ARGONNE NATIONAL LABORATORY
9700 SOUTH CASS AVENUE, ARGONNE, ILLINOIS 60439

August 2, 2002

Mr. Robert C. Wunderlich
Manager, Argonne Area Office
U. S. Department of Energy
9800 South Cass Avenue
Argonne, Illinois 60439

Dear Mr. Wunderlich:

Subject: **ANL-E Strategic Facilities Plan, FY 2004 – FY 2013**

Reference: Email, J. Yates to A. Harvey, B. Desmaria, C. Henderson et al, April 26, 2002, Additional Guidance re Preparation of Supporting Information for Site and Facilities Chapter of 2002 Institutional Plans

As requested by the reference message, the Laboratory has updated the Argonne National Laboratory-East, Strategic Facilities Plan, FY2004-FY2013. Three copies are enclosed for your use and information, in addition to the electronic copy that will be provided to you and members of your staff.

The modernization program presented in this Plan has been reviewed by the Laboratory's senior management and meets the objective of the Office of Science to accomplish full modernization of Argonne National Laboratory-East by 2013. The Laboratory looks forward to the full support of the Office of Science in bringing this objective to a successful conclusion.

Should you have any questions, please contact Rab Malhotra at 2-5315.

Sincerely,

M. Derbidge
Chief Operations Officer

Enclosure

c: A. Harvey
J. Yates

Argonne National Laboratory – East

STRATEGIC FACILITIES PLAN
FY 2004 – FY 2013

August 2002

OPERATED BY THE UNIVERSITY OF CHICAGO FOR THE U. S. DEPARTMENT OF ENERGY UNDER CONTRACT W-31-109-ENG-38

ARGONNE NATIONAL LABORATORY - EAST

STRATEGIC FACILITIES PLAN

FY 2004 – FY 2013

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Operated by the University of Chicago for the U. S. Department of Energy under Contract W-31-109-ENG-38

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EXECUTIVE SUMMARY

The Argonne National Laboratory – East (ANL) *Strategic Facilities Plan* documents the Laboratory's visions for its 21st Century scientific missions and for the supporting infrastructure at the Illinois site. This plan identifies the existing conditions of the ANL infrastructure, establishes the required facilities baseline for the scientific missions of the 21st century, provides a comprehensive plan for rehabilitation and modernization, and details the resources required to achieve the vision of ANL and the Office of Science. Major new programmatic facilities have individual plans for integration into the existing site infrastructure. These facilities are identified in this plan; however, their integration is not discussed.

The ANL-E site has few constraints to expanding the Laboratory's role in 21st century research. The physical setting at ANL is relatively unencumbered by serious environmental or contamination legacies and has available land and utilities to support mission adaptation and developmental change. Rather, reshaping and rehabilitating the existing facility infrastructure to meet the needs of emerging scientific missions, communications, and security technologies, and maintaining it in a readied condition is the challenge for ANL. Requirements for upgrading the infrastructure include the addition of key general-purpose facilities; compliance with today's standards of environmental performance and safety; continued remediation and monitoring of past operations; addressing increased national security concerns along with protecting physical assets and safeguarding special nuclear materials; and, the removal of outdated special purpose facilities.

ANL requires approximately $500 million in capital funds (MEL-FS, GPP, and GPE) between FY 2004 and FY 2013 to achieve its vision of the 21st Century. ANL also requires direct operational funding of approximately $70 million to address needed environmental, decontamination, and demolition activities, in addition to funding already committed by the Office of Environmental Management (EM) for the plan period. Finally, $170 million in real property maintenance funding will be required from the Laboratory programs to meet the maintenance needs of the modernized real property infrastructure.

With this funding commitment, a reliable, efficient, safe, secure and environmentally sound state-of-the-art infrastructure will reduce operating costs and result in improved scientific productivity. The plan for modernization is expected to demonstrate a measurable progression of overall facility condition from the category of minor rehabilitation needed to the adequate category within 5 years of initiating the underlying financial requirements. However, without this level of funding commitment, there will be no opportunity to gain an improvement in overall infrastructure condition. The Laboratory's capability to perform world-class, cost-effective research will degrade over the planning period and will result in the loss of key personnel to better-equipped competition.

PREFACE

Modern, effective, and efficient physical infrastructure is critical to maintaining the capability of the Department of Energy (DOE) Office of Science's (SC) multiprogram laboratories to continue world-class scientific research into the 21st century. To better address infrastructure modernization needs in support of the missions of SC and of the DOE, SC has requested each multi-program laboratory to develop and submit a *Strategic Facilities Plan* (hereafter "the Plan") for "Laboratories of the 21st Century." The goal is to accomplish full modernization of multi-program laboratories by 2013.

The SC objectives of the modernization effort are given below:

- **Mission:** The Laboratory's facilities and infrastructure will be adequate to accommodate each laboratory's expected programmatic mission activities and technological changes well into the 21st century. Facilities will be "right-sized" to the type and quality of space and equipment needed to meet mission needs. Activities and organizations will be co-located as needed. Facilities will be readily adaptable to changing research requirements and technologies. Off-site leased space will be reduced where economically appropriate.

- **Working Environment:** The Laboratory will achieve a quality of facilities setting that provides a "preferred" working environment for our researchers to help attract and retain high quality staff. The Laboratory will employ the latest advances in information technology to enhance worker productivity, interactions with other scientists, and the advancement of science. Quality training and conferencing facilities will be available. Visiting scientists will have access to quality accommodations and to research support facilities.

- **Environment, Safety, Health and Security:** The Laboratory's facilities and infrastructure will provide a safe, healthy, and secure working environment for Laboratory employees and visitors. Retired facilities will be removed and environmental cleanup will be completed. The Laboratory will continue to be viewed as a good community neighbor.

- **Operations and Maintenance:** Facilities and infrastructure will be efficient to operate and maintain.

This document, the *Argonne National Laboratory – East (ANL) Strategic Facilities Plan*, interprets these objectives as they apply to ANL site facilities and infrastructure and identifies the road map of activities and resources needed to achieve the objectives.

I. Mission of the Laboratory

Argonne National Laboratory-East (ANL) is a major multi-program laboratory managed and operated for the U.S. Department of Energy (DOE) by the University of Chicago under a performance-based contract. Its mission is to serve DOE by advancing the frontiers of knowledge, by creating and operating forefront scientific user facilities, and by providing innovative and effective tools and solutions for energy and environmental challenges to national and global well-being, in the near and long term, as a contributing member of the DOE laboratory system.

Argonne supports DOE's overarching mission of national security by contributing to the Department's underlying missions in science, energy resources, environmental stewardship, and national defense. The Laboratory has lead roles in science, operation of scientific facilities, and energy. In accomplishing its mission, Argonne partners with DOE, other federal laboratories, the academic community, and the private sector.

In each of DOE's four underlying mission areas, Argonne has a distinct level of responsibility. In **Science** and in **Energy**, the Laboratory has a principal role. Its role in **Environmental Quality** is as a major contributor. It participates in specialized ways in the Department's **National Defense** mission. The Laboratory's contractual responsibility to DOE in science and technology is defined in terms of the following goal: "To perform forefront science and technology aligned with DOE strategic goals and to conceive, design, construct, and operate world-class user facilities — all in a safe, environmentally sound, efficient, and effective manner."

A. Science

For DOE's Science mission, Argonne operates major scientific user facilities and has significant experimental and theoretical research programs in nuclear and high energy physics and in materials, chemical, computer, biological, environmental, and fusion science. In several key fields and subfields important to DOE, the Laboratory's research is among the most cited, and its scientists are international leaders. Argonne is also proud of its collaborations with other DOE laboratories, its interactions with the academic community, and the high-quality research experiences it provides for a few hundred undergraduate and graduate students each year.

Three of DOE's most successful major national scientific user facilities are at Argonne-East: the Advanced Photon Source (APS), the Intense Pulsed Neutron Source (IPNS), and the Argonne Tandem-Linac Accelerator System (ATLAS). The APS, the nation's premier hard X-ray synchrotron radiation facility, now serves more than 3,000 users from universities, corporations, and national laboratories throughout the country, and it routinely reports newsworthy new science. The IPNS provides extraordinarily reliable neutron beams to approximately 400 experiments, while continuing its tradition of leadership in the development of spallation target, neutron moderator, and neutron scattering instruments.

Unique low-energy heavy-ion beams from ATLAS enable a broad community of 300 users to conduct forefront research in nuclear, atomic, and applied physics. In addition, for several years Argonne has taken responsibility for major subprojects associated with user facilities or detectors located elsewhere. The most visible current example is the

Laboratory's participation in the Spallation Neutron Source (SNS). Argonne has leading responsibility for SNS spectrometer systems and provides major technical support for SNS target systems. Other examples include contributions to the ATLAS detector for the Large Hadron Collider, participation in the Linac Coherent Light Source, and detector fabrication for the MINOS neutrino experiment.

Four of the five major Laboratory initiatives featured in Chapter III of Argonne's 2002 *Draft Institutional Plan* build on Argonne strengths to enable future accomplishment of DOE's Science mission at the Laboratory's Illinois site, both through conducting forefront science and through service to users. Those four initiatives are the Center for Nanoscale Materials, the Rare Isotope Accelerator, Functional Genomics, and Advanced Computing.

The **Center for Nanoscale Materials** (CNM) proposes major contributions to the rapidly emerging fields of nanoscience and nanotechnology. The proposed Center is to include substantial new infrastructure for nanofabrication and materials characterization. These new facilities will be natural complements to Argonne's strong existing characterization infrastructure, including the APS, IPNS, and Electron Microscopy Center. The new facilities needed for nanofabrication include clean rooms and related infrastructure. A collaborative user facility is an important part of the initiative. The governor of Illinois has already committed funds for construction of a $36 million facility to house the Center.

The **Rare Isotope Accelerator** (RIA) will explore new frontiers in nuclear physics by accelerating beams of unstable nuclei ("rare isotopes"). In addition to serving investigations of major questions in fundamental science, the rare isotopes created promise to have important technological applications. Argonne's concept for RIA is based on two accelerators. A new primary production is required, but substantial savings are achieved by using ATLAS as the post accelerator. RIA is currently estimated to have a construction cost of approximately $640 million and a total estimated cost of $830 million. The state of Illinois is committed to funding a $22 million science center associated with RIA.

The **Advanced Computing** initiative aims to make petaflops-scale computing systems a reality and to ensure that such systems are well suited to important scientific applications. The two major objectives are (1) a petaflops scientific simulation facility to house one of the most powerful computers in the world and (2) a new generation of simulation software. Initial application will be to the life sciences.

Argonne's initiative in **Functional Genomics** proposes major expansion of the Laboratory's work in the areas of structural genomics, high-throughput biochemistry, and bioinformatics.

