporation DECnet protocol, Appletalk, and the Xerox Network Systems protocols. Network software and hardware allow users to transfer files, gain interactive access, send electronic mail, and run application programs on computing systems connected to networks.

Argonne's network topology consists of a hierarchy of networks, including local area networks based on Ethernet encompassing buildings or programs, a Laboratory-wide network based on an Ethernet-compatible capability (LANmark) and on the Fiber Distributed Data Interface (FDDI) token ring network, and gateways to major national and international networks (ESnet, NSFnet, CICnet and BITnet).

Argonne has identified FDDI, a widely accepted standard for high-speed (100 megabits per second) fiber optic networks, as an important networking technology. Argonne has used Support Development Funds for investigating FDDI and has created a plan for installing it at the Laboratory. In February 1990, Argonne installed a prototype FDDI network across the Laboratory. This installation was the culmination of an extensive effort to investigate FDDI and its applicability to the Argonne computing environment. Argonne believes that increased use of FDDI is needed to better accommodate applications such as high-speed host-to-host file transfer, distributed network file systems, scientific visualization, and distributed processing that require faster network transmission speeds than is commonly available today.

General Purpose Equipment funds have been used to connect the Cray X-MP/18 to the FDDI network and to connect the Laboratory-wide Ethernet network to the FDDI network. The equipment installed consisted of an FDDI/Cray Low-Speed Channel router and an FDDI/Ethernet Multiprotocol router. In addition, a SUN 4/490 server and a Silicon Graphics Inc. workstation have been connected to the FDDI network. The VAX 6410 cluster in CTD is expected to be connected in early 1992. CTD has submitted a General Physical Plan Proposal (GPP) to expand this fiber optic cable network throughout most of the Argonne East site.

In July 1991, the National Science Foundation completed installation of a major National Science Foundation network (NSFnet) switching node at Argonne. This switching node is connected to the NSFnet backbone at 45 megabits per second transmission speed. The NSFnet node has now been connected to the Laboratory FDDI prototype network. The NSFnet node at Argonne also serves as a major hub for Chicago area universities and universities in the Midwest region.

In October 1991, CTD reorganized its support of Laboratory computer networks: connections to external networks, Laboratory-wide LANmark and Fiber Distributed Data Interface Networks, and the Central Computing facility networks. CTD formed a Network Operations Center (NOC) to ensure the reliability of ANL Laboratory-wide and local area networks and to provide early notification and timely responses for network failures. The NOC is using automated network monitoring tools for TCP/IP, DECnet and SNMP agents to keep the current status of network components. A manual trouble ticket system was implemented to be replaced with an automated system in the future for tracking network problem resolution.

Argonne provides users of data processing equipment with a variety of data communications facilities to supply the means for remote access to data processing resources. These data communications capabilities accommodate user access to onsite and offsite computing networks: local area networks located on the ANL site, e.g., Argonne Integrated Heterogeneous File Transfer Network, ANL DECnet Networks, PC Networks, etc. and wide area networks located throughout the world, e.g., Bitnet, ESnet, HEPnet, NSFnet etc. (see Exhibit 1.2).

Data--The Laboratory installed a new PBX-Based Digital Telecommunications System (DTS), which was cut over on September 19, 1987. The system provides simultaneous voice/data capabilities. Users can select station equipment that provides them with switched asynchronous data service to 19.2 kbps and switched synchronous data service to 56 kbps from any standard telephone jack at the Laboratory. A major data strategy is thus to provide Laboratory-wide terminal/computer connectivity at high speeds.

The DTS also provides a Laboratory-wide Local Area Network capability (LANmark). Users can select station equipment that provides gateways between industry standard Ethernet devices and the DTS's internal packet switched network. A major local network strategy is to provide a Laboratory-wide Ethernet which allows simultaneous connectivity to hosts running a variety of network protocols: DECnet, TCP/IP, XNS, LAT, NI Cluster, NSP-IP, etc. Local Ethernet coaxial cables interconnect computers within a division, program, or building and are, in turn, interconnected into a Laboratory-wide network through gateways to LANmark. Fifty-eight LANmark devices are currently in use on the Laboratory-wide Ethernet.

In January 1989, CTD installed a new digital microwave system between Argonne National Laboratory and Fermi National Accelerator Laboratory (FNAL). CTD installed International Microwave Corporation modern digital equipment that uses the existing parabolic antennae and passive reflectors and operates on the same frequencies allocated to the old Motorola microwave. The new microwave system has the capacity to allow four T1 (1.544 megabits per second) channels and is used to support a variety of data services.

Exhibit 1.2: ANL External Networks

ARGONNE NATIONAL LABORATORY EXTERNAL NETWORKS

HEPnet
(DECnet)

ESnet

INTERNET
(TCP/IP and
OSI)

BLANCA
Gigabit
Testbed

ANL NETWORKS
(TCP/IP, DECnet, LAT, X.25,
XNS, NJE, SNA, OSI, and
AppleTalk)

BITnet
(NJE)

CICnet (TCP/IP,
DECnet, and
OSI)

NSFnet (TCP/IP
and OSI)
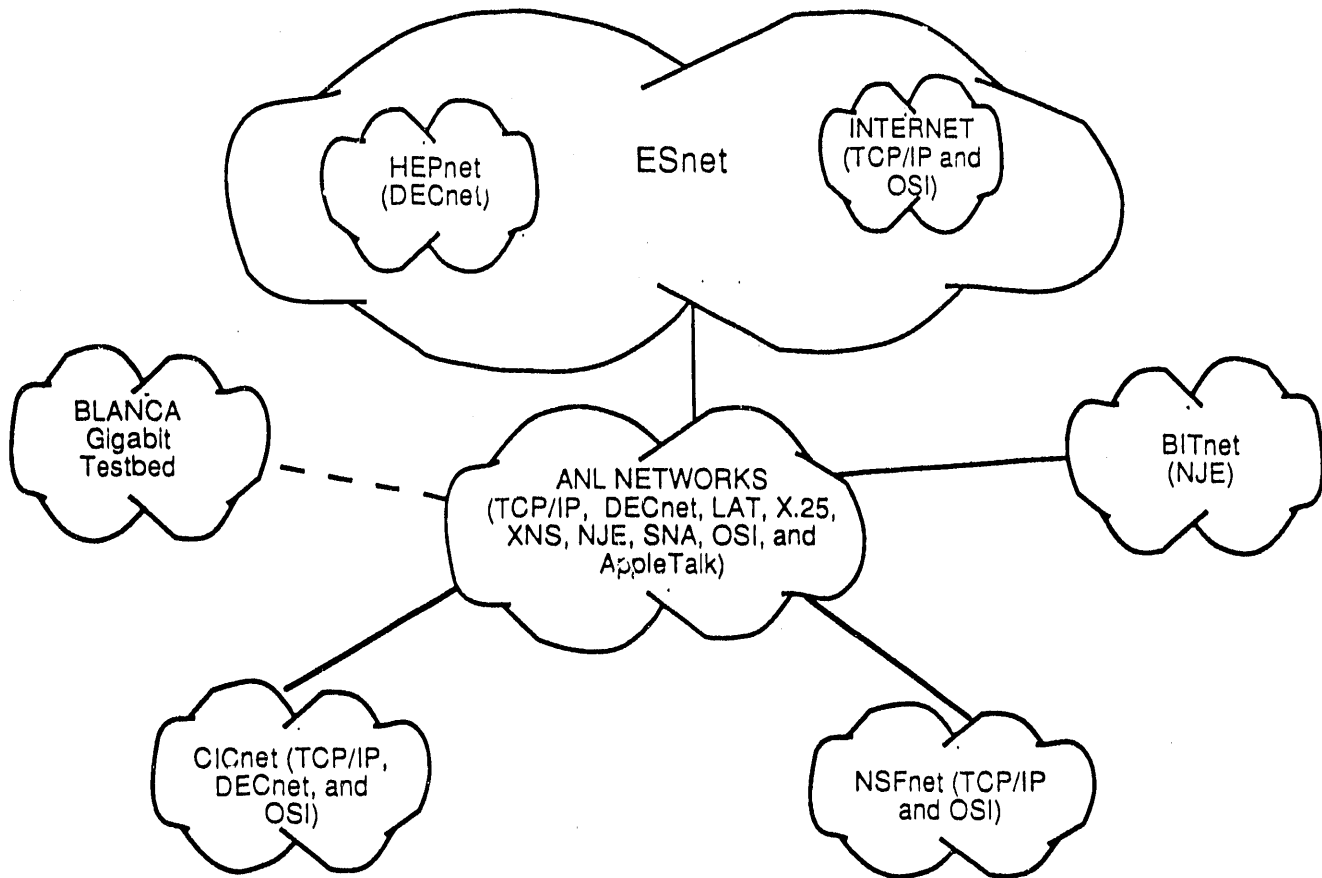
Argonne File Transfer Network--The IBM host computers operated by the Computing and Tele-communications Division are loosely coupled by telecommunication links, channel-to-channel adaptors, and virtual channel-to-channel adaptors, all of which use a standard IBM protocol, Net-work Job Entry (NJE). This protocol allows the transfer of files, jobs, and messages among connected systems. The network connects to offsite locations at the Fermi National Accelerator Laboratory, the University of Chicago, the University of Illinois at Chicago (UIC), Northern Illinois University, and the Morgantown Energy Research and Development Center. Several years ago Argonne developed software to run in a VMS operating system on a VAX computer. The VAX computers connect to the central IBM host computers by 9600 to 56,000 bits per second tele-communication links in a star configuration.

BITnet--The IBM and VAX computers that compose the Argonne File Transfer Network are connected to a nationwide university computer network called BITnet. As of December 1990, over 3273 academic and research systems are currently on BITnet. BITnet uses the same store-and-forward protocol as the networking for the Argonne File Transfer Network. This connection allows enhanced collaborative efforts between Argonne scientists and scientists at universities on Bitnet. BITnet allows users to share programs and data with other BITnet users and to communicate with them through electronic mail. Argonne connects to BITnet through a 9600 baud binary synchronous communication link to the University of Illinois at Chicago. The University of Chicago and Northern Illinois University gain access to BITnet through the Argonne node.

IBM Systems Network Architecture--Systems Network Architecture (SNA) is a networking architecture developed by IBM. Most of the new communications products that IBM and other vendors are announcing are compatible with SNA, and many may run only in an SNA environment. SNA has been put into the production system for the MVS and VM systems. An IBM 3745 communication controller allows remote cluster controllers to connect to the central IBM systems at 56 kilo bits per second. Some of the advantages of SNA to Argonne are:

- Direct system select for IBM 3270 users.

- Improved system availability.

- Provision for a multitude of communication devices.

- Sharing of communication lines by devices of different types.

Idaho Telecommunication Links--There are currently two 14.4K bps communication links between ANL-W (Idaho) and ANL-E. These links use multiplexors to provide for a variety of functions as follows:

- Nineteen Hewlett-Packard terminals and two printers in Idaho are connected to the two Hewlett-Packard computer systems in the Administration Building (Building 201).

- Two IBM 3278 terminals are connected through a 3274 cluster controller to the IBM host in Building 221.

- Two HASP workstations in Idaho are connected to the IBM 3705 in Building 221.

- One virtual HASP workstation at ANL-E connects to a CDC CYBER computer at EG&G in Idaho Falls.

- One hundred sixty-five terminals in Idaho are connected to a Micom voice/data system that in turn connects to a 272 port Tellabs digital switch. Fifty four of the Tellabs ports are connected to computers and one hundred sixty-five are connected to terminals. The Tellabs switch connects to two 14.4K bps modems over voice grade lines to ANL-E. At the ANL-E end, a similar Tellabs switch allows the ANL-W user to select among:

  — Dynapac X.25 connected to the IBM hosts

  — Tellabs X.25 connected to the IBM hosts

  — Two NBI OASys 64 word processor systems

  — DEC MicroVAX-II in Building 208

ESnet--The DOE Office of Energy Research (OER) under the management of the OER Scientific Computing staff has initiated a new effort in data communications networking designated the Energy Sciences network (ESnet). The ESnet concept is intended to bring together the various data communication efforts of the different research programs funded by OER into a single network that would use protocols being developed by the International Standards Organization for Open Systems Interconnect. A phased implementation of ESnet is now underway. ESnet supports dual protocols using Cisco routers: TCP/IP with gateways planned to connect to the Internet and DECnet for the HEPnet backbone. A T1 backbone is installed connecting major nodes. ANL is currently connected to ESnet with a T1 connection to Fermi National Accelerator Laboratory, Princeton Plasma Physics Laboratory, Iowa State University, and Oak Ridge National Laboratory.

Asynchronous Support--Dial-up and dedicated lines connected to the central IBM computing facility through IBM 3705 communication controllers are the means of access for asynchronous telecommunications to the interactive systems: CMS, Wylbur, and TSO. Dial-up lines are available at speeds of 300 to 19,200 bps. We provide dial-up lines for both onsite and offsite users in pools through the Private Branch Exchange (PBX). Onsite users with electronic telephone stations have access to the IBM computing facilities at speeds from 300 to 19,200 bps through Asynchronous Data Interfaces (ADI) on the PBX.

X.25 Concentrators--In addition to the asynchronous lines mentioned above, both offsite and onsite users may access the interactive systems from ASCII compatible terminals connected to X.25 concentrators. These concentrators allow terminals to be connected at speeds up to 19,200 bps. The traffic from these terminals is then multiplexed by the concentrators onto 9,600 or 56,000 baud lines (with the X.25 protocol), which are connected to the central computing complex.

3270 Terminal Accommodation--The interactive systems running under CICS, as well as the interactive systems CMS, Wylbur, and TSO, are accessible from IBM 3270-compatible full screen displays. While some of the displays in Computing and Telecommunications are directly connected via coaxial cable to channel-connected controllers, the majority are connected via coaxial cables to remote IBM 3274 cluster controllers. These remote cluster controllers are connected via dedicated 56K bps communication lines to the central computing complex. A high performance 3745 communication controller has been purchased and is installed to support 3274 cluster controller links at 56K bps. This controller will supply the premier data path to the central IBM facilities. The cluster controllers thus act as concentrators and allow (depending on the model) up to 32 displays to be connected. The controllers provide error checking and retransmission, flow control, and some local processing, all of which reduce the overall traffic between the controller and the host computers.

A 3174 Subsystem control unit is connected to the byte multiplexor channel on the central IBM 3084 VM machine. The 3174 supports up to 32 simultaneous IBM 3270 full screen terminals or IBM 3186 printers. The 3174 is connected to IBM's systems network architecture (SNA) Telecommunications program allowing access to the interactive systems running on the central IBM complex, including CICS, Wylbur, CMS and TSO. The 3174 ports are dedicated to a data interface unit (DIU-7) that connects to the PBX. The ports on the 3174 are accessed through the PBX on a contention basis, allowing these resources to be shared. Users of 3278 full screen terminals can connect directly to the PBX through an LDI700. The LDI700s connect the IBM 3278 terminals to the PBX, thus providing them with full screen support through the IBM 3174.

Hydra II Protocol Converter--The Hydra II protocol converter supports up to 62 asynchronous terminal connections into the IBM 3084 VM machine doing 3270 full screen emulation. A Hydra II protocol converter is connected to the byte multiplexor channel on the central IBM 3084 VM machine. The Hydra II is connected to IBM's Systems Network Architecture (SNA) Telecommunications program allowing access to the interactive systems running on the central IBM complex including CICS, Wylbur, CMS and TSO.

The Hydra II asynchronous ports are dedicated to asynchronous data interface devices (ADIs) that connect to the PBX. The Hydra II asynchronous ports are accessed through the PBX on a contention basis, allowing these resources to be shared. The Hydra II asynchronous ports are capable of auto bauding through the PBX, allowing terminal access to 19,200 bits per second. Argonne plans to purchase an additional Hydra II to provide additional ports and backup.

Central Onsite Distributed Print Queues--The Central VAX Cluster Computers and the Central IBM Computer provide onsite distributed print queues for remote printers--high speed line printers, laser writers, etc.

Remote Access Data System (RADS)--The RADS system is an onsite, remote batch system designed at ANL. The system emulates the standard IBM HASP Workstation protocol operating on binary synchronous telecommunication lines. The system provides users with workstations that support line printers, perforated paper tape punches and readers, card reader input, and PostScript laser printers. The stations are configured around TI 990/101M microcomputers. They communicate at speeds ranging from 4800 to 56,000 bits per second (bps) and connect to the central computing complex host computers through IBM 3705 and 3745 communication controllers.

Other Binary Synchronous Support--Binary synchronous dial-up lines are available at speeds that range from 2 kbps to 56 kbps for both onsite and offsite stations. Dedicated binary synchronous lines are available at speeds up to 56,000 bps. These lines provide services for equipment which uses the HASP Workstation, 3780, 2780, and NJE protocols. These lines are connected to ports on the IBM 3705 and 3745 communication controllers which are connected to the central computing complex host computers.