B. Energy

For its Energy mission, DOE has designated Argonne (with the Idaho National Engineering and Environmental Laboratory) as co-lead laboratory for reactor technology. In addition, the Laboratory has substantial programs and facilities serving DOE's mission to develop innovative, energy-efficient, cost-effective, and environmentally friendly technologies for electric power, transportation, and industry. Since the 1970s Argonne

has cultivated capabilities and programs -- and has produced results -- that are well aligned with recommendations of the Administration's energy policy, as described in the May 2001 *Report of the National Energy Policy Development (NEPD) Group* chaired by Vice President Cheney. In addition, Argonne-East operates numerous unique energy R&D facilities that are used by researchers from universities and industry.

The Laboratory has noteworthy expertise and facilities in nuclear reactors, nuclear fuel cycle technologies, superconductivity, fuel cells, fossil fuels and carbon management, renewable energy technologies, energy testing and analysis, and other key technologies. Over the years, Argonne has developed safe and reliable fast-reactor technologies and has laid the groundwork for demonstrating a proliferation-resistant closed nuclear fuel cycle, based on pyroprocessing, which can consume weapons-grade plutonium.

The Laboratory is ready to contribute solutions that will allow nuclear energy to be a significant, safe, sustainable, environmentally acceptable, proliferation-resistant, growing, economical component of the nation's energy supply portfolio, in both the near and long term. The major Laboratory initiative Advanced Reactor Development proposes development of a promising "Generation IV" nuclear technology that can generate electricity while reducing the burden on any high-level nuclear waste repository by reducing the long-term toxicity of the waste. Major facilities for the initiative are located at Argonne-West, in Idaho.

C. Environmental Quality

In support of DOE's Environmental Quality mission, Argonne develops innovative characterization and remediation tools and technologies, creates advanced technologies that intrinsically produce little or no pollution and minimize waste generation, and cleans up land and facilities on the Argonne sites. The focus of this work is shifting from effluent control technologies and associated regulation toward resource and waste management, site remediation, long-term stewardship, and global environmental issues.

The Laboratory's strength is its synergistic combination of capabilities in bioprocessing, ecology, modeling and measurement of environmental pathways, atmospheric physics and chemistry, environmental assessment, and decision models. Argonne has assumed responsibility for all three Cloud and Radiation Testbed (CART) facilities of DOE's Atmospheric Radiation Measurement (ARM) Program. The Laboratory is using the APS to pioneer synchrotron-based environmental tools to deepen microscale understanding of environmental processes, and it belongs to the EnviroCAT partnership, which has been approved to develop state-of-the-art APS beamlines specially designed to tackle a broad range of environmental science problems.

D. National Defense

Argonne's involvement in niches of DOE's National Defense mission draws on special Laboratory expertise to reduce the threats posed by nuclear, chemical, and biological weapons. In particular, the Laboratory's nuclear-fuels capability is applied to reduce nuclear proliferation risks by developing new fuels, targets, and analysis methods that allow research reactors to be converted from high-enrichment uranium fuel to low-enrichment uranium fuel. Argonne also devises highly sensitive instruments and

verification technologies to detect radiation, chemical threats, and biological clues to possible weapons proliferation or attacks. Finally, the Laboratory's modeling and decision-science skills contribute to critical infrastructure assurance at local, regional, national, and global scales.

II. INFRASTRUCTURE VISION, GOALS AND STRATEGIES

A. Infrastructure Vision

Argonne will retool its physical setting to achieve a 21st-century infrastructure having appropriately configured research facilities that provide reliable, safe, efficient, attractive working environments suitable for world-class science, engineering, and technical services.

B. Infrastructure Goals

Three major goals of the *Strategic Facilities Plan* support this vision:

1. Maintain Excellence in Environment, Safety, Security, and Health (ESS&H)

ANL is fully committed to maintaining continuing excellence in environment, safety, security, and health performance in existing operations as well as in the design, siting, construction, and operation of future facilities. This commitment includes compliance with applicable state and county regulations when they are not in conflict with DOE's policies and standards. ANL actively complies with Federal regulations in conducting project design, review, and construction, as well as in ongoing scientific and facilities operations. Complying with environment, safety, security, and health standards and increasing operational safety, security and reliability is a goal of the rehabilitation and upgrades to existing facilities. Argonne is committed to providing a safe and secure environment for all its employees and visitors. Facilities, equipment, and information must be protected from theft, disruption, or misuse.

The Laboratory will undertake the transition to newly applied external regulations, such as those from the Occupational Safety and Health Administration and the Nuclear Regulatory Commission.

2. Continue Cost-Effective Use of Existing Facilities and Systems

ANL will continue to manage existing facilities and infrastructure to maximize the efficiency of mission research and support effort at the lowest effective facilities cost.

Research and support space will be maintained to meet all functional, safety, and security requirements. As research requirements change,

facilities and systems will be refurbished or upgraded accordingly, or assigned a new functional use. New missions will be accommodated by adapting or upgrading existing general-purpose facilities to meet mission needs wherever feasible.

Infrastructure management will focus on reducing the real unit cost of space through application of best management practices in space management and allocation and in the maintenance and operation of the facilities. Substandard, obsolete or surplus facilities will be replaced or eliminated to reduce overall maintenance and operating costs and to free land for redevelopment.

3. Maintain and Enhance World-Class Setting

World-class research is enhanced by world-class work settings, both within the actual workplace itself, and in the natural surroundings of the facilities in a campus setting.

Modern, flexibly appointed research and support facilities will employ the latest construction technologies consistent with their research missions and provide for flexibility, versatility, and longevity, in design. Rehabilitation and construction will incorporate state-of-the-art sustainable design principles regarding selection of building materials and furnishings, construction techniques, energy and water conservation, and habitability features, to the extent that such practices are economically feasible.

Natural areas will be maintained as a buffer and to provide expansion space. Standards for building intensity, coverage, and open space, as related to existing conditions, will apply to all areas of the site. The existing site enhancement program will move forward in a manner consistent with the development standards.

C. Management Strategies

The following discussion describes the management strategies that are currently being used and will continue to be used to achieve each of the infrastructure goals.

1. Maintain Excellence in Environment, Safety, Security, and Health

ANL strives to comply with federal codes, standards, and regulations in conducting project designs, reviews, and construction, as well as ongoing scientific and facilities operations. Significant portions of available Laboratory resources are directed toward upgrading existing conditions and meeting ESS&H standards. Rehabilitation and upgrades include modification of existing facilities to maintain compliance with environment, safety, security, and health standards and to increase safety and security

reliability. Argonne has a responsibility to provide a safe and secure environment for all its employees and visitors. Facilities, equipment, and information must be protected from theft, disruption, or misuse. The ESS&H and Infrastructure (ESSH&I) prioritization process discussed in the following section focuses management's attention on the most urgent infrastructure requirements.

Environmental restoration has characterized and contained most former contaminated areas and waste disposal and storage sites. Corrective actions that are currently underway include remediation and monitoring to assure environmental quality, including compliance with discharge limits under the National Pollutant Discharge Elimination System (NPDES). Decontamination and Decommissioning (D&D) actions are addressing contaminated reactor, accelerator, and hot-cell facilities with the objective of returning these facilities to the site space inventory.

2. Ensure Effective Uses of Facilities and Systems

ANL will continue to use a number of very successful management strategies to ensure effective use of its existing facilities:

- Centralized ownership of facility management processes allows Plant Facilities and Services (PFS) Division, as landlord for the site, to process all facility-related funding requests. PFS also has responsibility for facility maintenance, planning, engineering, and similar activities. **Benefit:** This practice provides a balanced approach to prioritization, planning and conduct of maintenance-related activities for all ANL facilities.

- Site development planning provides for efficient land and facility utilization. The process is closely linked to the institutional planning process and to a Condition Assessment Survey of existing facilities. **Benefit:** Land is available for development and natural aesthetics and building occupancy rates are maximized.

- ANL manages its space in a manner consistent with program mission needs and General Services Administration (GSA) guidelines. No division or department has exclusive jurisdiction over the use of space within an entire building. Space is assigned by blocks of rooms consistent with Laboratory space policy and reflecting GSA space allocation standards. **Benefit:** Occupancy rates are maximized and routine changes in research programs are accommodated efficiently.

- The clearly defined space management program requires that each organization pay rent based on the square footage of space occupied. Facilities' occupancy charges affect all site users and are based on operational and maintenance costs for each facility. Utility use is metered and the proportionate cost is passed on to facility occupants or as a direct charge to the operators of metered equipment. **Benefit:** This system maintains a constant pressure on the Laboratory

programs to keep space usage to a minimum in order to preserve funds for research. At the same time, it provides a constant pressure on the facilities organizations to ensure that each facility-related dollar is spent effectively.

- Clear delineation of landlord and tenant roles allows PFS to function as landlord for the ANL site and be responsible for the general-purpose physical plant, including operations, maintenance, and compliance with ESS&H regulations. Facility occupants are responsible for the management, maintenance, and repair of all specialized equipment, experimental apparatus, and dedicated systems that support experimental or programmatic activities, including the ESS&H aspects of those activities. The building manager coordinates activities as a representative of all organizations occupying the building and provides the service interface for each building with the PFS point of contact. **Benefit:** This strategy clarifies the facility roles and responsibilities among the various organizational entities at the Laboratory and ensures that significant facility needs are not overlooked or "fall in a crack" due to confusion over who is responsible for what activity.

- A significant tool in assessing facility needs is the Laboratory's ongoing Condition Assessment Survey (CAS) program, which uses industry and DOE standards to systematically evaluate the condition of the physical plant. Assessments performed by outside specialists provide a credible, auditable basis for determining physical plant needs. Each facility or utility is surveyed every 3–5 years, and a life-cycle-based 10-year forecast of needs is developed. The assessments use standard cost estimating data, and needs are rated using the Capital Asset Management Program (CAMP) scoring system. **Benefit:** Assessments performed by outside specialists provide an independent, auditable basis for determining physical plant needs.

- Additional surveys and assessments are also performed, including decontamination and decommissioning (D&D) surveys, environmental surveys, safety and environmental audits and inspections, monthly life safety inspections, and semi-annual ESS&H inspections. Situations identified with an imminent danger are corrected immediately; other survey and assessment results are tracked in a database. All safety inspection findings are tracked to completion. **Benefit:** The internal, independent inspections assure that facility deficiencies are quickly identified, evaluated and corrected on the most advantageous schedule.

- Deficiencies are addressed as part of the ESS&H and Infrastructure (ESSH&I) prioritization process. Facility needs are regularly analyzed, integrated into a single list, and prioritized by representatives of all facility stakeholders, including programmatic organizations. This integration and prioritization process has been documented and

formalized and includes representation from all support and programmatic personnel up to the Laboratory Directorate level. **Benefit:** Buy-in from DOE and other stakeholders ensures that facility needs are comprehensively evaluated and considered in the annual development of funding plans and that limited resources are allocated in a prioritized manner.

- The Laboratory uses two tactics to manage the programmatic obsolescence of facilities. Facilities are reprogrammed for new uses or the facilities are remodeled and rehabilitated for reuse to meet current needs. Reuse of the Experimental Boiling Water Reactor (EBWR) facility, after decontamination and decommissioning, as the Radioactive Waste Storage Facility is an example of the first tactic. Reuse of the old Zero Gradient Synchrotron facilities for the Intense Pulsed Neutron Source is an example of facility reuse. **Benefit:** Elimination of substandard buildings allows redirection of maintenance funds to more productive uses.

- Continued replacement of outmoded facilities with more efficient facilities reduces maintenance and unit operating costs and consolidates research functions. Surplus facilities are demolished to reduce surveillance and maintenance costs and to make land space available for reuse. For instance, the East area and 800 area of the site are now ready for redevelopment and are again major resources for new program siting. Removal of obsolete structures in the 300 and 360 areas continues the current program of eliminating obsolete, substandard facilities. **Benefit:** This provides reduced operating and environmental costs while freeing land space for redevelopment.

- To ensure that the Laboratory optimizes the use and allocation of limited infrastructure and facility management funding, benchmarking and "make or buy" analyses are conducted regularly. **Benefit:** The Laboratory can make best use of the resources and expertise both within and outside of the Laboratory to obtain maximum benefit in the operation and maintenance of facilities.

- The Laboratory employs an active Energy Management Program to focus on operating and maintenance tasks designed to reduce the use of energy in facilities operation. The program also coordinates energy conservation projects done through third party financed programs such as the Utility Incentive Program and the Super Energy Savings Performance Contract program. **Benefit:** The Laboratory conserves energy and saves money.

3. Maintain a World-Class Research Setting

In order to maintain the Laboratory facilities as a world class research setting, the Laboratory upgrades the functional and operational characteristics of its buildings using the project priorities established by the ESSH&I prioritization process discussed previously. ANL continues to

enhance the functionality and appearance of the interior work environment with renovation of many public areas, accessibility upgrades, lobby and conferencing improvements, modifications to landscaping and parking areas, and general enhancement of the site's appearance to reflect its status as a world-class research facility.

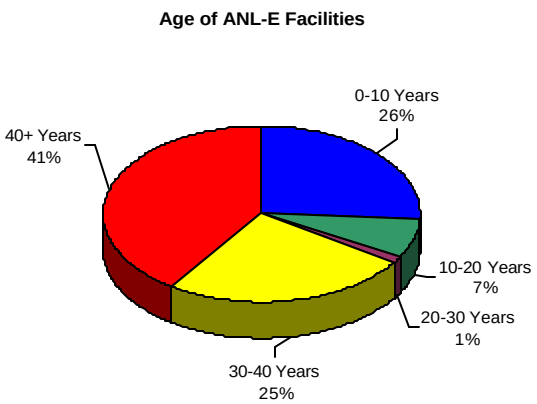
ANL has been unusually successful in integrating its development pattern into the natural landscape and linking the buildings together within each area. The Site Beautification Program and use of common architectural elements visually unite the various areas. Demolition of temporary and aged facilities and trailers has contributed to the campus-like ambience at ANL, both externally and in interior working environments.

Environmentally sensitive portions of the site along existing natural areas, floodplains, streams, and steep slopes are being protected in their natural state. Former ecology plots are being managed to enhance and maintain their natural biodiversity, which contributes heavily to the park-like setting. The Site Master Plan graphic at the end of this document provides an overview of the existing land use plan situation at the site.

III. FACILITY AND INFRASTRUCTURE ISSUES

A. Condition

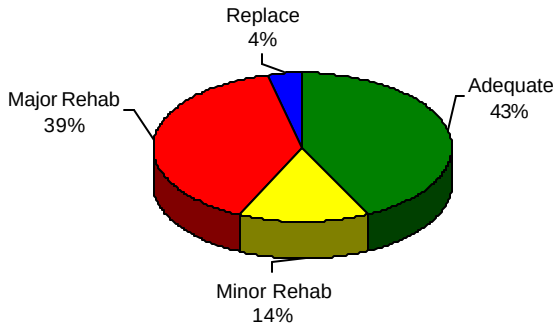
Of the 4.8 million square feet of buildings at ANL, 66% are over 30 years old and 39% still require major rehabilitation. The following charts provide an overview of the age and condition of the facilities at ANL-E.



Many research laboratories and offices are located in buildings that are nearly 40 years old or older. The aging general purpose infrastructure — including roofs, motor control units, architectural elements, and air handling systems—needs to be upgraded.

Recent Condition Assessment Surveys (CAS) indicates that approximately 90% of the documented needs affect buildings and other structures. Among the building rehabilitation needs, the mechanical systems account for approximately 40% of the site-wide totals; electrical, accounts for another 20%; and architectural; including roofs, enclosures, finishes, life safety, etc. the remaining 30% of documented needs.

Condition Summary for ANL-E Space



Age makes much of the building equipment difficult to repair. Often, replacement parts are no longer available; residual noise and vibration from older ventilation units also interferes with sensitive scientific work. Certain areas require renovation to accommodate precision equipment and both micro scale and nanoscale research.

ANL needs to provide increasing levels of automation for measuring, monitoring, operating, and maintaining buildings to enhance the ability to control the laboratory environments and energy supplies as well as to free staff from the need to perform equipment surveillance rounds so they may attend to other maintenance requirements. Building and perimeter access control and security systems must be upgraded and integrated to meet more extensive security requirements to protect the site occupants as well as the physical assets of the site.

In general, the capacities of site utility systems are adequate for anticipated needs. Still needed are upgrading of sewer system sections not rehabilitated during the 1990s and improvements in the reliability of the site's electrical distribution system. Also needed are improvements to the Central Heating Plant to modernize its auxiliaries and distribution systems and to extend its service life and reliability. The general site circulation and security infrastructure (roads, walks, access control points, perimeter, entrances, inspection points, lighting, and parking) is substantially degraded and needs major rehabilitation or outright replacement.

The Environmental Management (EM) program has provided over $29 million in funding for the rehabilitation or upgrading of the site sewer systems and wastewater treatment plants and the new Laboratory Wastewater Treatment Plant. This funding has been terminated. The majority of these utilities still require minor rehabilitation and upgrade, although the most serious distribution and collection system deficiencies have been addressed. The Canal Water supply system and storage system are among the most seriously impaired utility systems requiring major rehabilitation.

Site-wide condensate and steam distribution systems are currently being modified to correct areas of deterioration and provide improved steam trapping consistent with pending service modifications. Roads, walks, parking, access control points, perimeter, entrances, inspection points, lighting, and other surface infrastructures require significant replacement and rehabilitation.

Aging high-bay facilities suffer from many of the same problems as research laboratories. There is particular need for more effective control of temperature and humidity. Most existing high bays have little insulation, old suspended mercury vapor lamps. Midwestern temperature extremes, in both winter and summer, affect work in many high-bay facilities, including the IPNS accelerator in Building 375, the assembly area in Building 366, and workspaces in Buildings 306 and 363. It is important that these buildings be provided with adequate heating, air conditioning, and humidity control, and be made energy-efficient.

The current condition and high utilization of virtually all on-site space creates a situation where existing ANL facilities are being augmented by a 77,400 sq. ft. leased facility consisting of office and computer laboratory space. Overall vacancy rates have averaged less than 2%, and now approach 1%. Vacancy rates for office space are less than 0.5%. Moreover, available space is usually in isolated small pockets that cannot be economically consolidated into a space large enough for a new work group (such as a group now working offsite).

A similar situation, where all available space is occupied by existing functions, also exists in the high-bay spaces throughout the Laboratory. The necessity to upgrade the facilities (provide improved building HVAC systems and upgraded thermal insulation appropriate to support research requiring advanced thermal control within the research area) cannot readily occur with these activities in place. An additional facility is needed to provide the programmatic flexibility necessary for mission incubation and to relieve existing facilities of the gridlock now compromising mission adaptation and facility rehabilitation.

The information technology equipment (ITE) that is the backbone of the site's electronic data communication capability is rapidly becoming obsolete. Most of the computing equipment that supports the network infrastructure and manages the site's administrative data, including environmental and facilities information, has reached the end of its useful life. The Laboratory's current ITE lacks the capacity to effectively manage all the required data and support the desired research and development activities. The Lab cannot fully exploit new and planned scientific tera-scale and peta-scale supercomputing capabilities with its current ITE.

Insufficient General Purpose Equipment (GPE) funding over the past decade has led to serious aging and obsolescence of equipment for support activities and an inability to introduce needed major new equipment in a timely manner. The funding shortfall prevents orderly replacement of obsolete and inefficient equipment, a process needed to reduce a serious backlog of equipment needs that has accumulated during a decade of under funding. The Laboratory's emphasis on additional safety, security and environmental activities—particularly responses to self-assessments and corrective actions to meet expanding DOE, federal, and state requirements—has diverted resources and increased the backlog of needs in other areas.

Excluding laboratory equipment, the site's general plant equipment is on average 72% depreciated (asset value weighted). For equipment that is not already fully depreciated, the average remaining life expectancy is approximately 3.5 years.

Extrapolation of recent funding trends suggests that the Laboratory cannot maintain the inventory at replacement turnover rates.

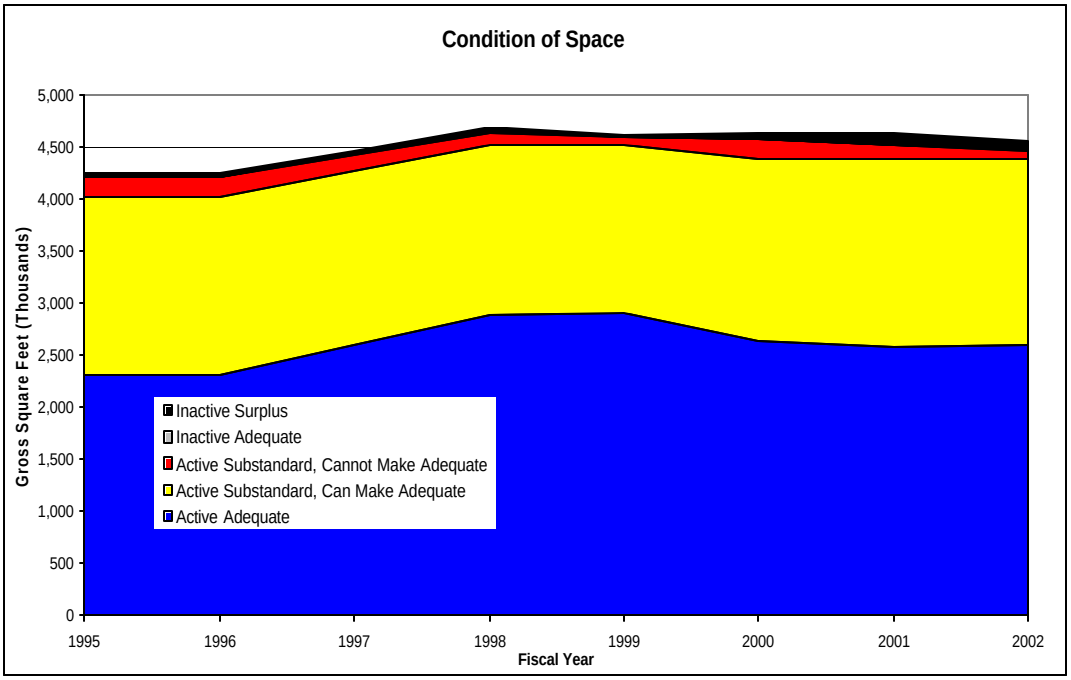
A number of remediation activities at ANL require sampling, analytical, and maintenance commitments well beyond the completion of remediation activities funded by DOE's Office of Environmental Management (EM). The Laboratory has an unfunded liability of asbestos and asbestos containing materials on site. This insulating material, used extensively in the earlier years of the Laboratory, is removed as encountered during facility modifications; however, its presence adds to the cost and complexity of the rehabilitation. Areas of residual beryllium and radium contamination exist in several older site buildings, such as the radium contaminates in the Building 203 service floor. These activities and eventual clean-up of the contaminates are necessary to maintain the corrective actions and satisfy conditions for Long Term Stewardship required by the Resource Conservation and Recovery Act Part B permit.