VAX DECnet Network--The Laboratory's Divisional Digital Equipment Corporation (DEC) VAX and PDP-11 computers are connected in a single Laboratory-wide homogeneous DECnet computer network via the PBX LANmark Ethernet capability. DECnet is a networking protocol developed by the Digital Equipment Corporation. These computers use the VMS, RSX, and RT operating systems and interchange files and mail in an efficient manner. Terminal passthrough exists between systems. The VAX gateway computer in Building 221 is part of the network allowing the VAX DECnet nodes access to MFEnet. The divisional local area DECnets are all interconnected via the Laboratory-wide Ethernet. The VAX-11/750 at ANL-W is connected via a 9.6 kilobaud asynchronous connection through existing multiplexed hardware.

All of the VAX computers are licensed to run DECnet, which is the protocol for use on the network. The full-function DECnet nodes handle all the message routing for their attached nodes, which are unaware of the network's topology. Nodes participating in the Laboratory-wide DECnet have to conform to node name conventions adopted by the Laboratory.

The Laboratory has purchased a site-wide Multinet license to run the TCP/IP protocol on VAX VMS computers. Many of the Laboratory's VAX systems are now running Multinet.

Several divisions at the Laboratory use DECnet to join their VAX, PDP-11, and LSI computers together in one network (see Exhibit 1.3). The High Energy Physics Division (HEP) connects their VAX computers together with a national DECnet network of computers (HEPnet) for High Energy Physics research purposes. The Physics Division gains access to HEPnet through HEP via the ANL PBX LANmark ethernet. The HEPnet network provides interactive, real-time access to the major high energy facilities located at HEP accelerator laboratories and collaborating universities throughout the USA for experiment monitoring and data analysis. Biological Environmental and Medical Research Division/Center For Environmental Research (BEM) connects their VAX to several computers, terminal servers, and a print server.

The Chemistry Division (CHM) has a VAX cluster consisting of seven MicroVAX computers. One MicroVAX computer serves as a front-end processor for 16 LSI 11/23s, and the other is a front-end processor for eight LSI 11/23s. The Chemical Technology Division (CMT) has a VAX which connects to two PDP 11/44 computers, which function as front-end processors for an array of other DEC processors. We have integrated Ethernet into the VAX DECnet networks in the Advanced Photon Source Division (APS), the Chemical Technology Division, the Chemistry Division, the Intense Pulsed Neutron Source Program (IPNS), and the Physics Division. Ethernet is a local area network transmission medium developed by Xerox, Intel, and Digital Equipment Corporation that implements local area communications at data rates to 10 M bits per second.

Exhibit 1.3: ANL DECnet Network

Argonne National Laboratory DECnet
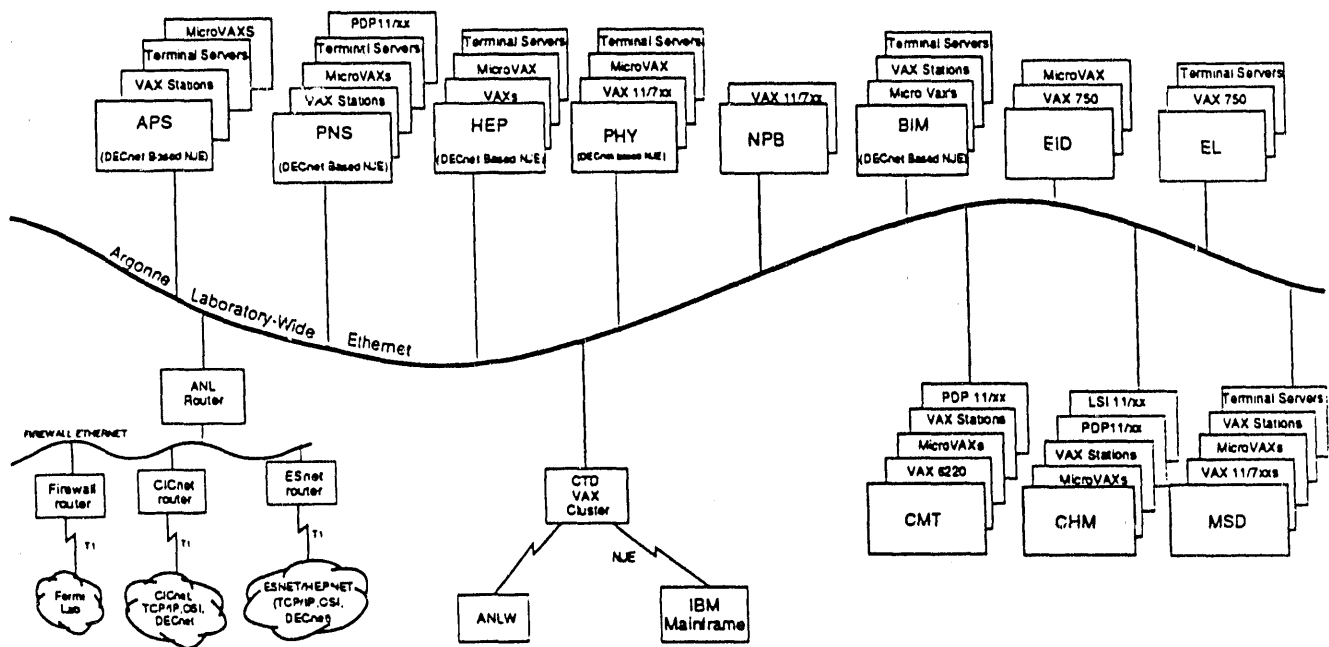
TCP/IP Networks--Argonne has a large and growing Laboratory-wide TCP/IP network (see Exhibit 1.4). Argonne has a registered domain, ANL.GOV, and runs primary and secondary name servers. The central IBM computers and VAX cluster computers all support TCP/IP access. Many divisions have scientific workstations connected to the network. The Mathematics and Computer Science Division's Advanced Computing Research Facility (ACRF), which contains a large parallel computer complex, is connected to the network. The network also supports IBM and Macintosh personal computers using the NCSA software.

The ANL TCP/IP network is connected to several external TCP/IP networks: ESnet (see above), and CICnet/NSFnet. CICnet is a regional network. A T1 link connects ANL to FNAL and ANL to UIC. ANL and FNAL are thus interconnected to CICnet through UIC. CICnet has two connections to the National Science Foundation Network, NSFnet; one at the University of Illinois--Urbana-Champaign (UIUC), and one at Michigan.

PC Local Area Networks--Personal Computers are an important tool of the scientist, engineer, and administrator at the Laboratory. IBM and Apple Macintosh represent the major models. IBM PCs use TCP/IP (See TCP/IP Networks above) or DECnet (see above) to communicate with larger computers and local area networks to share disks, printers, and mail among themselves.

Apple Macintoshes are connected throughout the Laboratory either directly through an external connection or through a local talk to Ethernet gateways. Like IBM PCs, these machines use TCP/IP and LAN protocols. Additionally, they use the Appletalk Protocol to share disks, printers and mail.

Other data communications systems and services are listed below.

Facsimile Service--Over three hundred facsimile terminals expedite the dissemination of information and programmatic coordination between the ANL main site and ANL-Idaho, other ANL offices, DOE, and contractors. All terminals utilize dial network services. Facsimile terminals are strategically located throughout the main site to provide convenient access for users.

Database and Literature Search--The Technical Library, the Environmental Assessment and Information Sciences Division, and the Office of International Energy Programs use Database and Literature Search, with access via the FTS 2000 and commercial switched networks (TELNET). The ANL technical libraries have twelve printer terminals dedicated to database and literature search. Regular FTS and commercial telephone billing includes the communication costs.

Wire Services--The Laboratory uses wire services such as TELEX and TWX. The onsite DOE-CH communications center operates the TELEX and TWX terminals. Costs shown in Schedule 4-1B include charges from DOE-CH for DOE-CH comcenter operations.

Site Alarm and Monitoring Systems--Site alarm and monitoring systems use the sitewide and cable plant for communications. These include the fire alarm system, the criticality alarm system, security systems, and plant monitor/ control systems.

Exhibit 1.4: ANL TCP/IP Network

Argonne National Laboratory TCP/IP Network
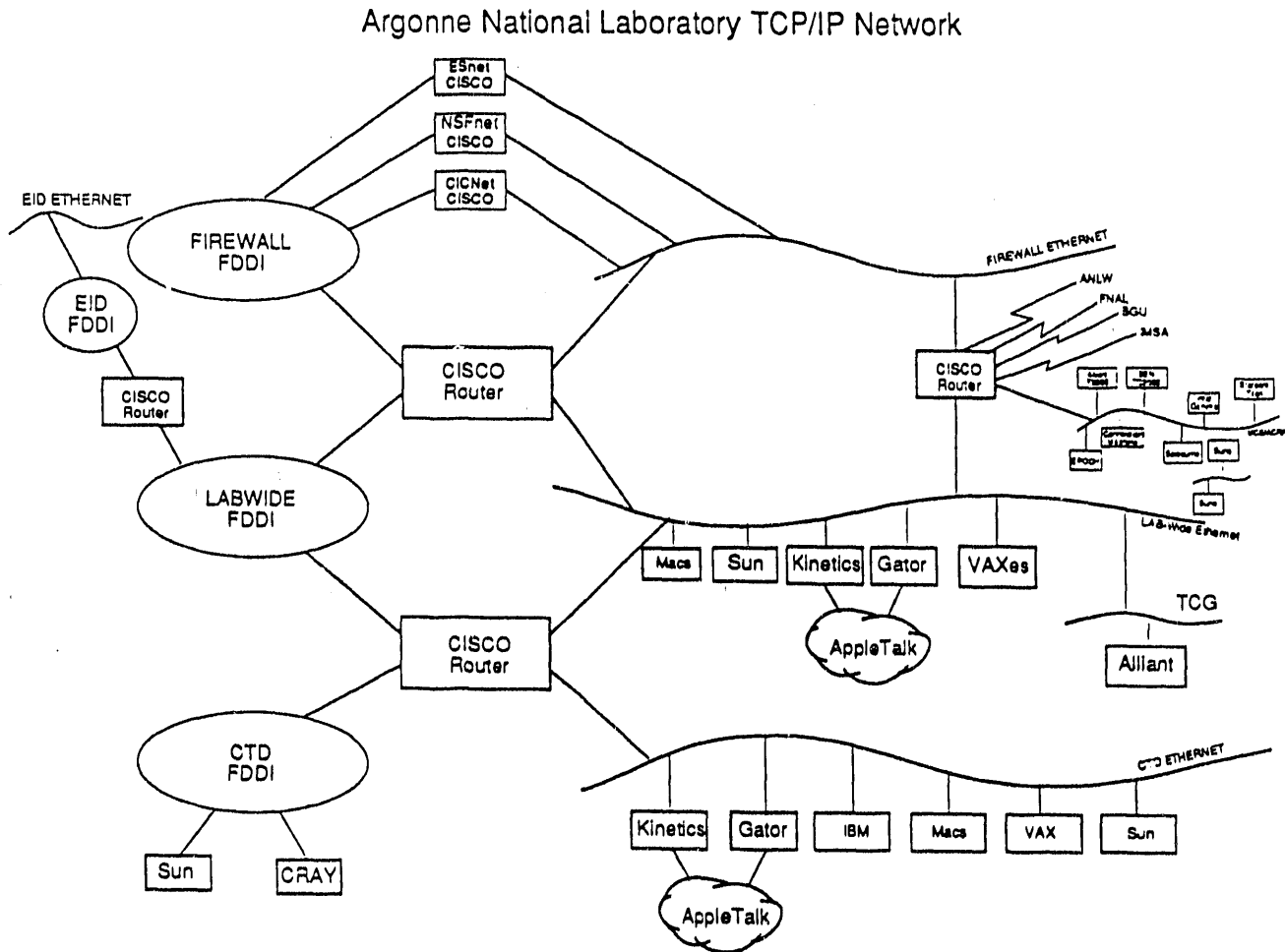
D. Planned Minor Initiatives/New Systems or Services

The trend is toward more scientific workstations on the worker's desk, higher speed parallel processors, and visualization tools (hardware and software), all of which require more interchange of information over networks at higher speeds. Thus the emphasis will be on higher speed connectivity, on local area networks, Laboratory-wide networks, and wide-area networks. In addition, emphasis will be placed on a transition to networks that conform to the Government Open Systems Interconnection Profile (GOSIP) standard.

Local Area and Laboratory-wide Networks--There will be a continued growth in Digital Equipment Corporation computers, Unix-based computers, workstations, parallel processors, and Macintosh and IBM personal computers. This will necessitate a growth in the number and size of local area networks as well as a need to interconnect these networks. In addition, a number of new technologies and standards are emerging. These technologies will be tracked and implemented as they become available. Argonne anticipates the following activities:

*   Installation of additional IP routers.

*   Administration of Laboratory-wide personal computer name space and installation of XNS routers.

*   Replacing one of two ANL East/West 14.2 kbps data links with a 56kbps fractional T1 link.

*   Migration to the new DECnet/OSI software.

*   Migration to the new Open System Interconnection (OSI) protocols which are being developed and in particular to the GOSIP standards. ANL is participating on the DOE GOSIP Migration Working Group and is developing a GOSIP transition strategy. The migration to DECnet/OSI will be a part of that strategy.

*   Migration from the Laboratory-wide Ethernet (1M bits per second speeds) to the emerging Fiber Distributed Data Interface (FDDI) technologies (100M bits per second). A FDDI network was installed in FY1990. FY1992 GPP funds are being requested to extend the ring to other ANL buildings.

*   Installation and testing of 1 gigabit per second fiber optic local area networks for applications such as visualization (graphics) that require very high speed data transfer.

External Networks--As existing national network communication backbones are upgraded and new ones are added, Argonne will upgrade and add new gateways between these external networks and the ANL Laboratory-wide networks as appropriate. Argonne anticipates the following activities:

*   Argonne is a major hub for CICNet. T1 links to the University of Wisconsin, Northwestern University, Michigan State University, University of Illinois at Chicago, and Notre Dame have been installed.

- Connection will take place to BLANCA, a national gigabit testbed that is being used to support very high speed (622 Mbps) networking.

- Argonne will be testing OSI products by participating in IETF, CICnet, ESnet and EDWG working groups.

Other Data Communications--We anticipate gradual increases in facsimile services during the plan years. We expect modest expansion in the use of Database and Literature Search services. We anticipate only minor increases in Teletype services during the plan years.

Planning for expansion of the PBX for a new experimental complex is continuing. The Advanced Photon Source (APS) will require installation of a PBX switching node to serve 800 stations. Buildings will be completed in phases from 1992 through 1995. Other buildings to be served in 1992 are the Transportation Facility and the Child Care Facility.

E.   Planned Major Initiatives

None

F.   Schedule 4-1A, Telecommunications Resource Estimates

DEPARTMENT OF ENERGY   Schedule 4-1A
TELECOMMUNICATIONS RESOURCES ESTIMATE   Part 1

Site: ARGONNE NATIONAL LABORATORY (ANL)

Functional Area: Telecommunications

REPORTING CATEGORY	Resource Estimates in Thousands							
	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998
1. CAPITAL INVESTMENTS								
A. Purchase of Hardware	158	230	390	240	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Purchase of Software	0	0	50	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
C. Site Preparation	86	242	150	150	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 1	244	472	590	390	410	430	452	474
2. TELECOMMUNICATIONS OPERATING COSTS								
A. Government Workyears	29.0	30.0	30.0	31.0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Inhouse Personnel Costs								
1. System Operations	551	559	407	605	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
2. System Maintenance	461	480	500	527	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. Analysis/Design/Engineering	434	453	473	498	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
4. System Studies and Other	190	198	46	218	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
C. Other Inhouse Operating Costs								
1. Hardware/Software Purchases	11	20	20	70	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
2. Lease of Hardware	2,199	1,707	1,707	1,707	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. Lease of Software	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
4. Space	255	344	345	357	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
5. Supplies and Other	264	273	310	297	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 2	4,365	4,034	3,808	4,279	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. COMMERCIAL SERVICES								
A. Leased Voice Communications	1,125	1,190	1,250	1,312	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Leased Data Communications	24	25	26	28	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
C. Operations/Maintenance	408	497	542	578	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
D. Systems Analysis, Programming Design, and Engineering	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
E. Studies and Other	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 3	1,557	1,712	1,818	1,918	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
4. NONCOMMERCIAL SERVICES								
A. Payments								
1. Other DOE Sites	117	93	93	93	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
2. Other Executive Branch Agencies	34	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. Other Noncommercial Service	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Offsetting Collections (-)	-11	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 4	140	93	93	93	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL FOR COMBINED CATEGORIES 2+3+4	6,062	5,839	5,719	6,290	6,602	6,932	7,279	7,643
GRAND TOTAL	6,306	6,311	6,309	6,680	7,012	7,362	7,731	8,117

NOTE: GOVERNMENT WORKYEARS (Section 2A) are not included in subtotal for Category 2 or Grand Total.