Other environmental activities include surveillance and monitoring of conditions in the vicinity of known, though stabilized areas of contamination. To properly carry out this responsibility, increased knowledge and documentation of subsurface water flows is required.

Similarly, the focus of the decontamination and decommissioning program at ANL has been to restore the facility to a condition of adaptive reuse, even if no economically competitive reuse for a particular structure can be identified. Demolition of the building following D&D will occur if there is no identifiable mission need for reuse. Otherwise, surveillance and maintenance funding would continue to be required for an indefinite end. Therefore, added operational funding will be needed for surveillance and maintenance activities and to complete the removal of decontaminated but unproductive space returned from D&D.

ANL embraces the concept of environmental stewardship as opportunities arise. Environmental stewardship embraces doing what is the “correct” action for the long run – healing damaged ecosystems, re-establishing native plant species and fauna to their remnant community and establishing management practices that are conducive to the continued maintenance and health of these natural systems and their constituent elements. These are not usually least-cost practices, but instead reflect a concept that once the ecosystems are returned to a healthy state, cost economies will begin to accrue over the longer run.

Despite considerable rehabilitation in recent years, aging of facilities leads to ongoing problems, particularly associated with meeting current environment, safety, security, and health (ESS&H) standards. Such deteriorated systems jeopardize both reliability and efficiency in the operation of aging facilities. The following graph shows the current trends in the condition of ANL space.



After an increase in adequate space, due primarily to the construction of APS, the total active, adequate space is again trending downward due to age-related deterioration. This downward trend can be expected to accelerate as the facilities age unless significant funds are devoted to rehabilitation and upgrade. Delayed upgrades invariably lead to age-related equipment failures that must be resolved using limited overhead funds. That strain on overhead funds in turn reduces funds available for routine maintenance and orderly replacement of building equipment. In recent years, 60% of the maintenance at Argonne-East has been corrective rather than scheduled.

The current condition assessment survey projects facility needs to increase at twice the rate that can be addressed under current funding, which has been relatively flat over the last few years. In terms of real dollars, funding has declined, causing a situation that is worsening as facilities continue to age. Under current rates of inflation, this pattern of funding represents a decline in real terms of more than 25% over 10 years. The decreasing capital funding trend requires the Laboratory to focus maintenance efforts to critical situations where breakdown or failure is imminent or has taken place, and perform activities to lengthen service, even at the increased cost of not replacing or upgrading the property or equipment at an efficient point in its life cycle.

Coupled with the aging of facilities, continuing historical levels of funding under Multiprogram Energy Laboratories-Facilities Support (MEL-FS), General Plant Project (GPP), and General Purpose Equipment (GPE) will have serious consequences. The Laboratory's capability to perform world-class, cost-effective research will degrade and result in the loss of key personnel to better-equipped competition. The rate of deterioration will continue to rise unless total capital funding for facility support is increased significantly.

Even as SC considers the funding requests in this plan to bring the general purpose infrastructure up to the needs of the 21st century research, DOE must consider the deteriorating state of its older, programmatic facilities. The Alpha Gamma Hot Cell facility within Building 212 is a prime example. Capital renewal of the hot cell manipulators, windows and transfer systems to bring them to 21st century standards is definitely needed; however, funding is considered a programmatic responsibility and so this issue and other similar issues are not included in this plan.

B. Operations and Performance—Future Trends and Their Impact

Future general-purpose infrastructure requirements and needs will also be determined by the changing needs of research at the Laboratory. Infrastructure conditions need correction to improve the functionality of the laboratory and support buildings. However, the changing needs of research for modern laboratory configurations, collaborative research space, conditioned power supplies, and state of the art communication capabilities are not directly addressed in building rehabilitation.

Many of the aging research laboratories require electrical service upgrades in order to accommodate increasingly sophisticated instruments and computational capabilities. An obvious additional reminder of general obsolescence is the fact that most of the older offices have only one or two electrical outlets, and those typically are not correctly located for modern office equipment. It is increasingly important to modernize aging offices as well as aging laboratories, because much research work is efficiently carried out in offices by taking advantage of automation and linking of facilities by computers. Appropriate modernization therefore also includes improved lighting, energy-efficient windows, better electrical connections, high-speed Internet access, and modernization of the telecommunications and information technology infrastructure, both to support internal communications and to facilitate collaboration with domestic and international partners. Some offices could be utilized more efficiently as meeting and collaboration areas by creating spaces with open architectures. A study is underway to consolidate distributed library functions under a central library to improve the effective use of resources and increase the interaction among the laboratory's scientific community.

In general science areas, additional computer networking capabilities are required to provide connections to central servers in the divisions, as well as to other laboratories and user facilities and to the Laboratory's high-performance computational center. The laboratory/office building of the future requires upgraded conditions to accommodate the supercomputers of the near future. The Laboratory's strategic plan for computing facilities, infrastructure, and mid-range computing support proposes acquisition of a teraflops-class computer in FY 2003 and acquisition of a next-generation large-scale computer system for future production use.

Scientific computing requirements and the availability of tera- and peta-scale computing facilities will require a high-speed, high-reliability networking

infrastructure. The volume of data in the coming scientific computing environment will drive the need for ubiquitous high-capacity, high-efficiency data management and storage equipment. Additional computing equipment will be required for the staging and support activities that come with these facilities.

In administrative computing and infrastructure areas, the Laboratory's emphasis on safety, environmental, and security activities is exacerbating the existing shortfall in ITE capacity. Additional administrative computing capacity is required to take advantage of newer, more efficient, highly effective, and very secure application and data architectures. A new administrative computing cluster will be acquired to meet these needs.

Precise temperature and humidity control is crucial for much experimental research, including chemical and biochemical synthesis work, laser analysis, accelerator operation, and electron microscopy. The size of experimental samples has decreased dramatically in recent years, but the precision now available through micro techniques generally requires a carefully controlled environment. These kinds of work also often require a cleaner environment where air is filtered for particulate matter and modern hoods control emissions from hazardous materials such as solvents and carcinogens. This need for better-controlled laboratory environments cuts across ANL's work in several areas of research.

Other examples of the new research needs include a vibration-free environment for the new electron microscope that will extend the capabilities of the Electron Microscopy Center for Materials Research. Space renovation will be required to accommodate this new instrument, as well as modernization of building utilities to enable scientists to fully exploit the instrument's capabilities. The 400 Area Chilled Water System will reach full capacity in FY 2002. Additional chilled water capacity must be added during the plan period to meet new demands on the system from the Center for Nanoscale materials and the Structural Genomics initiative.

Modern laboratory space must be increasingly flexible and should include modular laboratory benches that accommodate sophisticated equipment and are easily adapted to changing experimental needs. Synergistic collaborative research among traditional disciplines such as chemistry, biochemistry, and materials science greatly benefits from co-location in a flexible, modern research laboratory. One current example is a collaborative research project investigating enzyme-based production and purification of bio-based chemicals. The project involves scientists from three research divisions located in three different buildings. This promising collaboration would be significantly enhanced if the researchers were co-located.

Modernization will recognize other important considerations. All utilities should be easy to install and remove not only modern data transmission systems but also systems for water, electricity, compressed gas, etc. Long-term requirements for record handling and storage, library connections, and word processing need to be accommodated. More open areas are required, as are more natural light, better (and larger) windows, and better "surfaces" and finishes throughout the

interior that are easy to clean and, periodically, easy to repaint or otherwise resurface. Improved, affordable student housing is needed to encourage the best and the brightest to complete their research studies at the Laboratory.

Increasingly, research is being preformed from remote locations. Data connectivity is currently achieved via dial-up telephone connections, higher speed ISDN lines, and even still higher speed cable modem and DSL connections. Wireless data and voice connectivity is expected to grow exponentially in the next few years; connectivity with local, national, and international networks will become the norm in the foreseeable future.
The existing sitewide telecommunications is based on older technology that needs to be upgraded to a state of the art system to support 21st century research. To this end, the Laboratory has installed fiber optic cables between most of the Laboratory's major buildings. This inter-building fiber optic cable network is continuing to grow, and use is increasing. Fiber optic facilities from major long distance carriers have been, and are continuing to be installed to serve the Laboratory's increasing need to communicate data at high speeds with other educational and scientific institutions. The Laboratory also maintains national network connections, such as Esnet (the DOE-Energy Research network) and MREN (a high-speed test network in the Chicago metropolitan area). These external networks interface with local ANL networks and help to position the Laboratory as a major player in national and international networking initiatives.

Total telecommunications system replacement will be necessary early in the planning period. The Laboratory anticipates installing a fully integrated voice/data/video/wireless Site Wide Communications System (SWCS). This system would combine traditional PBX type features with data switching capabilities, video teleconferencing, wireless capabilities for both voice and data, as well as communications via the Internet. The new system would be state-of-the-art and capable of supporting scientific program communications requirements for the next several years.

Increased DOE requirements in the areas of safeguarding nuclear materials and security of personnel and physical assets affect infrastructure considerations with respect to custody of property, classified and unclassified cyber security, personnel security, information security and physical site access controls. Argonne has a responsibility to provide a safe and secure environment for all its employees and visitors. Facilities, equipment, and information must be protected from theft, disruption, or misuse.

Cradle-to-grave high-risk property tracking and monitoring is a major consideration associated with infrastructure needs. Inventory systems need to be capable of tracking all categories of property, including special nuclear materials. Access control points, the site perimeter, entrances, inspection points, communications systems and other security related infrastructures require significant replacement and rehabilitation, State-of-the-art network infrastructure requires parallel efforts: to improve controls and capabilities for protecting Laboratory information and resources, and to simultaneously satisfy the need for increased network bandwidth on a local, national, and international level.