DEPARTMENT OF ENERGY   Schedule 4-1A
TELECOMMUNICATIONS RESOURCES ESTIMATE   Part 2
Resource Estimates in Thousands

Site: ARGONNE NATIONAL LABORATORY (ANL)

Functional Area: Telecommunications

PROGRAMMATIC DISTRIBUTION OF CATEGORY 1 - CAPITAL INVESTMENTS

B&RC CODE	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998
40	42	81	102	67	71	74	78	82
AA	3	7	8	6	6	6	6	7
AF	60	117	146	97	101	106	112	117
AT	2	4	6	4	4	4	4	5
KA	5	9	11	7	8	8	8	9
KB	8	15	18	12	13	13	14	15
KC	108	209	262	173	182	191	200	210
KP	6	12	16	10	11	11	12	12
WN01	6	12	15	10	11	11	12	12
WN09	3	5	6	4	4	5	5	5
TOTALS:	243	471	590	390	411	429	451	474

Unmatched SUBTOTALS for CATEGORY 1 - CAPITAL INVESTMENTS

| | 244 | 472 | | | 410 | 430 | 452 | |

PROGRAMMATIC DISTRIBUTION OF CATEGORIES 2+3+4 - OPERATING EXPENSES

B&RC CODE	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998
40	1044	1005	985	1083	1137	1194	1253	1316
AA	86	83	81	89	94	98	103	108
AF	1500	1445	1415	1556	1634	1715	1801	1891
AT	58	55	54	60	63	66	69	73
KA	114	110	108	118	124	130	137	144
KB	189	182	178	196	206	216	227	238
KC	2688	2589	2536	2789	2928	3074	3228	3390
KP	159	154	150	165	174	182	191	201
WN01	158	152	149	164	172	181	190	199
WN09	65	63	61	68	71	74	78	82
TOTALS:	6061	5838	5717	6288	6603	6930	7277	7642

Unmatched SUBTOTALS for COMBINED CATEGORIES 2+3+4 - OPERATING EXPENSES

| | 6062 | 5839 | 5719 | 6290 | 6602 | 6932 | 7279 | 7643 |

G.   Schedule 4-2, Major Telecommunications Initiatives

None

H.   Schedule 4-5, Computer Networking Resources

COMPUTER NETWORKING RESOURCES   SCHEDULE 4-5

ARGONNE NATIONAL LABORATORY (ANL)

For Site-Managed Networks, complete all items. For External Networks, complete only items 1 through 9.

1. Network Name: x.400 - x.25 Prototype

2. Network Acronym: x400/25 Proto

3. ___ Currently Used Network   _X_ Planned Network/System*

     * Implementation Planned for FY 1992   *Type of Initiative: ___ Major   _X_ Minor

4. _X_ Site Managed Network   ___ External Network**

     **Network Owner:
     **Host Computing System:
     **Host Location:

5. Network Management Organization: Computing and Telecommunications Division
     Point of Contact: R.J. McMahon
     Telephone No.:   708-252-7270
     Street Address: 9700 S. Cass Avenue
                                     Argonne, IL 60439-4844

6. Network Access: _X_ Open   ___ Limited   ___ Restricted
     Network Access Provided To Whom? Argonne and DOE users

7. Protocols Supported: x.400 mail over x.25

8. Gateway Access Used: None

9. Community of Service: Argonne and DOE mail users

10. Network Operation Organization: Computing and Telecommunications Division
     Point of Contact: J. Love
     Telephone No.:   708-252-5421
     Street Address: 9700 S. Cass Avenue
                                     Argonne, IL 60439-4844

11. Technical Point of Contact: L. Winkler
     Telephone No.:   708-252-7236
     Street Address: 9700 S. Cass Avenue
                                     Argonne, IL 60439-4844

12. Administrative Point of Contact: R.J. McMahon
     Telephone No.:   708-252-7270
     Street Address: 9700 S. Cass Avenue
                                     Argonne, IL 60439-4844

13. Network Topology: Packet Switched
     Primary Nodes (Number/Location): Building 221

14. Transmission Technology Used: FTS2000 Packet Switched Network

15. Hardware Used: Cisco router, Drop/insert T1 multiplexer

16. Operating System Used:

17. Applications Supported: x.400

18. Security Restraints Employed:

19. GOSIP Standards/Compliance: Network is a GOSIP testbed

COMPUTER NETWORKING RESOURCES   SCHEDULE 4-5

ARGONNE NATIONAL LABORATORY (ANL)

For Site-Managed Networks, complete all items. For External Networks, complete only items 1 through 9.

1. Network Name: Argonne SNA Network

2. Network Acronym: SNA

3. _X_ Currently Used Network   ___ Planned Network/System*

   * Implementation Planned for FY   *Type of Initiative: ___ Major   ___ Minor

4. _X_ Site Managed Network   ___ External Network**

   **Network Owner:
   **Host Computing System:
   **Host Location:

5. Network Management Organization: Computing and Telecommunications Division
   Point of Contact: R.J. McMahon
   Telephone No.:   708-252-7270
   Street Address: 9700 S. Cass Avenue
                                    Argonne, IL 60439-4844

6. Network Access: X_ Open   ___ Limited   ___ Restricted
   Network Access Provided To Whom? Argonne and DOE IBM users

7. Protocols Supported: SNA

8. Gateway Access Used: None

9. Community of Service: Argonne and DOE IBM users

10. Network Operation Organization: Computing and Telecommunications Division
    Point of Contact: J. Love
    Telephone No.:   708-252-5421
    Street Address: 9700 S. Cass Avenue
                                    Argonne, IL 60439-4844

11. Technical Point of Contact: R. Carlson
    Telephone No.:   708-252-7289
    Street Address: 9700 S. Cass Avenue
                                    Argonne, IL 60439-4844

12. Administrative Point of Contact: R.J. McMahon
    Telephone No.:   708-252-7270
    Street Address: 9700 S. Cass Avenue
                                     Argonne, IL 60439-4844

13. Network Topology: Point - Point
    Primary Nodes (Number/Location): Building 221

14. Transmission Technology Used: Copper

15. Hardware Used: Point - Point modems

16. Operating System Used: VM/CMS and MVS

17. Applications Supported: Full screen interactive terminals, remote printing

18. Security Restraints Employed: Primary Nodes in secure area

19. GOSIP Standards/Compliance: Existing system - no plans to upgrade

COMPUTER NETWORKING RESOURCES   SCHEDULE 4-5

ARGONNE NATIONAL LABORATORY (ANL)

For Site-Managed Networks, complete all items. For External Networks, complete only items 1 through 9.

1. Network Name: National Science Foundation Network

2. Network Acronym: NSFNET

3. _X_ Currently Used Network   ___ Planned Network/System*

   * Implementation Planned for FY   *Type of Initiative: ___ Major   ___ Minor

4. ___ Site Managed Network   _X_ External Network**

   **Network Owner: NSF
   **Host Computing System: RS6000
   **Host Location:

5. Network Management Organization: NSFNET
   Point of Contact: Elise Gerich
   Telephone No.:   800-666-3748
   Street Address: 1075 Beal Avenue
                                  Ann Arbor, MI 48109

6. Network Access: ___ Open   X_ Limited   ___ Restricted
   Network Access Provided To Whom? NSF approved users

7. Protocols Supported: TCP/IP

8. Gateway Access Used: EGP

9. Community of Service: Interactive access, e-mail, file transfer

10. Network Operation Organization:
    Point of Contact:
    Telephone No.:
    Street Address:

11. Technical Point of Contact:
    Telephone No.:
    Street Address:

12. Administrative Point of Contact:
    Telephone No.:
    Street Address:

13. Network Topology:
    Primary Nodes (Number/Location):

14. Transmission Technology Used:

15. Hardware Used:

16. Operating System Used:

17. Applications Supported:

18. Security Restraints Employed:

19. GOSIP Standards/Compliance:

COMPUTER NETWORKING RESOURCES   SCHEDULE 4-5

ARGONNE NATIONAL LABORATORY (ANL)

For Site-Managed Networks, complete all items. For External Networks, complete only items 1 through 9.

1. Network Name: Argonne Laboratory-wide Ethernet - LANmark(PBX)

2. Network Acronym: LANmark

3. _X_ Currently Used Network   ___ Planned Network/System*

   * Implementation Planned for FY   *Type of Initiative: ___ Major   ___ Minor

4. _X_ Site Managed Network   ___ External Network**

   **Network Owner:
   **Host Computing System:
   **Host Location:

5. Network Management Organization: Computing and Telecommunications Division
   Point of Contact: R.J. McMahon
   Telephone No.:   708-252-7270
   Street Address: 9700 S. Cass Ave
                                    Argonne, IL 60439-4844

6. Network Access: _X_ Open   ___ Limited   ___ Restricted
   Network Access Provided To Whom?

7. Protocols Supported: TCP/IP,DECnet,Apple Talk,XNS,OSI

8. Gateway Access Used: CISCO routers to external networks

9. Community of Service: Argonne computer users

10. Network Operation Organization: Computing and Telecommunications Division
    Point of Contact: J. Love
    Telephone No.:   708-252-5421
    Street Address: 9700 S. Cass Ave
                                    Argonne, IL 60439-4844

11. Technical Point of Contact: T.C. Kuhfuss
    Telephone No.:   708-252-4360
    Street Address: 9700 S. Cass Ave
                                    Argonne, IL 60439-4844

12. Administrative Point of Contact: R.J. McMahon
    Telephone No.:   708-252-7270
    Street Address: 9700 S. Cass Ave
                                    Argonne, IL 60439-4844

13. Network Topology: Ethernet Emulator - LANmark
    Primary Nodes (Number/Location): Buildings 221,200,308

14. Transmission Technology Used: Carrier sense multiple access/collision detection

15. Hardware Used: Ethernet / InteCom S/80 PBX

16. Operating System Used: Proprietary

17. Applications Supported: File transfer, remote login, visualization,
                                    central file mounting, LAN interconnection

18. Security Restraints Employed: Switch, primary mainframes, routers in secure area

19. GOSIP Standards/Compliance: OSI gateway under development

COMPUTER NETWORKING RESOURCES   SCHEDULE 4-5

ARGONNE NATIONAL LABORATORY (ANL)

For Site-Managed Networks, complete all items. For External Networks, complete only items 1 through 9.

1. Network Name: Argonne ESnet/HEP Video Conferencing

2. Network Acronym: HEPvideo

3. ___ Currently Used Network   ___ Planned Network/System*

   * Implementation Planned for FY 1992   *Type of Initiative: ___ Major   _X_ Minor

4. ___ Site Managed Network   _X_ External Network**

   **Network Owner: DOE Energy Research
   **Host Computing System:
   **Host Location:

5. Network Management Organization: NERSC at LLNL
   Point of Contact: J. Leighton
   Telephone No.:   510-422-4025
   Street Address: Lawrence Livermore National Laboratory
                                   Livermore, CA 94551

6. Network Access: ___ Open   X Limited   ___ Restricted
   Network Access Provided To Whom? DOE Energy scientists

7. Protocols Supported: Video Telecom proprietary

8. Gateway Access Used:

9. Community of Service: DOE Energy Scientists

10. Network Operation Organization:
    Point of Contact:
    Telephone No.:
    Street Address:

11. Technical Point of Contact:
    Telephone No.:
    Street Address:

12. Administrative Point of Contact:
    Telephone No.:
    Street Address:

13. Network Topology:
    Primary Nodes (Number/Location):

14. Transmission Technology Used:

15. Hardware Used:

16. Operating System Used:

17. Applications Supported:

18. Security Restraints Employed:

19. GOSIP Standards/Compliance:

COMPUTER NETWORKING RESOURCES   SCHEDULE 4-5

ARGONNE NATIONAL LABORATORY (ANL)

For Site-Managed Networks, complete all items. For External Networks, complete only items 1 through 9.

1. Network Name: Energy Science Network

2. Network Acronym: ESnet

3. _X_ Currently Used Network   ___ Planned Network/System*

   * Implementation Planned for FY   *Type of Initiative: ___ Major   ___ Minor

4. ___ Site Managed Network   _X_ External Network**

   **Network Owner: DOE Energy Research
   **Host Computing System: Unix based systems and VAX VMS systems
   **Host Location: NERSC at LLNL

5. Network Management Organization: NERSC at LLNL
   Point of Contact: J. Leighton
   Telephone No.:   510-422-4025
   Street Address: Lawrence Livermore National Laboratory
                                    Livermore, CA 94551

6. Network Access: ___ Open   X_ Limited   ___ Restricted
   Network Access Provided To Whom? DOE Energy scientists

7. Protocols Supported: TCP/IP, DECnet, NSP/IP, OSI

8. Gateway Access Used: CISCO multiprotocol router

9. Community of Service: DOE Energy Scientists

10. Network Operation Organization:
    Point of Contact:
    Telephone No.:
    Street Address:

11. Technical Point of Contact:
    Telephone No.:
    Street Address:

12. Administrative Point of Contact:
    Telephone No.:
    Street Address:

13. Network Topology:
    Primary Nodes (Number/Location):

14. Transmission Technology Used:

15. Hardware Used:

16. Operating System Used:

17. Applications Supported:

18. Security Restraints Employed:

19. GOSIP Standards/Compliance:

COMPUTER NETWORKING RESOURCES   SCHEDULE 4-5

ARGONNE NATIONAL LABORATORY (ANL)

For Site-Managed Networks, complete all items. For External Networks, complete only items 1 through 9.

1. Network Name: CICNET Regional Network

2. Network Acronym: CICNET

3. _X_ Currently Used Network   ___ Planned Network/System*

   * Implementation Planned for FY   *Type of Initiative: ___ Major   ___ Minor

4. ___ Site Managed Network   _X_ External Network**

   **Network Owner: Corporation for Institutional Cooperation (CIC)
   **Host Computing System: CISCO
   **Host Location:

5. Network Management Organization: CICNET
   Point of Contact: Executive Director
   Telephone No.:   313-998-6106
   Street Address: 2901 Hubbard St. Pod G
                                     Ann Arbor, MI 48105

6. Network Access: ___ Open   _X_ Limited   ___ Restricted
   Network Access Provided To Whom?

7. Protocols Supported: TCP/IP, DECnet

8. Gateway Access Used: EGP

9. Community of Service: Interactive access, e-mail, file transfer

10. Network Operation Organization:
    Point of Contact:
    Telephone No.:
    Street Address:

11. Technical Point of Contact:
    Telephone No.:
    Street Address:

12. Administrative Point of Contact:
    Telephone No.:
    Street Address:

13. Network Topology:
    Primary Nodes (Number/Location):

14. Transmission Technology Used:

15. Hardware Used:

16. Operating System Used:

17. Applications Supported:

18. Security Restraints Employed:

19. GOSIP Standards/Compliance:

COMPUTER NETWORKING RESOURCES   SCHEDULE 4-5

ARGONNE NATIONAL LABORATORY (ANL)

For Site-Managed Networks, complete all items. For External Networks, complete only items 1 through 9.

1. Network Name: U.S.(and world wide) University Network

2. Network Acronym: BITnet

3. _X_ Currently Used Network   ___ Planned Network/System*

   * Implementation Planned for FY   *Type of Initiative: ___ Major   ___ Minor

4. ___ Site Managed Network   _X_ External Network**

   **Network Owner: Corp. for Research and Educational Networking CREN
   **Host Computing System:
   **Host Location:

5. Network Management Organization: BITNIC
   Point of Contact: INFO@BITNIC
   Telephone No.:   202-872-4200
   Street Address: 1112 16th St. NW, Suite 600
                                   Washington, DC 20036

6. Network Access: _X_ Open   ___ Limited   ___ Restricted
   Network Access Provided To Whom?

7. Protocols Supported: IBM, NJE, RSCS

8. Gateway Access Used: None

9. Community of Service: International IBM users

10. Network Operation Organization:
    Point of Contact:
    Telephone No.:
    Street Address:

11. Technical Point of Contact:
    Telephone No.:
    Street Address:

12. Administrative Point of Contact:
    Telephone No.:
    Street Address:

13. Network Topology:
    Primary Nodes (Number/Location):

14. Transmission Technology Used:

15. Hardware Used:

16. Operating System Used:

17. Applications Supported:

18. Security Restraints Employed:

19. GOSIP Standards/Compliance:

COMPUTER NETWORKING RESOURCES   SCHEDULE 4-5

ARGONNE NATIONAL LABORATORY (ANL)

For Site-Managed Networks, complete all items. For External Networks, complete only items 1 through 9.

1. Network Name: Argonne Fiber Distributed Data Network

2. Network Acronym: Argonne Lab Wide FDDI

3. _X_ Currently Used Network   ___ Planned Network/System*

   * Implementation Planned for FY 1992   *Type of Initiative: ___ Major   ___ Minor

4. _X_ Site Managed Network   ___ External Network**

   **Network Owner:
   **Host Computing System:
   **Host Location:

5. Network Management Organization: Computing and Telecommunications Division
   Point of Contact: R.J. McMahon
   Telephone No.:   708-252-7270
   Street Address: 9700 S. Cass Ave
                                    Argonne, IL 60439-4844

6. Network Access: ___ Open   _X_ Limited   ___ Restricted
   Network Access Provided To Whom? Argonne computer users requiring large bandwidth

7. Protocols Supported: TCP/IP, DECnet, Apple Talk, OSI (future)

8. Gateway Access Used: Cisco routers to external networks

9. Community of Service: Argonne computer users

10. Network Operation Organization: Computing and Telecommunications Division
    Point of Contact: J. Love
    Telephone No.:   708-252-5421
    Street Address: 9700 S. Cass Ave
                                    Argonne, IL 60439-4844

11. Technical Point of Contact: T. Kuhfuss
    Telephone No.:   708-252-4360
    Street Address: 9700 S. Cass Ave
                                    Argonne, IL 60439-4844

12. Administrative Point of Contact: R.J. McMahon
    Telephone No.:   708-252-7270
    Street Address: 9700 S. Cass Ave
                                    Argonne, IL 60439-4844

13. Network Topology: Token passing ring
    Primary Nodes (Number/Location): Buildings 221,308,362,900

14. Transmission Technology Used: Fiber optic

15. Hardware Used: FDDI routers

16. Operating System Used: Proprietary

17. Applications Supported: Fast file xfer, remote visualization, LAN only
                                    connection, Network File Sys window based apps

18. Security Restraints Employed: All equipment in locked areas

19. GOSIP Standards/Compliance: Equipment will route OSI protocols

COMPUTER NETWORKING RESOURCES   SCHEDULE 4-5

ARGONNE NATIONAL LABORATORY (ANL)

For Site-Managed Networks, complete all items. For External Networks, complete only items 1 through 9.

1. Network Name: Argonne East-West Data Communications

2. Network Acronym: ANLE-W

3. _X_ Currently Used Network   ___ Planned Network/System*

   * Implementation Planned for FY 1992   *Type of Initiative: ___ Major   ___ Minor

4. _X_ Site Managed Network   ___ External Network**

   **Network Owner:
   **Host Computing System:
   **Host Location:

5. Network Management Organization: Computing and Telecommunications Division
   Point of Contact: R.J. McMahon
   Telephone No.:   708-252-7270
   Street Address: 9700 S. Cass Avenue
                                   Argonne, IL 60439-4844

6. Network Access: ___ Open   _X_ Limited   ___ Restricted
   Network Access Provided To Whom?

7. Protocols Supported: TCP/IP, DECnet, Async

8. Gateway Access Used: None

9. Community of Service: Argonne East/West computer users

10. Network Operation Organization: Computing and Telecommunications Division
    Point of Contact: J. Love
    Telephone No.:   708-252-5421
    Street Address: 9700 S. Cass Avenue
                                    Argonne, IL 60439-4844

11. Technical Point of Contact: L. Winkler
    Telephone No.:   708-252-7236
    Street Address: 9700 S. Cass Avenue
                                    Argonne, IL 60439-4844

12. Administrative Point of Contact: R.J. McMahon
    Telephone No.:   708-252-7270
    Street Address: 9700 S. Cass Avenue
                                    Argonne, IL 60439-4844

13. Network Topology: Point - Point, Ethernet
    Primary Nodes (Number/Location): ANL East - Building 221, Argonne West

14. Transmission Technology Used: Copper, fractional T1, carrier sense mult access

15. Hardware Used: Ethernet, InteCom S/80 PBX, Copper cable

16. Operating System Used: VMS,IBM,MVS,VM,Unix

17. Applications Supported: Central systems, LAN interconnections

18. Security Restraints Employed: PBX, primary mainframe, routers in secure area

19. GOSIP Standards/Compliance: existing network - minor upgrade

COMPUTER NETWORKING RESOURCES   SCHEDULE 4-5

ARGONNE NATIONAL LABORATORY (ANL)

For Site-Managed Networks, complete all items. For External Networks, complete only items 1 through 9.

1. Network Name: Argonne/Navy San Diego Data Communications

2. Network Acronym: ANL-Navy

3. _X_ Currently Used Network   ___ Planned Network/System*

   * Implementation Planned for FY   *Type of Initiative: ___ Major   ___ Minor

4. _X_ Site Managed Network   ___ External Network**

   **Network Owner:
   **Host Computing System:
   **Host Location:

5. Network Management Organization: Computing and Telecommunications Division
   Point of Contact: R.J. McMahon
   Telephone No.:   708-252-7270
   Street Address: 9700 S. Cass Avenue
                                   Argonne, IL 60439-4844

6. Network Access: ___ Open   _X_ Limited   ___ Restricted
   Network Access Provided To Whom?

7. Protocols Supported: SNA,NJE,RSCS

8. Gateway Access Used:

9. Community of Service: Navy users of Argonne central systems

10. Network Operation Organization: Computing and Telecommunications Division
    Point of Contact: J. Love
    Telephone No.:   708-252-5421
    Street Address: 9700 S. Cass Avenue
                                    Argonne, IL 60439-4844

11. Technical Point of Contact: R. Carlson
    Telephone No.:   708-252-7289
    Street Address: 9700 S. Cass Avenue
                                    Argonne, IL 60439-4844

12. Administrative Point of Contact: R.J. McMahon
    Telephone No.:   708-252-7270
    Street Address: 9700 S. Cass Avenue
                                     Argonne, IL 60439-4844

13. Network Topology: Point - Point
    Primary Nodes (Number/Location): Building 221

14. Transmission Technology Used: Fractional T1

15. Hardware Used: CSU/DSU

16. Operating System Used: MVS at VM

17. Applications Supported: Navy personnel database

18. Security Restraints Employed: Primary node in secure room

19. GOSIP Standards/Compliance: Existing system - minor upgrade

COMPUTER NETWORKING RESOURCES   SCHEDULE 4-5

ARGONNE NATIONAL LABORATORY (ANL)

For Site-Managed Networks, complete all items. For External Networks, complete only items 1 through 9.

1. Network Name: Argonne NJE Network

2. Network Acronym:

3. _X_ Currently Used Network   ___ Planned Network/System*

   * Implementation Planned for FY   *Type of Initiative: ___ Major   ___ Minor

4. _X_ Site Managed Network   ___ External Network**

   **Network Owner:
   **Host Computing System:
   **Host Location:

5. Network Management Organization: Computing and Telecommunications Division
   Point of Contact: R.J. McMahon
   Telephone No.:   708-252-7270
   Street Address: 9700 S. Cass Avenue
                                    Argonne, IL 60439-4844

6. Network Access: _X_ Open   ___ Limited   ___ Restricted
   Network Access Provided To Whom? Argonne DEC & IBM users

7. Protocols Supported: IBM NJE

8. Gateway Access Used:

9. Community of Service: Argonne DEC & IBM users

10. Network Operation Organization: Computing and Telecommunications Division
    Point of Contact: Barry Finkel
    Telephone No.:   708-252-7277
    Street Address: 9700 S. Cass Ave
                                    Argonne, IL 60439-4844

11. Technical Point of Contact: Rich Raffenetti
    Telephone No.:   708-252-7236
    Street Address: 9700 S. Cass Ave
                                    Argonne, IL 60439-4844

12. Administrative Point of Contact: R.J. McMahon
    Telephone No.:   708-252-7270
    Street Address: 9700 S. Cass Ave
                                    Argonne, IL 60439-4844

13. Network Topology: Point-Point, Ethernet
    Primary Nodes (Number/Location): Building 221

14. Transmission Technology Used: Copper

15. Hardware Used: Point-Point modems, Ethernet

16. Operating System Used: VMS

17. Applications Supported: File transfer, remote printing

18. Security Restraints Employed: Switch & primary Nodes in secure area

19. GOSIP Standards/Compliance: Existing system - no plans to upgrade

I.   Schedule 4-6, Long Distance Transport Cost Estimates

SCHEDULE 4-6
LONG DISTANCE TRANSPORT COST ESTIMATES
(In Thousands of Dollars)

SITE: ARGONNE NATIONAL LABORATORY (ANL)

SERVICE	FY 1993	FY 1994	FY 1995
1. SWITCHED VOICE	879	922	969
2. SWITCHED DATA			
3. PACKET SERVICES	85	89	94
4. DEDICATED TRANSMISSION	11	12	13
5. ELECTRONIC MAIL	74	78	83
6. ISDN	21	22	23
7. COMPRESSED VIDEO			
8. WIDEBAND VIDEO			
9. OTHER			
TOTAL	1,070	1,123	1,182

J.   Schedule 4-7, SACNET Resource Estimates

None

Section B

Frequency Spectrum-Dependent Communications

A.   Strategy and Major Accomplishments

Strategy

The Laboratory plans to continue support of operations and programs through existing systems with minor enhancements and replacement of old equipment. CTD has reviewed the site radio coverage and has determined that relocation of a repeater and the installation of passive repeaters with radiating coaxial cable are needed to improve site radio communication. CTD has issued a service request to the site engineering for the installation of a new antenna tower and relocation of two base stations to the new tower. A second review of site coverage will be conducted after the relocation. Determination will be made as to where passive repeaters and radiating coaxial cables are required for service floor coverage.

The Laboratory is planning its changes keeping in mind the possible effect of the Emerging Tele-communication Technologies Act, which proposes that the Federal Government relinquish 200 MHz of the spectrum. Argonne will be reviewing its frequency allocations and defining where the Laboratory can utilize its frequencies more effectively. The Laboratory will be looking at trunked radio systems as a way of reducing the number of required radio frequencies.

Major Accomplishment

None

B.   Reconciliation to FY1993 Plan

None.

C.   Currently Utilized Services/Planned Minor Enhancements

Administrative Radio System--Argonne owns and operates a radio paging system which general-ly covers the site and the southwestern Chicago metropolitan area. The primary transmitter and encoder accommodate both voice and digital pagers. The backup transmitter has only voice paging capability and will be upgraded in FY1992. Approximately 750 pagers are currently in use at the laboratory.

Wide Area Radio Paging--The Laboratory has contracted for the use of a vendor wide area paging service to provide contact with key personnel for emergency operations.

Security Department Network--The Argonne Security Department has several portable/mobile radios which share the frequency of the DOE-CH subcontractor, AM-PRO, for coordinating securi-ty activities.

Fire Department Network--The primary responsibility of the Fire Department is the protection of Laboratory personnel, buildings, and equipment onsite. The Fire Department operates two ambulances in close cooperation with the Health Department. The ambulances are staffed with qualified paramedic personnel.

The radio communications equipment of the Fire Department consists of ten mobile radios, 30 portable radios, and one base station. The mobiles and portables are all four-frequency radios; the base station is single frequency. The Fire Department has one command vehicle which is equipped with a 15-channel mobile radio, transportable cellular and a mobile cellular telephone.

The Fire Department radio equipment is part of the Emergency Radio Network and is available for all site emergencies. Through a mutual-aid agreement with local fire departments, the department responds to local offsite emergencies when requested. Radio communication with outside local fire departments is through three mobile radios and two portables under the mutual-aid agreement. The ambulances carry mobile radios, transportable cellular telephones with telemetry equipment for communication with local hospitals during emergency transportation of the injured. Argonne has been invited to participate in these community networks.

Emergency Radio Network--The Emergency Radio Network provides communications among the various emergency response groups and personnel throughout the site. The network consists of two repeater base stations, one backup base station, and most of the multifrequency mobile and portable radios used by emergency response personnel.

Environment, Safety and Health Network--The general responsibility of the Environmental, Safety and Health Divisions (ESH) is to provide technical service, information, and guidance to promote the health and safety aspects of all Laboratory operations. The primary function is to detect, evaluate, and recommend controls for all types of environmental hazards. ESH collects air particles, gas samples, and water samples onsite and at various locations surrounding the site on a routine basis.

ESH communications consist of three base stations, 24 portables, and four mobiles. ESH operates two twenty-three-foot vans. One van is assigned to the Radiological Assistance Program (RAP). Radio communications for the RAP van consist of a base station, two single-frequency mobile radios, ten four-frequency portable radios, and cellular telephones. The second van is assigned to the Manhattan Engineering District/Atomic Energy Commission site resurvey team (MED/AEC). Radio communications for the MED/AEC van consists of four four-frequency portables. The radio equipped vehicles and vans are available for site emergencies and local community or national radiation incidents.

Argonne-Fermilab Microwave Link--A one-hop microwave link between Argonne and Fermilab provides both data and voice communications. These communications and costs are included in Section A.

Monitor & Control Telemetry--A radio telemetry system controls and monitors an offsite canal water pumping station. The system is part of the Energy Monitoring and Control System (EMCS). It is a full duplex, digital radio communications link used to control six operating functions and monitor 16 status points.

Industrial, Scientific, and Medical (ISM) Communications

None

D.   Planned Minor Initiatives/New Systems or Services

Argonne has issued a service request to site engineering for the installation of a new antenna tower and relocation of two base stations to the new tower. Plans are being made for a back-up digital base station and a new antenna tower for the paging system.

E.   Planned Major Initiatives

None

F.   Schedule 4-1B, Telecommunications Resource Estimates

DEPARTMENT OF ENERGY   Schedule 4-1B
TELECOMMUNICATIONS RESOURCES ESTIMATE   Part 1

Site: ARGONNE NATIONAL LABORATORY (ANL)

Functional Area: Frequency Spectrum-Dependent Communications

REPORTING CATEGORY	Resource Estimates in Thousands							
	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998
1. CAPITAL INVESTMENTS								
A. Purchase of Hardware	76	82	65	75	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Purchase of Software	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
C. Site Preparation	25	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 1	101	82	65	75	155	150	145	140
2. TELECOMMUNICATIONS OPERATING COSTS								
A. Government Workyears	0.0	0.0	0.0	0.0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Inhouse Personnel Costs								
1. System Operations	139	143	147	147	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
2. System Maintenance	93	96	96	99	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. Analysis/Design/Engineering	17	17	18	18	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
4. System Studies and Other	10	11	12	13	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
C. Other Inhouse Operating Costs								
1. Hardware/Software Purchases	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
2. Lease of Hardware	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. Lease of Software	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
4. Space	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
5. Supplies and Other	6	6	5	6	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 2	265	273	278	283	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. COMMERCIAL SERVICES								
A. Leased Voice Communications	5	5	6	6	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Leased Data Communications	2	2	3	3	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
C. Operations/Maintenance	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
D. Systems Analysis, Programming Design, and Engineering	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
E. Studies and Other	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 3	7	7	9	9	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
4. NONCOMMERCIAL SERVICES								
A. Payments								
1. Other DOE Sites	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
2. Other Executive Branch Agencies	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. Other Noncommercial Service	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Offsetting Collections (-)	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 4	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL FOR COMBINED CATEGORIES 2+3+4	272	280	287	292	299	301	301	395
GRAND TOTAL	373	362	352	367	454	451	446	535

NOTE: GOVERNMENT WORKYEARS (Section 2A) are not included in subtotal for Category 2 or Grand Total.

DEPARTMENT OF ENERGY   Schedule 4-1B
TELECOMMUNICATIONS RESOURCES ESTIMATE   Part 2
Resource Estimates in Thousands

Site: ARGONNE NATIONAL LABORATORY (ANL)

Functional Area: Frequency Spectrum-Dependent Communications

PROGRAMMATIC DISTRIBUTION OF CATEGORY 1 - CAPITAL INVESTMENTS

B&RC CODE	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998

No programmatic data found for CAPITAL INVESTMENTS

TOTALS:

Unmatched SUBTOTALS for CATEGORY 1 - CAPITAL INVESTMENTS

101	82	65	75	155	150	145	140

PROGRAMMATIC DISTRIBUTION OF CATEGORIES 2+3+4 - OPERATING EXPENSES

B&RC CODE	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998

No programmatic data found for OPERATING EXPENSES

TOTALS:

Unmatched SUBTOTALS for COMBINED CATEGORIES 2+3+4 - OPERATING EXPENSES

272	280	287	292	299	301	301	395

G.   Schedule 4-2, Major Telecommunications Initiatives

None

Section C

Other Teleservices Activities and Programs

A.   Teleconferencing Activities

1.   Strategies and Major Accomplishments

The Laboratory expects to use teleconferencing to improve productivity, expand educational and training opportunities, and further reduce travel costs. The Laboratory is planning to expand the site fiber optic network needed for telephone operations and data communication. The fiber optic network will include fibers for onsite video conferencing.

The Laboratory will provide communications from ESnet to the DOE-CH New Production Reactor program's video teleconferencing facility beginning in 1992. Program direction and equipment funding is by DOE Headquarters. The Laboratory's High Energy Physics Division is to be on the Superconducting Super Collider (SSC) video conferencing network over existing ESnet communication facilities beginning in 1992.

The Laboratory already utilizes satellite downlink for educational programs. The Laboratory has investigated the installation of a satellite up/down link and has determined that it is not yet cost effective at this time. The Laboratory will lease satellite service when there is a need. This service will be distributed throughout the site on a fiber optic network.