IV. PLANNING ASSUMPTIONS

The achievement of the infrastructure goals for the 21st Century at ANL is based on a number of planning assumptions for the 10-year planning horizon. These operational and mission-related assumptions are:

1. Operational funding is assumed to grow, matching the rate of inflation.

2. Overall site population is assumed to remain roughly stable as some research programs grow and others decline. Collaborative researchers from outside organizations will increase in numbers as the utilization of ANL user facilities increases.

3. Research at ANL continues to be diversified in keeping with the role of a multi-program laboratory. The types of research programs conducted at ANL will continue to match the projected Laboratory missions for the planning period.

4. The nature of the research at ANL is changing in terms of how fundamental research activities are being carried out. There will be a greater integration between experiments and simulation and increased remote access collaboration. Required infrastructure changes to meet this changing face of research within the existing facilities will be accommodated by the laboratory rehabilitations and upgrades set forth in this Plan. Major new programs are expected to fund the construction of required special-purpose facilities, such as CNM, RIA, the RIA Science Center, etc.

5. Major new programmatic facilities will be expected to fund all of the infrastructure upgrades necessary to successfully integrate the new facility into the site infrastructure. This includes but is not limited to road and pedestrian access, utilities and security enhancements.

6. Excluding old, inefficient facilities currently planned for demolition, all remaining facilities will be needed to support future research activities.

7. Compliance with existing and future ESS&H requirements (in addition to applicable federal and state of Illinois codes, standards, and regulations) will be mandatory and supported by the laboratory upgrades. The Laboratory will undertake the transition to newly applied external regulations, such as those from the Occupational Safety and Health Administration and the Nuclear Regulatory Commission.

8. All construction and refurbishment will incorporate state-of-the-art sustainable design principles regarding selection of building materials and furnishings, construction techniques, energy and water conservation, habitability features; to the extent such practices are economically feasible.

9. All research will be accommodated to the extent practical on the ANL property minimizing the need for off-site leased space.

10. The configuration of all refurbished or new laboratory space will meet the standards and needs of 21st century research. These laboratories will have space that allows co-location of research, increased communications capability, higher capacity utility services, and improved temperature and humidity control. Modern laboratory appliances such as fume hoods, laboratory benches, and high-bay capability will be provided for multi-purpose laboratory utilization.

11. The development of new facilities utilizing third party financing partnerships will continue to be a priority at the Laboratory.

12. The Laboratory will make use of third-party-financed alternatives for energy conservation and infrastructure upgrades to the extent they are cost-effective and in keeping with the Laboratory's missions.

13. The Laboratory will continue to be a good neighbor with the surrounding community stakeholders to minimize the impact of construction and operations. Environmental compliance including the involvement of all stakeholders will remain a priority of the Laboratory. DuPage County (Illinois) planned unit development standards applicable to office/research and light industrial developments will be used as a basis for future developments.

14. New financing alternatives for infrastructure improvements and upgrades will be utilized. The new Institutional General Plant Project (IGPP) funding mechanism is an example of these types of alternatives. This Plan has not anticipated IGPP funding for any infrastructure requirements.

V. PLAN FOR MODERNIZATION

Argonne's long-range vision is to "retool" its physical setting to a 21st-century infrastructure—having appropriately configured research facilities that provide reliable, safe, secure, efficient, and attractive working environments suitable for world-class science, engineering, and technical services.

Achieving the Laboratory's strategic vision for the 21st century begins by eliminating deficiencies in existing facilities due to aging and obsolescence. Beyond restoring impaired functionality, the Laboratory must upgrade telecommunications; enhance site-wide access controls, physical security, personnel security, information security, cyber security, and perimeter monitoring and surveillance; improve building electrical and mechanical services; and modernize the layouts and furnishings of laboratory space. Maintaining and upgrading sound but depreciated facilities is central to Argonne's operating strategy for existing general-purpose facilities. Disposal or replacement of inefficient structures, continued environmental stewardship, and construction of three new general-purpose facilities complete the salient physical features of the Plan.

Argonne's planning for general-purpose infrastructure focuses on maintaining facilities that are both safe, secure and efficient, upgrading R&D facilities to 21st-century standards, and providing improved utilities and transportation networks.

A reliable, efficient, safe, secure, and environmentally sound state-of-the-art infrastructure will reduce operating costs and result in improved scientific productivity. To this end, the Plan addresses three areas of the infrastructure and facilities at ANL where reshaping and rehabilitating the existing facility infrastructure is required to meet the needs of emerging scientific missions, communications, and security technologies. These three areas are: Site, Existing Facilities Needs, and New Facilities.

A. Site

The Argonne-East site can physically accommodate facilities totaling two to three times the present state of development. The Site Master Plan is shown in the Appendices for information and reference. Environmentally sensitive and interconnecting open- space areas that support the natural ecology and hydrologic drainage of the site are being retained in their natural condition. The intensity of planned development on the balance of the site—in terms of covered area, floor area ratio, and landscaping standards—will remain consistent with the character of areas already developed.

The roads and utility systems at Argonne-East require further rehabilitation but are adequate for future expansion. Major rehabilitation of the roadways and parking lots has not been undertaken in nearly 20 years. The general site circulation infrastructure—roads, walks, lighting, parking, perimeter controls, entrances, inspection facilities, traffic safety systems—is substantially degraded and needs major rehabilitation or outright replacement. Operating funding alone is not sufficient to restore these facilities in a timely fashion.

Portions of major utilities also need rehabilitation, most notably the laboratory and sanitary sewer systems that were not fully restored in the 1990s. At the Central Heating Plant, auxiliary systems and components require upgrading during this plan period in order to extend service life and reliability. The site's electrical distribution system requires additional equipment upgrades to achieve reliability during maintenance shutdowns or unplanned service conditions, thereby assuring uninterrupted service to R&D facilities. Other options are also being evaluated to interconnect this plant with an expanded central chilled water system or to add electric generating capacity through cogeneration.

Within the Laboratory's aggressive plan for rehabilitating and modernizing site buildings, the replacement of roofs is the highest priority for FY 2005. Many roofs have reached the end of their design life, and repair and replacement costs are beginning to escalate. Also needed are upgrades to site-wide communications, so the federal mandate of all-digital communications by the end of 2004 can be met. These upgrades, however; are not currently being supported.

Environmental monitoring and surveillance, including stewardship actions, are essential parts of the *Strategic Facilities Plan*. Included are surveillance and maintenance responsibilities that revert to the Landlord at the completion of EM-funded remediation. Several of the EM-funded remediation activities have arrested immediate health and environmental concerns; however, continued surveillance and maintenance of the remediated areas is required in accordance with the Laboratory's Resource Conservation and Recovery Act Part B permit.

Funding will be required for continued surveillance of the 800 area and 300 area former disposal sites, as well as a small operating contingency to address potential investigation of other sites that may be identified for further maintenance actions. Wetlands management and hydrological characterization of the underlying ground water are essential to maintain and monitor the natural environment surrounding the Laboratory. Careful study of local groundwater flows and sound management practices for wetlands and deer habitat are needed to ensure that the Laboratory remains a good steward of the environment.

B. Existing Facilities

Selected upgrades of the major permanent facilities and limited creation of new facilities remain the preferred options at ANL to support the small to modest incremental growth forecast for the next decade.

1. Rehabilitation and Upgrades

The primary focus of building system upgrades and modernization are the older multiprogram laboratory/office buildings in the 200 and 300 areas. Nine buildings totaling two million gross square feet (including buildings 200, 201, 202, 203, 205, 206, 208, 212, 221, 223, 360, and 362) account for the bulk of the modernization requirements. Two-thirds of the space in these buildings requires major rehabilitation; another 20% requires minor to moderate rehabilitation.

Argonne employs a standardized approach to classifying facility condition, based on the cost of rehabilitation compared to the cost of replacement construction. Facilities are classified as “adequate” if the estimated cost ratio of rehabilitation to replacement is less than 10%; “minor rehabilitation” indicates a ratio from 10% to 25%, “major rehabilitation” a ratio from 25% to 60%. The nature of modernization needs over the 10-year horizon of the *Strategic Facilities Plan* is well-illustrated by Building 212 (included in the list above), which is a particularly instructive example of a building in need of significant refurbishment in order to serve effectively as a modern research facility. By the end of the Plan’s 10-year horizon, the building will be over 50 years old and will house few (if any) of the research activities that originally motivated its unusual internal configuration.

Additionally, ESS&H needs must be one of the main drivers determining work area configurations. An overall plan for moving, storing, and continuously removing hazardous materials will form the backbone of the layout for offices and laboratories. For example, rehabilitation will allow the locations of satellite waste accumulation areas to be determined for long-run efficiency, not on the basis of short-run space availability. By making cleanup a continuous process supported by building

infrastructure, R&D groups will be able to reshape themselves quickly and efficiently, without a year-long D&D process at the front end of the planning cycle.

Flexible common space will be provided to support increased amounts of more effective collaborative research. The need is not just for a few conventional conference rooms, but also for areas of reconfigurable space where researchers can meet as needed and work together but still withdraw into individual work areas and laboratories in the immediate vicinity. Two projects originally validated for FY2002 start-up include upgrades to critical portions of the mechanical and control systems within 12 buildings at ANL and upgrade of critical portions of the electrical power distribution system located in the 200 and 300 areas and their support facilities. These projects are based on: (1) overriding health, safety and security concerns, (2) a need to improve reliability and performance to support the changed missions within the buildings, and (3) a need to reduce facility maintenance and repair costs. Only the project to upgrade the mechanical and control systems has been funded for FY 2002.

Projects for general-purpose laboratory facilities with modern capabilities include:

- Consolidation of cross-disciplinary research staff, especially for older inadequate facilities.
- Fostering increased scientific productivity.
- Upgraded chilled water supply capacity in the 400 Area.
- Ensuring rapid response to new emphases in DOE mission areas and evolving national issues.
- Strategic planning to renovate building wings and to relocate occupants during renovation.
- Improvements in affordable student housing.

Upgrades to site-wide communications and security systems must also be carried throughout the network of existing terminal stations, controls, and other building interfaces. Additionally, increasing levels of automation for monitoring, operating, and maintaining building systems will be provided. Automation will enhance the ability to control the laboratory environments and energy supplies as well as freeing staff from surveillance rounds so they may attend to other maintenance requirements.

Reconfigurable wide-bandwidth network access throughout the buildings will be provided, as efficient teleconferencing in the 21st century will require teleconferencing from the research location. Flexible building infrastructure will support plug-and-play information hardware and facilitate incorporation of new hardware and technologies. In anticipation of data transfer becoming wireless (even on a very local basis), potential interference from electrically noisy motors in HVAC systems and other building infrastructure will be minimized. Argonne-East plans to implement its upgrade and modernization programs in rotating phases

that concurrently address common system needs across several buildings. Broadly speaking, building electrical systems will be upgraded for reliability and load capacity. Mechanical and control equipment and distribution systems will then be improved to provide a more flexible and adaptable building utility support network. The final stage is to reconfigure, rehabilitate, and modernize space partitioning, laboratory furnishings, and architectural features.