New DOE requirements for Emergency Operations Center compatibility requires VSAT communications. No Laboratory funds will be used.

2.   Reconciliation to FY1993 Plan

The FY1993 Plan include significant increases in video teleconferencing activities. The satellite up/down link portion of the plan has been deleted.

3.   Currently Utilized Services/Planned Minor Enhancements

Voice Teleconferencing--Speakerphones and the PBX conferencing feature are commonly used for teleconferencing. Common carrier conferencing service is used for larger groups.

Portable Conference Telephones--Eight ANL-owned portable conferencing telephones are used for small telephone conference meetings.

Conference Room Audio Teleconferencing--The Laboratory has one conference room permanently equipped to provide teleconferencing service for the Office of the Director.

Auditorium Audio Teleconferencing--The Laboratory has one auditorium permanently equipped to provide audio teleconferencing service with any location on the telephone network. The teleconferencing equipment is electrically connected with the auditorium sound system.

Video Teleconferencing--The Laboratory uses satellite downlink and voice telephone service to participate in education and training programs.

4.   Planned Minor Initiatives/New Systems or Services

The Laboratory's High Energy Physics Division is to be added to the existing Superconducting Super Collider video teleconferencing network via an existing microwave link to Fermilab using ESnet. Video teleconferencing equipment and network interface equipment are on order.

5.   Planned Major Initiatives

None

6.   Schedule 4-1C1, Telecommunications Resource Estimates

DEPARTMENT OF ENERGY   Schedule 4-1C1
TELECOMMUNICATIONS RESOURCES ESTIMATE   Part 1

Site: ARGONNE NATIONAL LABORATORY (ANL)

Functional Area: Teleconferencing Activities

REPORTING CATEGORY				Resource Estimates in Thousands			
	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998
1. CAPITAL INVESTMENTS								
A. Purchase of Hardware	95	325	115	115	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Purchase of Software	0	4	6	6	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
C. Site Preparation	26	25	60	65	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 1	121	354	181	186	191	196	201	201
2. TELECOMMUNICATIONS OPERATING COSTS								
A. Government Workyears	0.0	0.0	0.0	0.0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Inhouse Personnel Costs								
1. System Operations	5	30	35	40	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
2. System Maintenance	15	55	55	73	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. Analysis/Design/Engineering	15	25	20	20	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
4. System Studies and Other	15	5	5	10	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
C. Other Inhouse Operating Costs								
1. Hardware/Software Purchases	2	5	10	10	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
2. Lease of Hardware	1	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. Lease of Software	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
4. Space	30	50	55	60	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
5. Supplies and Other	2	6	12	13	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 2	85	176	192	226	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. COMMERCIAL SERVICES								
A. Leased Voice Communications	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Leased Data Communications	0	17	133	158	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
C. Operations/Maintenance	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
D. Systems Analysis, Programming Design, and Engineering	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
E. Studies and Other	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 3	0	17	133	158	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
4. NONCOMMERCIAL SERVICES								
A. Payments								
1. Other DOE Sites	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
2. Other Executive Branch Agencies	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. Other Noncommercial Service	0	80	80	80	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Offsetting Collections (-)	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 4	0	80	80	80	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL FOR COMBINED CATEGORIES 2+3+4	85	273	405	464	507	560	560	560
GRAND TOTAL	206	627	586	650	698	756	761	761

NOTE: GOVERNMENT WORKYEARS (Section 2A) are not included in subtotal for Category 2 or Grand Total.

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                              DEPARTMENT OF ENERGY              Schedule 4-1C1
                        TELECOMMUNICATIONS RESOURCES ESTIMATE     Part 2
                           Resource Estimates in Thousands

Site: ARGONNE NATIONAL LABORATORY (ANL)

Functional Area: Teleconferencing Activities


            PROGRAMMATIC DISTRIBUTION OF CATEGORY 1 - CAPITAL INVESTMENTS

    B&RC CODE  FY 1991  FY 1992  FY 1993  FY 1994  FY 1995  FY 1996  FY 1997  FY 1998
              --------  -------- -------- -------- -------- -------- -------- --------
        No programmatic data found for CAPITAL INVESTMENTS
              ========  ======== ======== ======== ======== ======== ======== ========
    TOTALS:

    Unmatched SUBTOTALS for CATEGORY 1 - CAPITAL INVESTMENTS
                   121      354      131      186      191      196      201      201


            PROGRAMMATIC DISTRIBUTION OF CATEGORIES 2+3+4 - OPERATING EXPENSES

    B&RC CODE  FY 1991  FY 1992  FY 1993  FY 1994  FY 1995  FY 1996  FY 1997  FY 1998
              --------  -------- -------- -------- -------- -------- -------- --------
        No programmatic data found for OPERATING EXPENSES
              ========  ======== ======== ======== ======== ======== ======== ========
    TOTALS:

    Unmatched SUBTOTALS for COMBINED CATEGORIES 2+3+4 - OPERATING EXPENSES
                    85      273      405      464      507      560      560      560
```

7.   **Schedule 4-2, Major Telecommunications Initiatives**

None

B.   Communications Security (COMSEC) Programs

1.   Communications Security (COMSEC)

a.   **Strategies and Major Accomplishments**

Four STU-III telephones are currently in use for Security and Engineering Research. The STU-III telephones are used for voice communications. There are no plans for data communications.

b.   **Reconciliation to FY1992 Plan**

The STU-III ordered by ANL was cancelled.

c.   **Currently Utilized Services**

Four STU-III telephones are in operation that use Commercial Telephone Service.

d.   **Planned Minor Initiatives**

DOE's Emergency Operation Center (EOC) compatibility requirements may determine that COMSEC equipment be installed in a joint Argonne/DOE-CH EOC. Argonne has no independent plans.

e.   **Planned Major Initiatives**

None

f.   Schedule 4-1C2.1, Telecommunications Resource Estimates

DEPARTMENT OF ENERGY   Schedule 4-1C2.1
TELECOMMUNICATIONS RESOURCES ESTIMATE   Part 1

Site: ARGONNE NATIONAL LABORATORY (ANL)

Functional Area: CCMSEC

REPORTING CATEGORY	Resource Estimates in Thousands							
	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998
1. CAPITAL INVESTMENTS								
A. Purchase of Hardware	15	13	13	16	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Purchase of Software	1	0	1	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
C. Site Preparation	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 1	16	13	14	16	17	17	17	17
2. TELECOMMUNICATIONS OPERATING COSTS								
A. Government Workyears	0.0	0.0	0.0	0.0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Inhouse Personnel Costs								
1. System Operations	33	37	38	40	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
2. System Maintenance	29	30	30	33	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. Analysis/Design/Engineering	1	1	1	1	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
4. System Studies and Other	2	2	2	2	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
C. Other Inhouse Operating Costs								
1. Hardware/Software Purchases	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
2. Lease of Hardware	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. Lease of Software	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
4. Space	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
5. Supplies and Other	4	3	4	3	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 2	69	73	75	79	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. COMMERCIAL SERVICES								
A. Leased Voice Communications	2	2	2	2	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Leased Data Communications	9	9	9	9	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
C. Operations/Maintenance	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
D. Systems Analysis, Programming Design, and Engineering	2	2	2	2	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
E. Studies and Other	2	2	2	2	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 3	15	15	15	15	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
4. NONCOMMERCIAL SERVICES								
A. Payments								
1. Other DOE Sites	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
2. Other Executive Branch Agencies	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
3. Other Noncommercial Service	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
B. Offsetting Collections (-)	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL CATEGORY 4	0	0	0	0	XXXXXXX	XXXXXXX	XXXXXXX	XXXXXXX
SUBTOTAL FOR COMBINED CATEGORIES 2+3+4	84	88	90	94	96	100	102	106
GRAND TOTAL	100	101	104	110	113	117	119	123

NOTE: GOVERNMENT WORKYEARS (Section 2A) are not included in subtotal for Category 2 or Grand Total.

DEPARTMENT OF ENERGY   Schedule 4-1C2.1
TELECOMMUNICATIONS RESOURCES ESTIMATE   Part 2
Resource Estimates in Thousands

Site: ARGONNE NATIONAL LABORATORY (ANL)

Functional Area: COMSEC

PROGRAMMATIC DISTRIBUTION OF CATEGORY 1 - CAPITAL INVESTMENTS

B&RC CODE	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998

No programmatic data found for CAPITAL INVESTMENTS

TOTALS:

Unmatched SUBTOTALS for CATEGORY 1 - CAPITAL INVESTMENTS

| | 16 | 13 | 14 | 16 | 17 | 17 | 17 | 17 |

PROGRAMMATIC DISTRIBUTION OF CATEGORIES 2+3+4 - OPERATING EXPENSES

B&RC CODE	FY 1991	FY 1992	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998

No programmatic data found for OPERATING EXPENSES

TOTALS:

Unmatched SUBTOTALS for COMBINED CATEGORIES 2+3+4 - OPERATING EXPENSES

| | 84 | 88 | 90 | 94 | 96 | 100 | 102 | 106 |

g.   **Schedule 4-2, Major Telecommunications Acquisitions**

None

2.   **Emission Security (TEMPEST) Testing Program**

At the present time the Laboratory has no programs which meet the TEMPEST Testing program criteria as described in the call for *FY1994 Information Technology Resources Long-Range Plans.*

3.   **Protected Distribution System (PDS) Program**

At the present time the Laboratory has no programs which meet the Protected Distribution System (PDS) program criteria as described in the call for *FY1994 Information Technology Resources Long-Range Plans.*

C.   **National Security Emergency Preparedness Program (NSEP)**

At the present time the Laboratory has no programs which meet the NSEP program criteria as described in the call for *FY1994 Information Technology Resources Long-Range Plans.*

D. DOE Teleprocessing Services Program (TSP)

SCHEDULE 4-4
DOE TELEPROCESSING SERVICES PROGRAM (TSP)
DATA COLLECTION FORM
FOR FY 1992 DATA

Please Print or Type   SITE CODE: ANL
                                                            FORM NO.:
                                                            (Assigned by AD-252)

1. SITE NAME: ARGONNE NATIONAL LABORATORY

2. TECHNICAL CONTACT NAME: Shannon D. Savage

   TITLE: IPD/TIS Director

   TELEPHONE NUMBER: 708-252-4221

   ADDRESS: TIS, Bldg 203 - D140, 9700 S. Cass Avenue

            Argonne, IL 60439-4843

3. VENDOR NAME: STN - Int'l, c/o Chemical Abstracts Service

   ADDRESS: P.O. Box 2228, 2540 Olentangy River Rd.

            Columbus, OH 43202

4. TYPE OF SERVICE: 03 - Bibliographic Retrieval

5. DATA BASE OR SOFTWARE USED: STN

6. TOTAL FY 1991 EXPENDITURES: $17,164

7. TYPE OF CONTRACT: PO

8. CONTRACT END DATE: 09/92

9. DISCOUNT NEGOTIATED?: ___ YES _X_ NO

   IF YES, TYPE OF DISCOUNT:

10. PLANNED EXPENDITURES:

FY 1992	FY 1993	FY 1994
$ 25,000	$ 27,000	$ 30,000

SCHEDULE 4-4
DOE TELEPROCESSING SERVICES PROGRAM (TSP)
DATA COLLECTION FORM
FOR FY 1992 DATA

Please Print or Type

SITE CODE: ANL
FORM NO.:
(Assigned by AD-252)

1. SITE NAME: ARGONNE NATIONAL LABORATORY

2. TECHNICAL CONTACT NAME: Shannon D. Savage

   TITLE: IPD/TIS Director

   TELEPHONE NUMBER: 708-252-4221

   ADDRESS: TIS, Bldg 203 - D140, 9700 S. Cass Avenue

            Argonne, IL 60439-4843

3. VENDOR NAME: Research Libraries Group, Inc.

   ADDRESS: 1200 Villa Street

            Mountain View, CA 94041-1100

4. TYPE OF SERVICE: 03 - Bibliographic Retrieval

5. DATA BASE OR SOFTWARE USED: RLIN

6. TOTAL FY 1991 EXPENDITURES: $377

7. TYPE OF CONTRACT: PO

8. CONTRACT END DATE: 12/92

9. DISCOUNT NEGOTIATED?: ____ YES   _X_ NO

   IF YES, TYPE OF DISCOUNT:

10. PLANNED EXPENDITURES:

FY 1992	FY 1993	FY 1994
$ 1,000	$ 1,000	$ 1,000

SCHEDULE 4-4
DOE TELEPROCESSING SERVICES PROGRAM (TSP)
DATA COLLECTION FORM
FOR FY 1992 DATA

Please Print or Type   SITE CODE: ANL
                                                 FORM NO.:
                                                 (Assigned by AD-252)

1. SITE NAME: ARGONNE NATIONAL LABORATORY

2. TECHNICAL CONTACT NAME: Shannon D. Savage

   TITLE: IFD/TIS Director

   TELEPHONE NUMBER: 708-252-4221

   ADDRESS: TIS, Bldg 203 - D140, 9700 S, Cass Avenue

            Argonne, IL 60439-4843

3. VENDOR NAME: Orbit Search Service

   ADDRESS: 8000 Westpark Drive

            Mc Lean, VA 22102

4. TYPE OF SERVICE: 03 - Bibliographic Retrieval

5. DATA BASE OR SOFTWARE USED: ORBIT

6. TOTAL FY 1991 EXPENDITURES: $

7. TYPE OF CONTRACT: PO

8. CONTRACT END DATE: 09/92

9. DISCOUNT NEGOTIATED?: ___ YES _X_ NO

   IF YES, TYPE OF DISCOUNT:

10. PLANNED EXPENDITURES:

FY 1992	FY 1993	FY 1994
$ 2,040	$ 2,040	$ 2,040

SCHEDULE 4-4
DOE TELEPROCESSING SERVICES PROGRAM (TSP)
DATA COLLECTION FORM
FOR FY 1992 DATA

Please Print or Type   SITE CODE: ANL
                                                  FORM NO.:
                                                  (Assigned by AD-252)

1. SITE NAME: ARGONNE NATIONAL LABORATORY

2. TECHNICAL CONTACT NAME: Shannon D. Savage

    TITLE: IPD/TIS Director

    TELEPHONE NUMBER: 708-252-4221

    ADDRESS: TIS, Bldg 203 - D140, 9700 S. Cass Avenue

            Argonne, IL 60439-4843

3. VENDOR NAME: NASA Scientific & Technical Information Facility

    ADDRESS: P.O. Box 8757

            Batlimore/Wash Intnl Airport, MD 21240

4. TYPE OF SERVICE: 03 - Bibliographic Retrieval

5. DATA BASE OR SOFTWARE USED: NASA/RECON

6. TOTAL FY 1991 EXPENDITURES: $67

7. TYPE OF CONTRACT: PO

8. CONTRACT END DATE: 12/92

9. DISCOUNT NEGOTIATED?: ___ YES   _X_ NO

    IF YES, TYPE OF DISCOUNT:

10. PLANNED EXPENDITURES:

           FY 1992   FY 1993   FY 1994
        $ 300 $ 300 $ 300

SCHEDULE 4-4
DOE TELEPROCESSING SERVICES PROGRAM (TSP)
DATA COLLECTION FORM
FOR FY 1992 DATA

Please Print or Type

SITE CODE: ANL
FORM NO.:
(Assigned by AD-252)

1.   SITE NAME: ARGONNE NATIONAL LABORATORY

2.   TECHNICAL CONTACT NAME: Shannon D. Savage

     TITLE: IPD/TIS Director

     TELEPHONE NUMBER: 708-252-4221

     ADDRESS: TIS, Bldg 203 - D140, 9700 S. Cass Avenue

            Argonne, IL 60439-4843

3.   VENDOR NAME: Illinet/OCLC Services

     ADDRESS: Illinois State Lib., 288 Centennial Bldg.

            Springfield, IL 62756

4.   TYPE OF SERVICE: 03 - Bibliographic Retrieval

5.   DATA BASE OR SOFTWARE USED: OCLC

6.   TOTAL FY 1991 EXPENDITURES: $16,786

7.   TYPE OF CONTRACT: PO

8.   CONTRACT END DATE: 08/92

9.   DISCOUNT NEGOTIATED?: ___ YES   _X_ NO

     IF YES, TYPE OF DISCOUNT:

10. PLANNED EXPENDITURES:

FY 1992	FY 1993	FY 1994
$ 18,500	$ 20,000	$ 20,000

SCHEDULE 4-4
DOE TELEPROCESSING SERVICES PROGRAM (TSP)
DATA COLLECTION FORM
FOR FY 1992 DATA

Please Print or Type   SITE CODE: ANL
                                                        FORM NO.:
                                                        (Assigned by AD-252)

1.   SITE NAME: ARGONNE NATIONAL LABORATORY

2.   TECHNICAL CONTACT NAME: Shannon D. Savage

     TITLE: IPD/TIS Director

     TELEPHONE NUMBER: 708-252-4221

     ADDRESS: TIS, Bldg 203 - D140, 9700 S. Cass Avenue

              Argonne, IL 60439-4843

3.   VENDOR NAME: DOE Office of Scientific & Technical Information

     ADDRESS: P.O. Box 62

              Oak Ridge, TN 37831

4.   TYPE OF SERVICE: 03 - Bibliographic Retrieval

5.   DATA BASE OR SOFTWARE USED: ITIS & SIS

6.   TOTAL FY 1991 EXPENDITURES: $3,590

7.   TYPE OF CONTRACT: Deposit account

8.   CONTRACT END DATE: 09/92

9.   DISCOUNT NEGOTIATED?: ___ YES   _X_ NO

     IF YES, TYPE OF DISCOUNT:

10. PLANNED EXPENDITURES:

                    FY 1992   FY 1993   FY 1994
                    $ 4,000 $ 5,000 $ 5,000

SCHEDULE 4-4
DOE TELEPROCESSING SERVICES PROGRAM (TSP)
DATA COLLECTION FORM
FOR FY 1992 DATA

Please Print or Type   SITE CODE: ANL
                                                  FORM NO.:
                                                  (Assigned by AD-252)

1. SITE NAME: ARGONNE NATIONAL LABORATORY

2. TECHNICAL CONTACT NAME: Shannon D. Savage

    TITLE: IPD/TIS Director

    TELEPHONE NUMBER: 708-252-4221

    ADDRESS: TIS, Bldg 203 - D140, 9700 S. Cass Avenue

             Argonne, IL 60439-4843

3. VENDOR NAME: Dialog Information Services

    ADDRESS: 3460 Hillview Avenue

             Palo Alto, CA 94304

4. TYPE OF SERVICE: 03 - Bibliographic Retrieval

5. DATA BASE OR SOFTWARE USED: DIALOG

6. TOTAL FY 1991 EXPENDITURES: $48,811

7. TYPE OF CONTRACT: PO

8. CONTRACT END DATE: 09/92

9. DISCOUNT NEGOTIATED?: ___ YES   _X_ NO

    IF YES, TYPE OF DISCOUNT:

10. PLANNED EXPENDITURES:

                FY 1992   FY 1993   FY 1994
                $ 65,000 $ 65,000 $ 65,000

SCHEDULE 4-4
DOE TELEPROCESSING SERVICES PROGRAM (TSP)
DATA COLLECTION FORM
FOR FY 1992 DATA

Please Print or Type   SITE CODE: ANL
                                                    FORM NO.:
                                                    (Assigned by AD-252)

1. SITE NAME: ARGONNE NATIONAL LABORATORY

2. TECHNICAL CONTACT NAME: Shannon D. Savage

    TITLE: IPD/TIS Director

    TELEPHONE NUMBER: 708-252-4221

    ADDRESS: TIS, Bldg 203 - D140, 9700 S. Cass Avenue

             Argonne, IL 60439-4843

3. VENDOR NAME: Defense Technical Information Center

    ADDRESS: Cameron Station

             Alexandria, VA 22304-6145

4. TYPE OF SERVICE: 03 - Bibliographic Retrieval

5. DATA BASE OR SOFTWARE USED: DROLS

6. TOTAL FY 1991 EXPENDITURES: $219

7. TYPE OF CONTRACT: Deposit account

8. CONTRACT END DATE: 09/92

9. DISCOUNT NEGOTIATED?: ___ YES   _X_ NO

    IF YES, TYPE OF DISCOUNT:

10. PLANNED EXPENDITURES:

              FY 1992   FY 1993   FY 1994
              $ 300 $ 400 $ 400

SCHEDULE 4-4
DOE TELEPROCESSING SERVICES PROGRAM (TSP)
DATA COLLECTION FORM
FOR FY 1992 DATA

Please Print or Type   SITE CODE: ANL
                                                            FORM NO.:
                                                            (Assigned by AD-252)

1. SITE NAME: ARGONNE NATIONAL LABORATORY

2. TECHNICAL CONTACT NAME: Shannon D. Savage

    TITLE: IPD/TIS Director

    TELEPHONE NUMBER: 708-252-4221

    ADDRESS: TIS, Bldg 203 - D140, 9700 S. Cass Avenue

            Argonne, IL 60439-4843

3. VENDOR NAME: BRS Information Technologies

    ADDRESS: 8000 Westpark Drive

            Mc Lean, VA 22102

4. TYPE OF SERVICE: 03 - Bibliographic Retrieval

5. DATA BASE OR SOFTWARE USED: BRS

6. TOTAL FY 1991 EXPENDITURES: $5,851

7. TYPE OF CONTRACT: PO

8. CONTRACT END DATE: 09/92

9. DISCOUNT NEGOTIATED?: ___ YES   _X_ NO

    IF YES, TYPE OF DISCOUNT:

10. PLANNED EXPENDITURES:

            FY 1992   FY 1993   FY 1994
            $ 15,100 $ 16,000 $ 18,000

Part 5

Printing and Publishing Plan

Section A

Three-Year Printing and Publishing Activities Plan

A.   Printing and Publishing Activity

The Information and Publishing Division (IPD) of Argonne National Laboratory was established in August 1991. Its mission is to provide services that enhance the quality, timeliness, and cost-effectiveness of communication in two contexts:

*   Exchange of scientific and technical information between Argonne and its research and development (R&D) sponsors and between Argonne and the R&D community at large.

*   Exchange of administrative and operating information within Argonne and between Argonne and the Depart.nent of Energy.

The Division fulfills its mission as follows:

*   Acquiring, managing, and disseminating information:
     IPD operates specialized libraries; manages and provides access to electronic information systems; purchases publications for libraries and R&D staff; and disseminates Argonne publications through Department of Energy channels.

*   Preparing information products:
     IPD provides a full range of services to support preparation of publications and presentation materials, including design and production planning, writing, editing, computer-based text and graphics processing, photographic and digital imaging, and printing.

*   Representing Argonne's information and publishing interests:
     IPD serves as the Laboratory's point of contact with the Department of Energy for planning and policy development regarding scientific and technical information, printing, and publishing.

The Division is committed to pursuing continuous improvement within its operations and to providing broad leadership within Argonne in achieving excellence in information management and communication. In all activities, IPD places the highest priority on employee safety and environmental protection.

Schedule 1.1: Schedule 5-1, Equipment Acquired During Fiscal Year 1991

None

Schedule 1.2: Schedule 5-2, Narrative Report - JCP Approved Equipment only

None

PRINTING AND PUBLISHING ACTIVITY   Schedule 5-3
BUDGET PROJECTIONS   11/91
(Dollars in Thousands)

FACILITY NAME: Argonne National Laboratory: East   CONTACT: Rich Nixon

ADDRESS: 9700 S. Cass, Bldg. 222, Med   PHONE: 708-972-560U
             Argonne, IL 60439-4828

ACTIVITY	PAST FY 1991	CURRENT FY 1992	PLAN FY 1993	OUT-YEARS FY 1994	FY 1995
In-House Printing (Schedule 5-9) (JCP Form No. 1)	737	766	797	823	856
In-House Duplicating (Schedule 5-12) (Duplicating Facility Report)					
Private Sector Printing: GPO/RPPO Activities (Schedule 5-13)	413	425	438	451	465
UNICOR Activities (Schedule 5-14)	4	4	4	4	5
Direct Commercial Procurement (Schedule 5-10) (Report full FY data from JCP Form 2's)	11	11	11	11	11
Composition: In-House	95	98	101	104	107
GPO/RPPO					
Copying Activity (Schedule 5-15) (Convenience Copiers Only)	720	741	763	785	808
DOLLAR TOTALS	1,980	2,045	2,114	2,178	2,252

PRINTING AND PUBLISHING ACTIVITY
PRODUCTION PROJECTIONS

Schedule 5-4
11/91

FACILITY NAME: Argonne National Laboratory: East

CONTACT: Richard D. Nixon

ADDRESS: 9700 S. Cass, Bldg. 222, Mod
             Argonne, IL 60439-4828

PHONE: 708-972-5600

ACTIVITY		PAST FY 1991	CURRENT FY 1992	PLAN FY 1993	OUT-YEARS FY 1994	FY 1995
In-House Printing (Schedule 5-9) (JCP Form No. 1)						
Production Units/1000's		23,725	24,196	24,680	25,174	25,677
Actual Jobs		7,724	7,368	7,515	7,665	7,818
In-House Duplicating (Schedule 5-12) (Duplicating Facility Report)						
Production Units/1000's						
Actual Jobs						
Private Sector Printing:						
GPO/RPPO Activities (Schedule 5-13)	Actual Jobs	439	452	466	480	494
UNICOR Activities (Schedule 5-14)	Actual Jobs	1	3	3	3	3
Direct Commercial Procurement (Schedule 5-10) (Report full FY data from JCP Form 2's)	Actual Jobs	19	15	15	16	16
Composition:						
In-House	Actual Jobs	451	1,051	1,072	1,093	1,115
	Pages	5,007	6,104	6,226	6,351	6,478
GPO/RPPO	Actual Jobs					
	Pages					
Copying Activity (Schedule 5-15) (Convenience Copiers Only)	Copies/1000's	30,186	31,400	32,342	33,312	34,311

PRINTING AND PUBLISHING ACTIVITY
NEW EQUIPMENT JUSTIFICATION
Fiscal Year 1993

Schedule 5·5
11/91

FACILITY NAME: Argonne National Laboratory: East

ADDRESS: 9700 S. Cass, Bldg. 222, Med
              Argonne, IL 60439-4828

Equipment Description (Make/Model/Type)	Application	Annual Cost & Lease/Purchase	Justification (Include Projected Cost Avoidances)
BAUM 500 R/H FOLD	Paper Folder • PROGRAM COMMITMENTS : SUPPORTS ALL PROGRAMS • MIX OF WORK : BOOK PUBLISHING, PAMPHLETS, FLYERS, AND ANNOUNCEMENTS • WORK FLOW : MAINTAIN PRESENT WORK LOAD OF 545546 SHEETS FOLDED • RESPONSIBLE ORGANIZATION : ARGONNE GRAPHIC ARTS DEPARTMENT	$20,000 Purchase	Turnaround time: 3 days Classified: 1% Projectc / Cost Avoidance: $2,083

Workload:
Cost:

	CURRENT	PROPOSED
Workload:	545,546	545,564
Cost:	$5,015	$2,932

EQUIPMENT DISPOSED OF OR TRADED-IN
  Make/Model/Type   Serial Number
BAUM 17.5X22.5   35591-54

PRESENT EQUIPMENT IS 24 YEARS OLD, USED WELL BEYOND ITS EXPECTED LIFE. IT IS
ONLY CAPABLE OF DOING TWO FOLDS. THE PROPOSED EQUIPMENT WILL DO FIVE FOLDS, AVOIDING THE EXTRA COST OF HAND FOLDING.

PRINTING AND PUBLISHING ACTIVITY   Schedule 5-5
NEW EQUIPMENT JUSTIFICATION   11/91
Fiscal Year 1993

FACILITY NAME: Argonne National Laboratory: East

ADDRESS: 9700 S. Cass, Bldg. 222, Med
              Argonne, IL 60439-4828

Equipment Description (Make/Model/Type)	Application	Annual Cost & Lease/Purchase	Justification (Include Projected Cost Avoidances)
SULBY 1250 BINDER	Book Binder · PROGRAM COMMITMENTS : SUPPORTS ALL PROGRAMS · MIX OF WORK : BOOK PUBLISHING, PAMPHLETS, FORMAL AND INFORMAL REPORTS · IMPROVEMENTS : REDUCE PRESENT TWO MAN OPERATION TO ONE MAN OPERATION	$49,000 Purchase	Turnaround time: 3 days Classified: 1% Projected Cost Avoidance: $2,620

Workload: CURRENT 30,000   PROPOSED 30,000
Cost: $10,878 $8,258

EQUIPMENT DISPOSED OF OR TRADED-IN
  Make/Model/Type   Serial Number
SULBY MINABINDER   7030

NEEDED TO REPLACE EQUIPMENT PURCHASED IN 1962. PRESENTLY
COSTING $2150.00
IN ANNUAL REPAIRS TO KEEP IN OPERATION

PRINTING AND PUBLISHING ACTIVITY   Schedule 5-5
NEW EQUIPMENT JUSTIFICATION   11/91
Fiscal Year 1994

FACILITY NAME: Argonne National Laboratory: East

ADDRESS: 9700 S. Cass, Bldg. 222, Mod
                Argonne, IL 60439-4828

Equipment Description (Make/Model/Type)	Application	Annual Cost & Lease/Purchase	Justification (Include Projected Cost Avoidances)
MULTIGRAPHICS 1650	Two Color Printing - PROGRAM COMMITMENTS : SUPPORTS ALL PROGRAMS - MIX OF WORK : BOOK PUBLISHING, PAMPHLETS, FLYERS, ANNOUNCEMENTS - WORK FLOW : MAINTAIN PRESENT WORK LOAD OF 3,040,609 UNITS - RESPONSIBLE ORGANIZATION : ARGONNE GRAPHIC ARTS DEPARMENT	$26,000 Purchase	Turnaround time: 3 days Classified: 1% Projected Cost Avoidance: $7,555

                                                                CURRENT   PROPOSED
                                        Workload: 3,040,609   3,040,609
                                        Cost: $45,343 $37,787

                                        EQUIPMENT DISPOSED OF OR TRADED-IN
                                          Make/Model/Type   Serial Number
                                        MULTIGRAPHIC 1250   905402

                                        THIS EQUIPMENT WOULD REPLACE EQUIPMENT PURCHASED IN 1969.BY
                                        PURCHASING A TWO COLOR PRESS WE CAN REDUCE THE COST OF LABOR
                                        $10900.00

PRINTING AND PUBLISHING ACTIVITY   Schedule 5-6
NEW TECHNOLOGY APPLICATION   11/91
Fiscal Year 1993

FACILITY NAME: Argonne National Laboratory: East

ADDRESS: 9700 S. Cass, Bldg. 222, Mod
              Argonne, IL 60439-4828

_____Application_____   _____Description of New Technology_____

Xerox 9790   The Xerox 9790 System is a single-channel electronic printing system housing all
This application of electronic, on-demand printing   production functions in one device. The operation of these functions is
technology will interface with the Laboratory's   computer-controlled, requiring an operator to be less-skilled in mechanical
Sitewide Ethernet, permitting direct transmission   operations than his predecessors, craftsmen mixing negatives and plates and running
of documents from the author's location, to the   presses. This technology is expected to save substantial dollars through elimination
printing device.   of expensive prepress operations and makeready costs. As a consequence of this
                                              elimination, short production runs, producing only the amount of books currently
                                              required, become practical, substantially reducing mailing and storage costs as well.

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                              PRINTING AND PUBLISHING ACTIVITY              Schedule 5-7
                              PROJECTED PUBLISHING ACTIVITIES                      11/91
                              (Actual Number of Publications)
```

FACILITY NAME: Argonne National Laboratory: East   CONTACT: David R. Hamrin

ADDRESS: 9700 S. Cass, Bldg. 222, Med   PHONE: 708-252-5611
              Argonne, IL 60439-4828

ACTIVITY	PAST FY 1991	CURRENT FY 1992	PLAN FY 1993	OUT-YEARS FY 1994	FY 1995
Scientific and Technical	1,345	1,412	1,482	1,557	1,634
Public Communications	20	20	20	20	20
Administrative	16	17	18	19	20
Statistical		2	2	2	2

PRINTING AND PUBLISHING ACTIVITY
JOURNAL PUBLISHING ACTIVITIES
(Dollars in Thousands)

Schedule 5-8
11/91

FACILITY NAME: Argonne National Laboratory: East

ADDRESS: 9700 S. Cass, Bldg. 222, Med
             Argonne, IL 60439-4828

	Past Year FY 1991	Current Year FY 1992	Plan Year FY 1993	Outyear 1 FY 1994	Outyear 2 FY 1995
Quantity	480	504	529	555	583
Cost (in thousands)	175	184	193	203	213

Section B

Printing Activities Report

A.   Printing Plant Report

PRINTING PLANT REPORT
JCP FORM NO. 1 (Rev. 3-71)   Region: 05
DOE (Rev. 7-86)   Schedule 5-9
Department headquarters shall submit 2 copies of this report to the JCP within 60 days after the close of the fiscal year.