Argonne plans to implement modernization in wings or floors of buildings, so that entire buildings need not be shut down; however, a multiprogram laboratory/office building is needed to accommodate personnel and research activities displaced during the 10-year course of modernization.

2. Decommissioning and Decontamination

Decontamination of slightly contaminated facilities and spaces, which do not qualify for DOE-EM funding, needs to be a priority of the DOE-SC Excess Facilities Program. Current and FY 2003 activities have been identified to decontaminate the highest priority areas for return to general use and occupancy. Additionally, the remnants of an old radium spill in the service floor of Building 203 require a complete clean-up. Funding has been identified beginning in FY 2004 for this task.

The current DOE-EM baseline includes the D&D of the Hot Cells in Building 301, the Juggernaut Reactor in Building 335, and the ZPR Reactors in Building 315. Completion was scheduled for FY 2003. However, DOE-EM has suspended funding for these projects and has indicated that funding will not resume until FY 2007. DOE-EM should restore funding so that these projects can be completed in a timely and cost effective manner. The Plan assumes that funding is restored in FY 2004. At the present time, DOE-EM is providing funding for surveillance and maintenance of these facilities.

A contaminated excess facility that is not in the current EM baseline is the Hot Cell Facility in the M-Wing of Building 200. ANL is proposing that the EM Program include the D&D as well as the demolition of the facility in a future baseline. The Plan assumes that EM will accept the transition to EM in FY 2005.

Finally, the continuing mission for D&D activities envisioned through the duration of the planning horizon is for the continuing need to decontaminate small areas within existing facilities.

3. Demolition

The demolition of larger, multi-story masonry and reinforced concrete structures with extensive foundations is inherently more costly than removal of slab-on-grade-metal enclosures, which has been the recent

norm at the Laboratory. Argonne-East envisions demolition of Buildings: 40, and 604.

Buildings 330 and 301 should also be demolished since they are surplus facilities with no future mission. Building 330, CP-5 Reactor, has been decommissioned by the EM program; the end state was reuse of the building. Some contamination still exists, namely tritium in the concrete. Argonne is proposing that EM accept the demolition of the building in a future baseline. The Plan assumes that EM accepts this facility in FY 2004 and that demolition begins in the same year.

Building 301 Hot Cells are in the present EM baseline, but the end point is for reuse. Argonne is proposing that EM accept the demolition in a future baseline. The demolition would occur after the D&D is complete. If funding is restored for D&D in FY 2004, demolition could occur in FY 2006.

C. New General Purpose Facilities

ANL-E needs three new general purpose facilities:

- A new multi-program laboratory/office building to accommodate personnel and research activities displaced during the 10-year course of modernization;
- A new multiprogram computational facility for advanced computer simulation; and,
- A new high bay facility to provide added high bay space for developing program work.

Because major new programs are expected to fund the construction of any new special-purpose facilities, these initiatives are not discussed within this plan. The 50,000 sq. ft. laboratory/office building will be located in the 200 area to augment the presently limited capability to rotate scientific staff as the various buildings and wings are modernized. The facility will also provide for state-of-the-art conference facilities for hosting scientific workshops. Additionally, the facility will provide a needed means of accommodating other spatial adjustments to program growth, reorganization, and general on-site flexibility, which has been severely restricted through the elimination of obsolete facilities and the resultant reductions in vacant available space. A more extensive discussion of this specific project is found in Chapter VI under the discussion regarding Line Item projects.

The proposed 40,000-square-foot multiprogram computational facility will consolidate massive parallel computing systems and provide a hub serving computational technology being incorporated into modernization projects throughout the site. Approximately half of the facility is to be devoted to the "machine room" housing the massively parallel computer, computer networks, and virtual reality systems that are at the heart of computer simulation. This facility is needed to concentrate computer simulation technology and high-bandwidth network hubs in order to maximize the simulation capability afforded to all researchers.

Construction of the third new facility, a flexible 25,000 sq. ft. general-purpose high-bay facility is needed to supplement current facilities and to consolidate R&D during the upgrades to other high-bay facilities. A freestanding location will provide increased potential for expansion and access to laboratory space with minimal physical obstructions. The need for flexible-use space with an intrinsic capability for expansion or reconfiguration cannot be met with rehabilitation or reprogramming of existing high-bay areas. This is due to their present continuing usage and because the older construction methods used to build these facilities cannot accommodate the needed changes.

Several small new or replacement facilities are anticipated to be supported by GPP funding. These include an improved central fire station, an emergency response building to replace the existing, vulnerable metal-frame building and a replacement to the on-site bathhouse supporting the housing and recreational facilities in the 600 area. A new replacement for the aged metal storage facilities (Buildings 325C, 329 and 374A) completes the inventory of general-purpose facilities envisioned in the Plan.

D. General Purpose Equipment

In order for ANL to serve DOE as a premier multi-program laboratory, the support infrastructure must include general-purpose equipment that supports efficient performance. GPE funds are the Laboratory's primary resource for purchasing equipment needed for vital support activities such as: (1) plant maintenance; (2) health, safety, and security activities; (3) monitoring and control of effluents to the environment; (4) motor vehicle services; and (5) technological support, including computing, machine shops, and electronics support. Priority will be given to equipment upgrades for improved safety and security in operation, productivity improvements, and for cases where technological change has made existing equipment obsolete.

GPE funding will be required to upgrade the site's networking and cabling infrastructure to the next standard of electronic data communications. GPE funding will also be required to replace obsolete data center equipment and add capacity to the existing data centers.

E. Real Property Maintenance

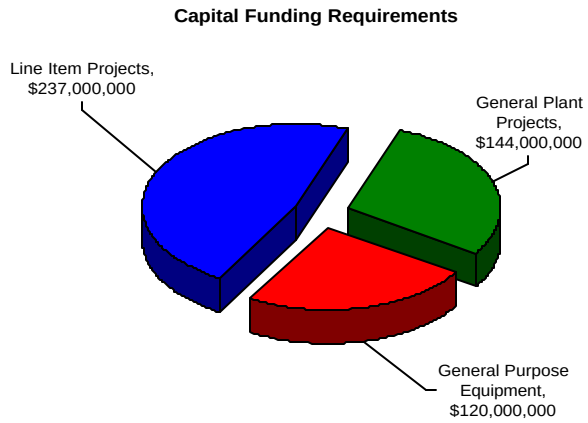
Laboratory policy is to operate and maintain all buildings and facilities at ANL in compliance with applicable environment, safety, security, health, and quality requirements. This policy further divides maintenance responsibilities into two parts, referred to as programmatic and non-programmatic. Non-programmatic physical plant activities include the management, maintenance, and repair of building exteriors and of internal general-purpose building systems (structural, mechanical, and electrical). Non-programmatic maintenance responsibilities also include efforts to maintain the general appearance and condition of building offices and common areas (e.g., lobbies, washrooms, hallways, lunchrooms, auditoriums, and service areas) and, unless otherwise specified, fan lofts, service floors, and mechanical rooms.

Programmatic organizations are responsible for the management, maintenance, and repair of all specialized occupant-related equipment, experimental apparatus, and dedicated systems designed to support experimental or programmatic activities. All environment, safety, security, and health aspects of these operations are also the responsibility of the occupant organization. In addition to capital funds, ANL has averaged approximately $17 million annually in operating funds for real property and non-programmatic maintenance of the site and facilities.

This Plan requires that this baseline be maintained in real dollars throughout the planning horizon. Therefore, the current level of operations and maintenance funding will continue through the Plan period. This level can be best defined as being approximately 1% of the replacement plant value (RPV) of site facilities, which continues present funding levels. This level of funding is considered acceptable. The effects of building modernization and removal of unneeded facilities will offset the effects of aging within the planning horizon. The extent to which this projection is borne out by experience and the need to reassess this funding position will be examined in the later years of the Plan.

VI. RESOURCE NEEDS SUMMARY

ANL requires approximately $500 million in capital funds between FY 2004 and FY 2013 to achieve its vision of the 21st Century. This represents a substantial increase over historical levels of funding for line items (MEL-FS), GPP, and GPE. An additional $70 million in direct operating funds are required to address legacy and landlord issues. A breakdown of both the capital and operating funding needs is provided in the Appendices under the Resources Needs Summary Table and accompanying chart.



Three principal factors provide the basis for increased line item and GPP requirements. First, the foundation rests on the known deficiencies associated with existing conditions of facilities and the reasonable forecasts of needs over the next 10 years. These needs amount to approximately $280 million, to be addressed essentially by MEL-FS and GPP funding.

Second, the focus of this plan, the additional need for modernization—not just rehabilitation—has increased the emphasis on “future” issues such as communications, computer simulation, flexibility, and adaptability of general research space. Funding

(again in terms of line item and GPP funds) is estimated at $50 million (in the range of 25% to 30% of the funding requirement for the currently known deficiencies). This funding will address modernization in selected major facilities designed to reflect future mission needs. Also included in the modernization is a new site-wide communications system necessary to link together the laboratories of the 21st century.

Third, this plan proposes three new additional general-purpose facilities ($50.2 million) to complement the modernization program and provide needed research space and replacement space for co-location of massively paralleled computers and computer simulation systems. In addition, funds for GPE are needed at the $120 million level over the plan period for replacement of aging equipment and the provision of new modernized resources for communications, computer simulation, maintenance automation, and labor productivity. Machine tools and materials-handling equipment will be upgraded to current standards as technological changes have vastly improved the precision and efficiency in the use of such equipment. Personnel monitors and other radiological detection equipment will be purchased to maintain the high level of quality in ESS&H activities. Computer network systems and workstations will be added to increase workplace productivity and increase the interaction between researchers.

Direct operating funding of approximately $70 million is required to address legacy and landlord responsibilities regarding decontamination, remediation, environmental stewardship activities and demolition of obsolete facilities that are not being replaced. The Laboratory considers that the funding for demolition of Building 330, 301, and the hot cells in Wing M, Building 200 should come from the EM program. Finally, the level of real property maintenance funding (Laboratory overhead) is planned to be $170 million during the period based on maintaining a funding level of approximately 1.5% of replacement value.

A. Line Items (MEL-FS)

An important portion of the recent rehabilitation funding has been provided from the Multi-Program Laboratory - Facilities Support (MEL-FS) program, averaging $6.7 million annually since 1995. These funds have been used to rehabilitate major buildings or utility systems and to provide new general-purpose facilities. In order to address the projected needs, approximately $237 million in new Line Item funding is needed, including $50.2 million in funding for new facilities and $187 million in funding for rehabilitation and modernization of existing facilities. The following text summarizes the line-item projects necessary to implement the Plan.