Department or Agency DEPARTMENT OF ENERGY	Name and Location of Plant Argonne National Laboratory: East 9700 S. Cass, Bldg. 222, Med Argonne, IL 60439-4828	JCP Authorization Number 08538	For Period Ended 9/30/91

Part I.--Cost Information (For Fiscal Year)

Item	All Printing Except Composition 1. (Col A)	Composition All Types 2. (Col B)	Operations Other Than Printing 3. (Col C)
	Omit Cents	Omit Cents	Omit Cents
Total Salaries of all personnel including supervisory directly engaged in the operation of the plant (including overtime and annual and sick leave)	$347,395	$39,894	$759,960
Cost of paper, ink, chemicals, negatives, plates, etc., used during report period	$184,433	$31,153	$907
Depreciation of equipment (1% per month of original cost until fully depreciated)	$26,654	$12,518	$0
Amount spent for repairs and maintenance	$43,328	$10,554	$27,266
Allowance for space occupied (whether Government-owned or rented), utilities, etc. (14.5 cents per month per sq. ft. of total space occupied). Square footage: 14,465	$8,544	$670	$15,095
Amount spent for rental of equipment	$126,526	$0	$0
TOTAL COST (Use col A total from this line to compute cost per 1000 units)	$736,880	$94,789	$803,228
TOTAL COST OF PRINTING INCLUDING COMPOSITION (col A+col B)		$831,669	

1. Include in Col A cost of all offset camera work, negative work, imposition, platemaking, duplicating, presswork, scoring, perforating, numbering, folding, collating, gathering, drilling, punching, stitching, sewing, inserting, tipping, padding, trimming, tying, wrapping, and all other operations needed to complete printing or binding product.
2. Include in Col B cost of all composition produced by plant.
3. Include in Col C cost of all operation not involving printing (Col A) and composition (Col B). Costs to be included in Col C will include addressing, distribution, camera work (other than lithographic), photostating, ozalid, B/W, etc.

Part II.--Production Information (For Fiscal Year)

Presswork		Units Per Press Impression (Col D)	Number of Presses In Each Category Reported (Col E)	Number of Masters and Plates (Col F)	Total Units Produced, Excluding Overruns (Col G)
	11x17 (Image <= 10 3/4x14 1/4)	1	2	3,046	1,759,107
	11x17 Tandem (Image <= 10 3/4x14 1/4)	2	1	14,929	3,501,990
	11x17 (Image > 10 3/4x14 1/4)	2			
	14x20 and 15x18	2	2	1,152	1,969,212
	11x17 Tandem (Image > 10 3/4x14 1/4)	4	1	5,360	4,502,688
O	17x22 and 19x25	4			
F	22x29	6			
F	22x34	8			
S	23x36	8			
E	23x36 Perfecting	16			
T	34x44	16			
	Other (specify)				
	TOTAL UNITS PRODUCED BY OFFSET				11,732,997
E D	XEROX MODEL 9900	1	2	642,210	11,724,507
L U	KONICA 7090	1	1	63,352	267,557
E P					
C L					
T I					
R C					
O A					
S T					
T O	TOTAL UNITS PRODUCED BY ELECTROSTATIC DUPLICATORS				11,992,064
A R*	TOTAL UNITS PRODUCED IN PLANT THIS FISCAL YEAR				23,725,061

COST PER 1000 UNITS (total cost of printing, excluding composition, part I, col A, divided by total production units produced in the plant. Drop last 3 digits of col G when computing cost per 1000 units). $31.06

Prepared by (Person in charge of plant)   Date Submitted:
                                                                                      11/01/91

* Electrostatic duplicators include, but are not limited to, Xerox 1000 and 9000 series; Kodak 100 and 200 series; and IBM copier III's where staffed.

ANL-5.2.2

PRINTING PLANT REPORT
JCP FORM NO. 1 (Rev. 3-71)   Region: 05
DOE (Rev. 7-86)   Schedule 5-9
Department headquarters shall submit 2 copies of this report to the JCP within 60 days after the close of the fiscal year.

Department or Agency DEPARTMENT OF ENERGY	Name and Location of Plant Argonne National Laboratory: East 9700 S. Cass, Bldg. 222, Med Argonne, IL 60439-4828	JCP Authorization Number 08538	For Period Ended 9/30/91

Part III.--List of Reportable Jobs Run During the Period* (for Fiscal Year)

*Report only those jobs which exceed the quantity of production
units, by press production unit size, as shown below:

Press Production Unit Size	Production Units
Less than 4 units	25,000
4 units	60,000
6 units	90,000
8 units	120,000
16 units	240,000
Over 16 units	No listing required

Unit Size**
```
11"x17" or less (maximum image 10.75"x14.25")..1
11"x17" or less, tandem (maximum image
         10.75"x14.25")...........................2
11"x17" (image > 10.75"x14.25")..................2
14"x20"..........................................2
15"x18"..........................................2
11"x17" tandem (image > 10.75"x14.25").........4
17"x22"..........................................4
19"x25"..........................................4
```

Unit Size**
```
22"x29"........6
22"x34"........8
23"x36"........8
25"x38".......10
23"x36"
    perfecting..16
34"x44".......16
45"x48".......24
42"x58".......28
48"x54".......30
```

Title of publication or form (1)	Number of pages (2)	Number of copies of each page (3)	Finish print page size (4)	Unit size of press** (5)	Press run required to complete job (6)	Total production units (col 5 x col 6) (7)	Process O=Offset E=Electrostatic (8)
AMPRO MAS	8	7,000	8.5X11	1	56,000	56,000	O
ANL 90/15	222	236	8.5X11	1	52,392	52,392	O
	2	236	11X17	2	472	944	O
REPORT	110	300	8.5X11	1	33,000	33,000	O
	2	300	11X17	2	600	1,200	O
ANL-90/50	88	340	8.5X11	1	29,920	29,920	O
	2	340	11X17	2	680	1,360	O
ANL-91-18	2	388	11X17	2	776	1,552	O
ANL-91/18	248	388	8.5X11	1	96,224	96,224	O
ANL-TM-483	2	235	11X17	2	470	940	O
ANL/90-16	224	255	8.5X11	1	57,120	57,120	O
ANL/ES-160	220	200	8.5X11	1	44,000	44,000	O
	2	200	11X17	2	400	800	O
REPORT	198	198	11X17	1	39,204	39,204	O
	2	198	11X17	2	396	792	O
REPORT	80	350	8.5X11	1	28,000	28,000	O
	2	350	11X17	2	700	1,400	O
ANL/IFR-149	44	500	8.5X11	1	22,000	22,000	O
	72	500	11X17	2	36,000	72,000	O
ANL/TM-460	171	250	11X17	2	42,750	85,500	O
CHAPTER 5 & 7	184	200	8.5X11	1	36,800	36,800	O
CONF/91-05016	192	350	8.5X11	1	67,200	67,200	O
CONF/91-05116	75	350	11X17	2	26,250	52,500	O
CORE MANUAL	41	1,000	11X17	2	41,000	82,000	O
DOE EH 0135	248	150	8.5X11	1	37,200	37,200	O
	1	150	11X17	2	150	300	O
DOE-CH-10406	138	220	8.5X11	1	30,360	30,360	O
	5	220	11X17	2	1,100	2,200	O
EAIS/TM-39	316	225	8.5X11	1	71,100	71,100	O
	22	225	11X17	2	4,950	9,900	O
EAIS/TM-54	128	200	8.5X11	1	25,600	25,600	O
ESH/QA PLAN	104	300	8.5X11	1	31,200	31,200	O
	1	300	11X17	2	300	600	O
FAC BOOK	2	300	11X17	2	600	1,200	O
FAC. BOOK	85	300	8.5X11	1	25,500	25,500	O
GREY BOOK: EWP	341	155	8.5X11	1	52,855	52,855	O
GUIDE NE111	89	350	8.5X11	1	31,150	31,150	O
GUIDE NE113	101	350	8.5X11	1	35,350	35,350	O
HEP-PR-90-104	75	450	8.5X11	1	33,750	33,750	O
HOISTING RIGGING	402	175	8.5X11	1	35,175	35,175	O
LISTINGS	160	200	11X17	2	32,000	64,000	O
MCT SUMMARY	200	250	8.5X11	1	50,000	50,000	O
	2	250	11X17	2	500	1,000	O
MSD SHEETS	1	200	8.5X11	1	200	200	O
	200	200	11X17	2	40,000	80,000	O
MYSTERY LINE	190	200	8.5X11	1	38,000	38,000	O
OPEN HOUSE BROCHURE	4	10,000	11X17	2	40,000	80,000	O
POLAND REPORT	192	140	8.5X11	1	26,880	26,880	O
POSTER	3	12,000	11X17	2	36,000	72,000	O
PROFILE TERR.	144	325	8.5X11	1	10,725	10,725	O
	33	325	11X17	2	10,725	21,450	O
R&D FACT BOOK	22	2,500	11X17	2	55,000	110,000	O

TOTAL | See last page

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PRINTING PLANT REPORT
JCP FORM NO. 1 (Rev. 3-71)                                                              Region: 05
DOE (Rev. 7-86)                                                                     Schedule 5-9
Department headquarters shall submit 2 copies of this report to the JCP within 60 days after the close of the fiscal year.
```

| Department or Agency
DEPARTMENT OF ENERGY | Name and Location of Plant
Argonne National Laboratory: East
9700 S. Cass, Bldg. 222, Med
Argonne, IL 60439-4828 | JCP Authorization
Number   08538 | For Period
Ended 9/30/91 |

Part III.--List of Reportable Jobs Run During the Period* (for Fiscal Year)