Keys to the goals for each project are as follows:

ANL Goals	*DOE-SC Goals*
1 = Maintain Excellence in Environment, Safety, Security and Health	*A = Mission*
	B = ESH & Security
2 = Cost-Effective Use of Existing Facilities	*C = Working Environment*
3 = Maintain and Enhance World-Class Image	*D = Ops & Maint.*

1. Multiprogram Laboratory Office Building
Goals 1, 2, 3 / A, B, C, D

This project provides for the design and construction of a multiprogram laboratory and office building (50,000 square feet). Systems and components will be designed to minimize life-cycle costs and improve environmental performance. The building will facilitate the rehabilitation of laboratory/office space in other buildings by housing dislocated activities, which is currently difficult to do.

2. Mechanical and Control Systems Upgrades — Phases I –IV
Goals 1, 2, 3/A, B, C, D

This series of four projects will upgrade critical parts of mechanical and control systems. The projects involve rehabilitation and upgrading of heating, ventilation, and air conditioning systems; exhaust systems; drainage systems; and controls to address concerns such as reliability of operations and environmental protection. Phase I was funded to begin in FY 2002.

3. Building Electrical Service Upgrade – Phases II-V
Goals 1, 2, 3/A, B, C, D

These projects will upgrade critical parts of the electrical power distribution system in the 200, 300, and 360 areas and their support facilities. The systems will be updated to meet current safety standards, to improve reliability and performance, to support new research programs, and to reduce maintenance and repair costs. The work will include (1) upgrading lighting and power panel boards, 13.2-kV switches, 480-V switchgear, and transformers, and (2) the provision of emergency power for selected buildings. Particularly important will be replacing 13.2-kV switches and 480-V switchgear with new equipment having state-of-the-art metering and protection devices.

4. Laboratory Space Upgrades — Phases I – IV
Goals 1, 2, 3 / A, B, C, D

These projects encompass essentially all aspects of modernizing laboratory space, including reconfiguration and upgrading of laboratory space envelopes, laboratory interiors, work area furnishings,

communications, security, electrical distribution systems, plumbing systems, and laboratory and process piping. The projects address safety and health concerns by including upgrades of fume hoods, vacuum frame hoods, canopy hoods, and glove boxes, along with associated utilities. Also included are removal and disposal of potentially contaminated or hazardous materials such as hoods, exhaust ductwork, piping, and asbestos insulation.

5. Central Heating Plant Auxiliaries Upgrade
Goals 1 & 2/B, D

Upgrade of the steam production auxiliary systems and components at the Central Heating Plant will be undertaken to improve reliability and performance of the steam production process. Additionally, the project will provide both energy and operational savings and may be undertaken as a third party financed energy conservation project.

6. Fire Safety Improvements – Phase V
Goals 1 & 2/B, D

This project addresses remaining capital improvements needed for fire protection. Work includes correction of deficiencies affecting property protection and potential interruption or work, installation or upgrading of fire barriers, replacement of halon systems and obsolete building sprinkler water supply connections, and repair of hydraulically deficient sprinkler systems not related to life safety.

7. General-Purpose Laboratory Facility
Goals 1, 2, 3/A, B, C, D

This project will provide a flexible high-bay research facility (25,000 square feet) to supplement current facilities and to more readily meet changing needs. A freestanding location will facilitate expansion and reconfiguration and will achieve proximity to laboratory space with minimal physical obstructions. These capabilities cannot be achieved through rehabilitation or reprogramming of existing high-bay areas, because of the resulting disruption of current work and of the type of construction used in the existing buildings.

8. Roads/Parking/Walks/Street Lighting
Goals 1 & 2/B, D

Many roads, parking lots, and sidewalks at Argonne-East have deteriorated beyond amenability to general maintenance and basic repair. Other areas require additional parking and walkways. This project will rehabilitate or upgrade the surfaces of selected roads, parking lots, and sidewalks (and will use recycled materials where possible). A new site wide high-pressure sodium lighting system will cut electrical loads by approximately half and will provide better coverage at roadway

intersections and in parking lots.

9. Multi-program Computational Facility
Goals 1, 2, 3/A, B, C, D

This project will provide a computational center (40,000 square feet) as a focus for massively parallel computers and simulation technologies. In existing facilities, computers cannot be co-located with virtual reality equipment in a way that allows for adequate expansion and reconfiguration.

10. Building 362 Asbestos Abatement
Goals 1 & 2/B, D

Asbestos-containing materials (ACMs) are present in numerous older buildings at Argonne-East. Damaged ACMs threaten building occupants and workers and must be repaired or removed; undamaged ACMs may be left undisturbed or sealed. This project will remove asbestos fireproofing materials now under floor decks and attached to steel structural elements in Building 362. Where needed, the project will clean up friable asbestos. Portions of each floor will be done in turn, cordoned off, enclosed with containment measures and remediated on a rotating basis, including removal of ceiling tiles, where present, and replacement with a new ceiling system. Occupants will be rotated from affected areas while the building remains in service.

11. Building Roof Replacement
Goals 1 & 2/B, D

This project involves comprehensive replacement of the roofing systems on older buildings, including all original buildings in the 200 and 300 areas and buildings constructed between 1970 and 1990. The last comprehensive roof replacement at Argonne-East occurred between 1983 and 1987 and used roofing systems with a predicted life of 20 years. Repair of small leaks is now necessary with increasing frequency. Roof replacement of the 400 area buildings will need to begin in 2012.

12. Electrical System Upgrade – Phase IV
Goals 1 & 2/B, D

This project will upgrade 5-kV overhead lines to 13.2-kV and will increase the capacity of the 13-kV overhead lines in the 200, 300, and 400 areas. The project will also replace 13.2-kV switchgear and interrupter switch lineups that serve the 300 area, increase the capacity of transformer T3, and replace transformer T6. Outdoor automatic transfer switches will be installed to serve Buildings 201 and 221. Most importantly, additional electrical service capacity will be brought to the site distribution system from Commonwealth Edison's supply grid, allowing increased reliability and service levels.

13. Site Wide Communications System (SWCS) Upgrade
Goals 1, 2, 3 / A, B, C, D

Argonne-East anticipates installing a fully integrated voice-data-video-wireless sitewide communications system by January 2005, when system replacement becomes mandatory. This new system will combine traditional PBX features with capabilities for data switching, video teleconferencing, wireless service, and Internet access.

B. General Plant Project (GPP)

General Plant Project (GPP) funding has averaged approximately $4.7 million annually in FY 1996-FY 2001 has supported urgently needed facility modifications, upgrades, and replacement of equipment. GPP funding also supports environmental projects, near-term infrastructure improvements, and key safety upgrades. In general, GPP funds are crucial for work that goes beyond short-term maintenance and repair but must be undertaken more quickly than would be allowed by the normal lead times for line-item construction projects. GPP funding does not support particular R&D programs. Historically, GPP funding received by Argonne has been inadequate to address infrastructure and modernization needs. Requirements over the 10-year planning horizon of the *Strategic Facilities Plan* total $144 million, more than 3 times greater than current annual funding levels.

Strategic application of GPP funds continues to fall into three general areas. First, the recent pattern of applying GPP funds to smaller-scale upgrades and modifications of buildings will continue. These projects modernize smaller buildings and implement less extensive reconfigurations, thereby complementing the larger-scale renovations. Within these efforts, a contingency-type usage of GPP will be retained to provide fast-track resolution of pressing needs for modernization.

Second, GPP funding will support upgrades to site-wide utility systems at selected locations. These systems include laboratory and sanitary sewer collection systems that were not completely rehabilitated under earlier projects supported by DOE-EM. Upgrades undertaken will also include continuing improvements to the canal water and storm water systems.

Third, GPP funding will complement line-item funding by supporting construction of smaller new facilities costing less than $5 million. GPP funding will also support construction of new general-purpose support facilities. Examples are a replacement for the Emergency Services Department (Building 333) and replacement of the scattered, older, active contaminated storage facilities that are still active (i.e., Buildings 325C, 329, and 374A) with a better-located, more efficient, centralized waste storage facility in a more efficient location. As the implementation of the plan progresses, other specific, smaller-scale whole facility needs are expected to emerge that are not now clearly focused at the overall strategic scale.

C. General Purpose Equipment (GPE)

Beginning in FY2004, the annual GPE funding requirements of Argonne-East are $12 million. Increases over current funding levels are required for purposes such as appropriately configuring and updating high-bandwidth networking and collaboration equipment and acquiring high capacity computer clusters. The increased funding level will allow the Laboratory to take advantage of current technologies and to satisfy researchers' increasing needs for electronic data communication and collaboration. The increase will also be used to acquire and rehabilitate general-purpose equipment (but not to support specific R&D programs).

GPE funds will be used for vital support activities, including: (1) plant maintenance monitoring equipment; (2) operating equipment meeting current ESS&H standards; (3) equipment for monitoring and controlling release of effluents to the environment; (4) motor vehicles; and (5) technological support in areas such as computing, cyber-security, machine shops, and electronics

D. Real Property Maintenance

In addition to capital funds, ANL has averaged approximately $17 million annually in operating funds for real property and non-programmatic maintenance of site and facilities. The Plan requires that this baseline will be maintained in real dollars throughout the planning horizon. The effects of building modernization and removal of unneeded facilities are expected to cumulatively offset incremental aging within the planning horizon.

Approximately 60% of maintenance at Argonne-East is devoted to corrective maintenance, as opposed to recurring, operational, or preventive maintenance. This situation reflects the large proportion of equipment still operating beyond its normal service life. Modernization of older equipment will lessen the current need for emergency or urgent corrective maintenance, allowing the Laboratory to focus on preventative maintenance that lengthens the service life of equipment and reduces costs in the long run. Real property maintenance funding will remain stable at approximately $17 million annually for real property maintenance. Replacement plant value is expected to increase only slowly, following general inflation trends, and maintenance expenditures are projected to remain near 1.5% of that value.

For the purposes of this plan, real property maintenance is the day-to-day work that is required to maintain and preserve plant and capital equipment in a condition suitable for it to be used for its designated purpose. Maintenance cost and work do not include the following: Regularly scheduled janitorial work such as cleaning; Work performed in relocating or installing partitions, office furniture, and other associated activities; Work usually associated with the removal, moving, and replacement of equipment; Work aimed at expanding the capacity of an asset or otherwise upgrading it to serve needs different from or significantly greater than those originally intended; Improvement work performed directly by in-house workers or in support of construction contractors accomplishing an improvement; Work performed on special projects not directly in support of

maintenance or construction; Non-maintenance roads and grounds work, such as grass cutting and street sweeping; and Maintenance on programmatic equipment.

E. Operating Funding

Direct operating funding is required to transition facilities from EM-funded activities, monitor and manage the natural environment of the site, and for demolition of inefficient facilities.