```
 *Report only those jobs which exceed the quantity of production          Unit Size**                     Unit Size**
units, by press production unit size, as shown below:      11"x17" or less (maximum image 10.75"x14.25")..1    22"x29"........6
                                    Production             11"x17" or less, tandem (maximum image               22"x34"........8
Press Production Unit Size             Units                   10.75"x14.25")............................2       23"x36"........8
                                                           11"x17" (image > 10.75"x14.25")................2     25"x38".......10
    Less than 4 units.............    25,000               14"x20"........................................2     23"x36"
    4 units.......................    60,000               15"x18"........................................2        perfecting..16
    6 units.......................    90,000               11"x17" tandem (image > 10.75"x14.25").........4     34"x44".......16
    8 units.......................   120,000               17"x22"........................................4     45"x48".......24
    16 units......................   240,000               19"x25"........................................4     42"x58".......28
    Over 16 units........No listing required                                                                    48"x54".......30
```

Title of publication or form (1)	Number of pages (2)	Number of copies of each page (3)	Finish print page size (4)	Unit size of press** (5)	Press run required to complete job (6)	Total production units (col 5 x col 6) (7)	Process O=Offset E=Electrostatic (8)
RECRUIT EEBR	9	5,000	11X17	2	45,000	90,000	O
REPORT	136	300	8.5X11	1	40,800	40,800	O
RERTR-TM/17	382	200	8.5X11	1	76,400	76,400	O
	2	200	11X17	2	400	800	O
RERTR/TM-14	238	179	8.5X11	1	42,602	42,602	O
	47	179	11X17	2	8,413	16,826	O
SCOTTAIR F	570	130	8.5X11	1	74,100	74,100	O
	61	130	11X17	2	7,930	15,860	O
TEACHERS GUIDE	185	350	8.5X11	1	64,750	64,750	O
TEACHERS GUIDE 2	140	350	8.5X11	1	49,000	49,000	O
TEACHERS GUIDE 3	174	350	11X17	2	60,900	121,800	O
TECH GUIDE	130	300	8.5X11	1	39,000	39,000	O
TRAINING LIST	7	7,000	8.5X11	1	49,000	49,000	O
TT ASS.BOOK	512	400	8.5X11	1	204,800	204,800	O
	240	400	11X17	2	9,600	19,200	O
WASTE MANUALP	331	350	8.5X11	1	117,250	117,250	O

| | | | | | TOTAL | 2,862,731 | ▓▓▓▓ |

COMMERCIAL PRINTING REPORT   Region: 05
JCP FORM NO. 2 (Rev. 3-71)   Schedule 5-10

NAME OF DEPARTMENT OR AGENCY Department of Energy	NAME OF SERVICE Argonne National Laboratory: East		CITY AND STATE Argonne, IL	FOR PERIOD ENDED 9-30-91
DESCRIPTION List each job separately	JCP or GPO waiver number and date (if applicable)	Total number of copies	Number of pages per copy	Style of of binding (if any)	Total Cost including paper

DESCRIPTION	JCP or GPO waiver number and date (if applicable)	Total number of copies	Number of pages per copy	Style of binding (if any)	Total Cost including paper
10 X 13 ENVELOPE		6,000	1		987
14 X 19 SAFETY POSTER		300	2		408
24TH CHICAGO BROCHURE		1,500	4		760
6 X 11 SAFETY POSTER		300	1		425
ARGONNE WEEK		5,000	8		919
AUGUST ARGONNE WEEK		5,400	4		977
JULY ARGONNE WEEK		5,000	4		919
JUNE ARGONNE WEEK		5,000	4		919
MAY ARGONNE WEEK		5,000	4		919
OPEN HOUSE PASSPORTS		8,000	2		589
PACIFIC BASIN BROCHURE		1,500	2		359
POSTER		400	4		400
SEPTEMBER ARGONNE WEEK		5,400	4		977
SHIPPING LABEL		1,000	1		451
TABS - APS		50	7		649
TABS - CMT		250	1		250
TABS - OPS		50	4		346
TAGS - SENSITIVE		1,000	1		165
				Total cost	$11,419

SIGNATURE Richard D. Nixon	TITLE Manager	DATE SUBMITTED 11/05/91

ANNUAL PLANT INVENTORY   Region: 05
JCP FORM NO. 5 (Rev. 5-65)   Schedule 5-11

NAME OF DEPARTMENT OR AGENCY Department of Energy	NAME AND LOCATION OF PLANT Argonne National Laboratory: East Argonne, IL		JCP AUTHORIZATION NUMBER ESTABLISHING PLANT 08538	FOR PERIOD ENDED 9-30-91

DESCRIPTION	AGE YEARS	CONDITION See *	SERIAL NUMBER	SIZE	MODEL	STATUS See **
Composition:						
Macintosh Workstation	4	E	F7433XX	SE	M5011	
Macintosh Workstation	3	E	F8378J	SE	M5011	
Macintosh Workstation	3	E	F84990	SE	M5011	
Processor, Chemco	3	N	P045753	12 inch	R660	
Typesetter, Linotype Linotroni	4	N	70312526	12 inch	L300P	
Platemaking:						
A-M Platemaker	5	N	505292	11x17	885	
Kodak Versamat Processor	21	P	599	17 inch	317N	
Roconex Platemaker	4	N	0002PJ	30x40	V-44	
Printing presses:						
A-M Duplicator, System 7	3	N	407087-88	8.5x11	TCS-7	
Davidson Press, W/Roll Convert	7	E	831591	11x17	702	
Konica duplicator	1	N	454202307	NA	7090	
Multigraph, Complete	23	P	107701	15x18	1850	
Multigraph, Complete	26	P	905402	10.75x14	1250	
Multigraph, complete	26	P	105677	10.75x14	1250	
Number Attachment for A-M 1250	26	P	NONE	NONE	NA	
Omni Adast Offset Press	1	N	3155160	14.5x20	515	
T-51 Head for A-M 1250	26	P	NONE	10.75x14	T-51	
Xerox Engrg Dwrg Copier	1	E	64G026009	NA	2510	
Xerox Cutter One	2	E	89N002899	NA	1	
Xerox Duplicator	4	E	920-300959	NA	9900	
Xerox Duplicator	4	E	920-301706	NA	9900	
Xerox Duplicator	4	E	M08046480	NA	1090	
Binding:						
Baum Folding Machine	25	P	35591-54	NA	BAUM-2	
Challenge Paper Drill	27	P	21534	NA	EH3	
Collator, Bourg	3	N	611000084	22 8in	AE22S	
Electric Punch	25	P	1202217	NA	316-EP	
Face Trimmer, Bourg	3	N	5910001	NA	NA	
Folder, A-M	16	G	78110378	NA	917	
Folder/Nester, Cheshire	1	N	766-001	NA	766	
GBC Therm-A-Bind	11	F	2611942	NA	T-320	
Manual Stitcher	2	G	29711	NA	EHFS-64	
Manual Stitcher	2	G	30869	NA	EHFS-64	
Perforator	12	G	220771744	NA	220	
Planex Hot Tape Binder	1	N	6009	NA	750	
Punch, 3-hole, Bourg	3	N	320150	NA	NA	
Receding Stacker, Bourg	3	N	175313	NA	NA	
Saddle Folder, Bourg	3	N	551001282	NA	NA	
Scriptomatic Addressing Machin	2	N	9A81503	NA	1180Q	
Seybold Citation Papercutter	25	F	5412	42 inch	CLB-P	
Stitcher, 3-head, Bourg	3	N	581001951	NA	NA	
Stitcher, Bostitch	20	F	77142	NA	7	
Sulby Minabinda, Automated	28	P	7038	NA	NA	

SIGNATURE Richard D. Nixon	OFFICIAL TITLE Manager			DATE SUBMITTED 11/05/91

* CONDITION: N=New, E=Excellent, G=Good, F=fair, P=Poor, U=Unserviceable
** STATUS: "ADDED" or "DELETED" when applicable.

ANNUAL PLANT INVENTORY (Additions/Deletions)   Region: 05
JCP FORM NO. 5 (Rev. 5-65)   Schedule 5-11

NAME OF DEPARTMENT OR AGENCY Department of Energy	NAME AND LOCATION OF PLANT Argonne National Laboratory: East Argonne, IL	JCP AUTHORIZATION NUMBER ESTABLISHING PLANT 08538	FOR PERICO ENDED 9-30-91

DESCRIPTION	AGE YEARS	CONDITION See *	SERIAL NUMBER	SIZE	MODEL	STATUS See **
No equipment added or deleted						

SIGNATURE Richard D. Nixon	OFFICIAL TITLE Manager		DATE SUBMITTED 11/05/91

* CONDITION: N=New, E=Excellent, G=Good, F=Fair, P=Poor, U=Unservicable
** STATUS: "ADDED" or "DELETED" when applicable.

Schedule 2.4: Schedule 5-12, Duplicating Facility Report

None

OMB Approval Number 1910-1300   Schedule 5-13

Report Outline for RPPO Activities FY 1991

This report applies to all activities and a negative report is required.

FACILITY NAME: Argonne National Laboratory: East

ADDRESS: 9700 S. Cass, Bldg. 222, Med
              Argonne, IL 60439-4828

CONTACT NAME: Rich Nixon   TELEPHONE NUMBER: 708-972-5600

RPPO Activity (RCS DOE-AD-AN-0076)

1. Publications

   a. Number of orders   47

   b. Number of production units   11,456,815

   c. Number of original pages (masters)   33,480

   d. Total dollar activity $247,630

   e. Cost per 1,000 production units (d. divided by b. times 1,000) $21.61

2. Forms

   a. Cut sheets and snapouts

      (1) Number of orders   244

      (2) Total dollar activity $87,659

   b. Computer Forms (marginally punched continuous forms)

      (1) Number of orders   8

      (2) Total dollar activity $16,107

   c. Totals (sum of 2.a.(2) and 2.b.(2)) $103,766

3. Specialty Items (tags, labels, and all items not included above)

   a. Number of orders   140

   b. Total dollar activity $61,661

4. Totals (sum of 1, 2, and 3 above)

   a. Orders (sum of 1.a., 2.a.(1), 2.b.(1), and 3.a.)   439

   b. Total dollar activity (sum of 1.d., 2.c., and 3.b.) $413,057

OMB Approval Number 1910-1300   Schedule 5-14

Report Outline for Federal Prison
Industries, Inc. (UNICOR), Activities FY 1991

This report applies to all activities and a negative report is required.

FACILITY NAME: Argonne National Laboratory, East

ADDRESS: 9700 S. Cass, Bldg. 222, Med
                Argonne, IL 60439-4828

CONTACT NAME: TELEPHONE NUMBER: 708-972-5600

UNICOR Activity (RCS DOE-AD-AN-0076)

1. Publications

   a. Number of orders   1

   b. Number of production units   510,000

   c. Number of original pages (masters)   102

   d. Total dollar activity $3,960

   e. Cost per 1,000 production units (d. divided by b. times 1,000) $7.76

2. Forms

   a. Cut sheets and snapouts

      (1) Number of orders   _____

      (2) Total dollar activity   _____

   b. Computer Forms (marginally punched continuous forms)

      (1) Number of orders   _____

      (2) Total dollar activity   _____

   c. Totals (sum of 2.a.(2) and 2.b.(2))   _____

3. Specialty Items (tags, labels, and all items not included above)

   a. Number of orders   _____

   b. Total dollar activity   _____

4. Totals (sum of 1, 2, and 3 above)

   a. Orders (sum of 1.a., 2.a.(1), 2.b.(1), and 3.a.)   1

   b. Total dollar activity (sum of 1.d., 2.c., and 3.b.) $3,960

CMB Approval Number 1910-1300   Schedule 5-15

Report Outline for Copying Activities FY 1991
(Convenience Copiers Only)

This report applies to all activities and a negative report is required.

FACILITY NAME: Argonne National Laboratory: East

ADDRESS: 9700 S. Cass, Bldg. 222, Med
              Argonne, IL 60439-4828

CONTACT NAME: Rich Nixon   TELEPHONE NUMBER: 708-972-5600

Copying Activity (RCS DOE-AD-AH-0048)

		Begin FY 1991	End FY 1991
1. Number of Copiers:			
a. Leased			
b. Owned		40	19
c. Cost-per-copy contract		145	175
d. Total		185	194

2. Copies Reproduced:			
a. Leased			
b. Owned			384,171
c. Cost-per-copy contract			29,801,427
d. Total			30,185,598

		Cost per 1000	
3. Cost of Supplies (i.e., paper, toner, developer, etc.):			
a. Leased			
b. Owned		$9.56	$3,673
c. Cost-per-copy contract		$4.82	$143,640
d. Total		$4.88	$147,313

		Cost per 1000	
4. Cost of Equipment:			
a. Leased			
b. Owned (cost of maintenance)		$23.20	$8,913
c. Cost-per-copy contract		$18.90	$563,386
d. Total		$18.96	$573,299

5. Total Supply and Equipment Costs (3.d. + 4.d.):			$719,512

6. Cost-per-copy:			
a. Leased (3.a. + 4.a. / 2.a.)			
b. Owned (3.b. + 4.b. / 2.b.)			$0.0328
c. Cost-per-copy contract (3.c. + 4.c. / 2.c.)			$0.0237
d. Total (5. / 2.d.)			$0.0238

7. Number of Copiers Purchased During FY 1991:   _____

8. Cost of Copiers Purchased During FY 1991:   _____

9. Planned Action to Reduce Copying Cost During Next FY:

   CONTINUE TO REPLACE OWNED COPIERS WITH COST PER COPY EQUIPMENT. ALSO, PERIODICALLY BID COST PER
   COPY CONTRACT TO INSURE BEST PRICE AND SERVICE FOR THE LAB.

PRINTING AND PUBLISHING ACTIVITY   Schedule 5-16
SURVEY OF GPO PERFORMANCE FOR FISCAL YEAR FY 1991   11/91

SITE: Argonne National Laboratory: East   CONTACT: Richard D. Nixon

LOCATION: Argonne, IL   PHONE: 708-972-5600

GPO Term Contract Number	Contract Scope	Name and Location of Contractor	Print Orders Placed	Reported Late Deliveries	Reported Quality Defects
1517-S	SELF COVER BOOK MUST AT DESTINATION	GEORGE PRINTING AURORA, IL	7	0	0
3519-S	SEPARATE COVER BOOK MUST AT DESTINATION	ERIC HUGO PRINTING SCHENECTADY, NY	2	0	0
3522-S	NCR FORMS MUST AT DESTINATION	GEM BUSINESS FORMS CHICAGO, IL	108	0	0
3537-S	SELF COVER BOOK MUST AT DESTINATION	KELLER GRAPHICS ARLINGTON HTS., IL	1	1	1
5514-S	NEWSLETTER MUST AT DESTINATION	BURCZYK PRINTERS CALUMET CITY, IL	6	0	0
5514-S	NEWSLETTER MUST AT DESTINATION	TAMMS LITHO CEDARSBURG, WI	6	2	0
5527-S	ENVELOPE PRINTING MUST AT DESTINATION	ENVELOPE FACTORY NEW HAVEN, CT	39	0	0
5527-S	ENVELOPE PRINTING MUST AT DESTINATION	ILLINOIS ENVELOPE KALAMAZOO, MI	4	0	0
5527-S	ENVELOPE PRINTING MUST AT DESTINATION	INTERMOUNTAIN ENVELOPE SALT LAKE CITY, UT	35	0	1
5527-S	ENVELOPE PRINTING MUST AT DESTINATION	MCQUIRK ENVELOPE CHICAGO, IL	1	1	0
5527-S	ENVELOPE PRINTING MUST AT DESTINATION	OUTLOOK ENVELOPE HUNTLEY, IL	5	0	0
SF-1	MISCELLANEOUS		207	0	0
	TOTALS		421	4	2

Appendix A

Computer Protection Policy

1. PURPOSE

   This policy exists to provide guidance for the protection of Laboratory unclassified computer systems and computerized information.

2. SCOPE

   This policy covers all unclassified computer systems, including (1) personal computers and word processing systems, (2) computer systems used for scientific and engineering computations, information processing, and experimental control, (3) new, experimental computing systems, and (4) the central computing systems operated by the Computing and Telecommunications Division.

3. POLICY

   It is Laboratory policy to protect its computers, the information stored in them, and the sensitive applications running on them. They are to be protected, as far as is reasonably possible, from unauthorized access to applications and computing resources, and unauthorized (or accidental) modification (or destruction) of information. Adequate protection will be based on an evaluation of risks, a cost/benefit analysis of protection measures, and the sensitivity and value of the assets to be protected.

   It is Laboratory policy that the primary responsibility for protection of Laboratory computers, programs, and data lie directly with the users, operators, and managers of those Laboratory assets.

   It is Laboratory policy that all users, operators, and managers of computing resources be trained in their computer protection responsibilities.

   It is Laboratory policy that Laboratory-owned computers be used only for Laboratory-approved work.

4. GOALS

   - To protect sensitive computer applications (e.g., accounts payable, personnel, and sensitive DOE energy programs) from unauthorized alteration or disclosure.

   - To protect computer systems from deliberate or accidental physical damage.

   - To protect computer data and applications from deliberate or accidental modification or destruction.

   - To provide adequate and realistic backup procedures and contingency plans that will protect the Laboratory from the consequences of any serious computer failures, and to provide for continuity of operations for computer applications supporting DOE mission-essential functions.

- To prevent the use of Laboratory computers for unauthorized purposes.

- To follow DOE requirements for reporting computer security incidents.

5. RESPONSIBILITIES

Laboratory Director:

- Appoints the members of the Computing Policy Committee.

Chief Operations Officer:

- Approves Computer Protection Policies.

Computing Policy Committee:

- Advises the Laboratory Chief Operations Officer on the suitability of proposed Computer Protection Policies.

- Approves plans for implementing proposed policies.

Director of Computing and Telecommunications:

- Appoints the ANL Computer Protection Program Manager.

Deputy for ANL-West to the Associate Laboratory Director for Engineering Research:

- Appoints the Associate Computer Protection Program Manager for Argonne West.

ANL Division Directors, Program Managers, and Department Heads:

- Appoint a Divisional, Program, or Departmental Computer Protection Program Representative for their organization.

- Appoint an Assistant Computer Protection Program Manager for each sensitive computer in their organization (one person may be responsible for more than one system). This person is usually (but need not be) the system manager for the computer.

- Ensure that computer security awareness and education training is provided for their organizations.

Computer Protection Program Manager:

- Formulates ANL computer protection policies.

- Prepares the Laboratory's Computer Protection Plan.

- Manages a program to identify sensitive computer applications.

- Manages a program to review, test, and approve protection plans for sensitive applications and computer systems.

- Reviews and approves the computer protection aspects of audit inspections.

- Conducts appraisals of adherence to the Laboratory's Computer Protection Plan.

- Manages a computer security education and awareness program.

- Manages a program to train divisional Computer Protection Program Representatives and Assistant Computer Protection Program Managers.

- Manages the Laboratory's computer-incident reporting system.

- Maintains the Laboratory's computer protection files.

- Coordinates requirements for the unclassified computer protection program with Laboratory personnel having responsibilities for telecommunications security and classified computer security.

- Serves as a Laboratory focal point to coordinate with DOE on matters involving unclassified computer security.

Associate Computer Protection Program Manager for Argonne West:

- Coordinates computer protection activities at Argonne West to comply with the ANL Computer Protection Program.

- Formulates computer protection policies for Argonne West (in cooperation with the Computer Protection Program Manager).

- Reviews and approves the computer protection aspects of audit inspections at Argonne West.

- Reviews protection plans and conducts appraisals of adherence to the Laboratory's Computer Protection Plan at Argonne West.

- Coordinates the computer security education and awareness training at Argonne West.

- Coordinates Argonne West's computer-incident reporting and subsequent investigations for incidents at Argonne West.

Computer Protection Program Representatives:

- Charge the manager of each new or significantly changed application to determine the sensitivity of the application and forward that information to the Computer Protection Program Manager.

- Review, approve, and have available upon request risk assessments and protection plans for sensitive applications and computer systems in their organizations.

- Ensure compliance with generic Laboratory risk assessments and protection plans (or write an individual risk assessment and protection plan) for non-sensitive computer applications and systems in their organizations.

- Conduct security-design reviews and tests, and certify and re- certify protection measures for sensitive computers and applications in their organizations.

- Ensure that personnel in their organizations receive computer security education and awareness training.

- Report and document computer security incidents in their organizations in compliance with the ANL Computer Incident Reporting Procedures.

- Review the contents of unclassified divisional computer systems at unannounced intervals with the knowledge and cooperation of division management by random sampling. Document the results, and forward any findings to the Computer Protection Program Manager.

  This review must occur at least annually, but may not cover every computer. The resources used should be commensurate with the loss expectancy.

Director of Management Information Systems:

- Appoints a Computer Protection Program Representative for systems maintained by Management Information Systems.

- Reviews risk assessments and protection plans for all Laboratory-wide sensitive information-system applications.

Computer Protection Program Representative for Management Information Systems:

- Charges the manager of each new or significantly changed application managed by Management Information Systems to determine the sensitivity of the application and forwards that information to the Computer Protection Program Manager.

- Reviews, approves, and has available upon request risk assessments and protection plans for sensitive applications maintained by Management Information Systems.

- Ensures compliance with generic Laboratory risk assessments and protection plans, (or writes individual risk assessments and protection plans) for non-sensitive computer applications and systems maintained by Management Information Systems.

- Conducts security-design reviews and tests, certifies, and re- certifies security specifications for sensitive applications .

- Ensures that personnel in Management Information Systems receive computer security and awareness training commensurate with their responsibilities.

- Manages the documentation and reporting of computer security incidents involving applications maintained by Management Information Systems.

- Reviews and approves the computer protection aspects of audit inspections made on systems maintained by Management Information Systems.

Assistant Computer Protection Program Managers:

- Prepare and have available on request risk assessments and Computer Protection Plans for each of the sensitive computers for which they are responsible.

  This task can be delegated to the system manager for the computer system and then approved by the assistant, where the two are not the same person.

- Submit the protection checklist for their computer(s) to the Computer Protection Program Manager.

Managers of Computer Applications:

- Complete a Computer Application Sensitivity Questionnaire for each new or significantly changed application and verify the information as requested by the Computer Protection Program Manager.

- Ensure that adequate back-up protection exists for the application data.

- Comply with protection measures documented in the protection plan.

Managers of Sensitive Computer Applications:

- Prepare risk assessments and protection plans (and, where appropriate, contingency plans) for each sensitive computer application.

- Ensure that the protection of any computer system on which the application runs is adequate for the protection needs of the application.

System managers of Non-sensitive Computer Systems:

- Ensure that the computer system complies with Laboratory policy and procedures for the protection of computing resources.

Requisitioners of Sensitive Computer Applications or Significant Computer Systems:

- Include appropriate protection requirements in the Procurement specifications.

- Provide completed sensitive computer system or application check lists.

Procurement Department:

- Ensures that procurement requests for sensitive computer systems and computer applications are in compliance with ANL procurement procedures.

Human Resources Department:

- Performs normal pre-employment screening checks on prospective employees.

Internal Audit Department:

- Reviews the contents of the ANL mainframe computer systems at unannounced intervals by random sampling at the request of the Computer Protection Program Manager (subject to effort constraints).

Computer Users:

- Provide adequate protection, including proper password selection and protection and data backup, for the applications, data, and computers they use.

- Report computer-security incidents and other suspicious happenings or activities to the proper authority.

- Understand and comply with the ANL Computer Protection Policy and computer protection plans for the applications and computer systems they use.

6. DEFINITIONS:

a. An application is a set of all computer programs and related data used in an activity or project or closely related set of activities or projects. Examples of individual applications are the Laboratory's Integrated Financial System, the codes used to calculate the energetics and dynamics of molecular systems, and the codes used to determine core neutronics.

b. A sensitive computer application is an application that requires protection because it contains data that must legally be protected (e.g., Privacy Act Information, Unclassified, Controlled Nuclear Information, Official Use Only Information) or because of the risk and magnitude of loss or harm that could result from improper operation or deliberate manipulation of the application (e.g., payroll, personnel, proprietary code, DOE energy code, reactor control code, substantial financial loss).

c. A sensitive computer system is a computer system that processes sensitive applications or one that qualifies as sensitive because it is significant (see below).

d. A significant computer system is a computer system that consists of a stand-alone computer with peripheral equipment or a network of computer systems. The capacity of the system or network is such that its computing capacity currently requires it to be reported in the annual DOE Information Technology Resources long range planning process.

e. A protection checklist is either of two specific forms. The "Sensitive Application Check List" describes the information needed to complete a protection plan for a sensitive application. The "Sensitive Computer System Check List" describes the information needed to complete a protection plan for a sensitive computer system.

END

DATE
FILMED
6/2/92