1. S&M and Transfer to EM

The EM program leaves some legacies from D&D and Environmental Remediation activities. The main legacies are unresolved environmental and facility contamination issues where conclusion of EM funding has stabilized the contamination; however, longer-term stewardship is required. Continuing requirements for contaminated sites (surveillance and maintenance) will cost approximately $4.5 million will be required at the conclusion of the current EM program. DOE-EM funding for D&D of Argonne-East facilities no longer in use was suspended in FY 2002.

Argonne was in a position at the beginning of FY 2002 to complete by the end of FY 2003 all D&D activities identified in the approved baseline, if specified funding had continued to be provided. The site's two remaining contaminated surplus facilities (Buildings 330 and 301) were also identified as candidates for future DOE-EM funding that ultimately would support demolition. The demolitions of these building would cost $4.7 million. Two additional facilities, neither yet surplus, also require D&D: (1) the M-Wing Hot Cells in Building 200 (a partial facility), for which DOE-EM funding (estimated as requiring $31 million) had been sought, and (2) the instrument calibration facility in Building 40 (the last remaining original building in the east area).

2. Environmental Management

Environmental remediation and long-term stewardship of the site's natural ecosystems will continue through the plan period. Wetlands management and hydrological characterization will be funded through operating funds from the Landlord, as will provisions for continuing efforts to remove small areas of contamination and continuing requirements for contaminated sites. These actions will amount to $28 million over the planning horizon.

3. Demolitions

Demolitions will occur throughout the Plan period. The significant demolitions are as follows:

a. Building 330 - Final demolition is planned for FY 2004, if EM funding is obtained. Due to the nature of the remaining contamination, complete removal of both underground tritium and involved building foundations is not possible. The

site will require capping and monitoring subsequent to the active demolition. This project is recommended for EM funding.

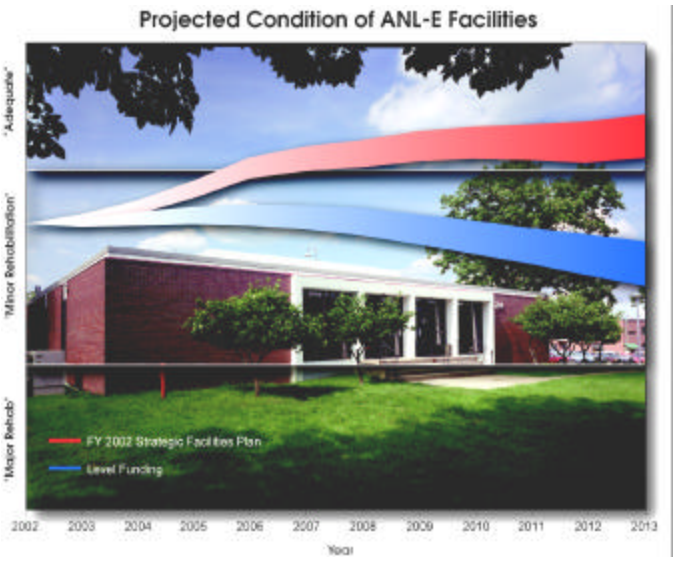
b. Building 301 - Similar to Building 330, removal of the nearby hot cell facility in FY 2006, if EM funding is obtained, will require extensive demolition efforts to remove the existing hot cells subsequent to their D&D, and removal of the surrounding building and foundations. This project is also envisioned as an EM responsibility.

c. Building 040 - The last remaining obsolete structure in the site's east area will also require demolition in FY 2005 after relocation of testing and calibration equipment and decontamination of the facility.

d. Building 604 - Replacement of the aging bathhouse in FY 2007 with a new facility satisfying the Americans with Disabilities Act will be undertaken as a GPP project, as part of rehabilitating the 600 area.

e. Building 200 – Demolition of Building 200 M-wing Hot Cells, including D&D, is planned to reduce long-term environmental concerns, as well as surveillance and maintenance liabilities.

F. Impact of Continuing Capital Funding at Current Levels



Implementation of capital funding as summarized above is expected to demonstrate a measurable progression of overall infrastructure condition from "Minor Rehabilitation Needed" to "Adequate" within 5 years of initiating funding as illustrated in the figure below. Conversely, the continuation of capital funding at current levels as proposed in the DOE Budget Formulation Funding Tables and related guidance will not provide positive changes in infrastructure condition and will lead to a continued degradation of the physical plant. This trend is also illustrated in the figure.

The analysis behind the illustrations assumes a deficiency closure rate of approximately 60% of capital funds expended and the incremental addition of $70 million in new deficiencies associated with the continued aging of the facilities, which is not currently captured in the inventory of needs because it is beyond the ability of the current survey methodology to reliably predict. An additional carrying cost of $40 million is attributed to current deficiencies carried forward to reflect continued increases to costs for remediation due to projected

worsening conditions over the intervening time.

Projecting the deficiency closure experience rate (approximately 60% of capital funds expended) on the Major Repair expenditures, Line Item and GPP funding recommended in the plan is projected to result in an overall facility condition index of adequate at the end of the planning period.

Extrapolation of the proposed funding levels in the DOE Budget Formulation Funding Tables over the planning period and given the assumptions on deficiency retirement and identification, the overall facility condition index will show no improvement over the plan period.

VII. PLAN DEVELOPMENT AND PRIORITIZATION PROCESS

ANL has developed and applied a rigorous process to develop, vet, and document this Plan. The development of this Plan has built upon relationships established as a part of the ESSH&I prioritization and planning process employed at ANL and discussed in Section II.

Representatives from each of the major programmatic areas reviewed their vision statements regarding the research and mission they foresaw for the planning period. This review validated and expanded the vision developed in the *Institutional Plan*. Concurrently, the program areas developed a statement regarding the nature of change envisioned in scientific research in their areas of expertise and the likely physical and infrastructure requirements necessary to support that change.

These program visions and new infrastructure needs were then integrated with the mission of the Laboratory as described in the *Institutional Plan* and compiled as a strategic view forward from the program part of ANL. The program participants then reviewed the draft document and provided input regarding the resultant prioritization and coverage of the projects described, overall recognition and understanding of these changes and the appropriate areas of lead responsibility for the support divisions.

This input has been combined with the facilities and infrastructure planning previously documented in the *Institutional Plan* and developed through the ESSH&I prioritization and planning process. The activities and resources needed to accomplish the overall vision have been evaluated and grouped into the types of facilities impact they create (i.e., site area, existing facilities, new facilities, and maintenance and operations activities) and the means of implementation – MEL-FS, GPP, GPE, etc.

Projects included in the Plan have been ranked and selected based on the necessity of including them in the funding scenario. The majority of these needs have been evaluated on the basis of established criteria contained in the Capital Asset Management Plan (CAMP) criteria as it relates to ESSH&I risk assessment. The scheduling reflects a broad consensus of operational and programmatic areas of responsibility and an integration of needs necessary to accomplish full modernization by 2013.

Finally, the Laboratory Management of ANL has approved this *Strategic Facilities Plan* for ANL to accomplish the SC goal of full modernization of the Laboratory by 2013.

VIII. PERFORMANCE METRICS AND CHANGE INDICATORS

The Laboratory monitors a large number of performance indicators to help evaluate the management of its site and facilities. Some of the most notable are the DOE/University of Chicago (U of C)/ANL operating contract performance measures, by which the Laboratory has consistently been rated as outstanding. Pending approval of additional measures by a consensus of the multi-program laboratories (at which time they would be adopted in this entire cohort's operating contracts) ANL recommends adoption of the existing primary metrics for benchmarking the Laboratory's progress in implementing the Plan.

Other internal performance measures used at ANL may be considered for broader evaluation and possible future adoption. These include factors such as the ratio of emergency maintenance calls to total calls, a possibly useful indicator of reliability. The site's deferred maintenance backlog (as reported in FIMS) is another possible measure. The Laboratory would also recommend that the condition assessment survey results be used as a standardized basis for conveying to OMB and Congress the condition of facilities to do our mission work and the need for increased capital funding.

Finally, the Laboratory recommends periodic surveys and benchmarking against private industry and university standards as a means of evaluating the quality of the facilities and infrastructure.

Additional qualitative indicators of the performance in managing site and facilities might also be based on DOE Landlord Reviews or in other types of surveys conducted on a broad level among the DOE Facilities. As a measure of plan commitment and implementation, a means of tracking project implementation status regarding schedule, cost, and scope might also be established focusing on data included in Resource Needs for Achieving SC Vision for 21st Century Labs.

APPENDICES

RESOURCE NEEDS SUMMARY TABLE

Laboratory: Argonne National Laboratory - East

Project/Activity	Space Added (sq. ft.)	Space Removed (sq. ft.)	TEC	2002**	2003**	Modernization Needs 2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
REAL PROPERTY MAINTENANCE				17	17	17	17	17	17	17	17	17	17	17	17
(% of RPV)				1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
General Plant Projects (GPP)															
Canal Water System Overhaul - Building 582/583			1.4	0.6											
Building 364 - 2400V Transformer T11 & T12			0.4	0.4											
Central Chilled Water System Upgrade, Bldg 371			3.0	1.1	1.8										
Upgrade Inadequate PA Systems Program			0.5		0.2	0.3									
Overhead Crane Modifications Program			0.4		0.1	0.1	0.1	0.1							
Elevator Improvements Program			9.2		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		
Restroom Upgrade Program			3.6				1.8	0.6	0.6	0.6					
Space Rehabilitation Program			10.3				1.0	1.0	2.0	1.3	1.0	1.0	1.0	1.0	1.0
5 KV Distribution System			1.5				1.5								
Improve Central Chilled Water Dist. & CFC Compliance, Phase II			2.2			2.2									
Sewer Renovation Completion			2.8						2.8						
Metasys Expansion - Phase II			2.0			2.0									
Main Steam & Condensate Upgrades			2.0				1.0	1.0							
Site Wide Door & Window Upgrades			6.0					1.0	1.0	1.0	1.0	1.0	1.0		
Building 364 Chiller Upgrades			1.9				1.9								
400 Area Chilled Water System Expansion			7.5			3.3		2.1		2.1					
Replacement Instrument Calibration Facility			1.5			1.5									
Replacement Waste Storage Building			2.0				2.0								
Replacement Central Fire Facility			4.3					4.3							
Building 604 (Bath House) Replacement			1.5						1.5						
Misc. GPP Projects (TEC<1.0M or TBD)				3.3	1.8	2.6	3.1	3.4	6.7	8.5	11.5	11.5	11.5	13.5	13.5
Total GPP				5.4	4.9	13.0	13.4	14.5	15.6	14.5	14.5	14.5	14.5	14.5	14.5
General Purpose Equipment (GPE)															
IT: Networking Facilities Needs						2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
IT: Conferencing and Collaboration Equipment						1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
IT: Digital Libraries and Information Management						4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
IT: "Network Smart" Equipment Infrastructure						1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Other GPE Priorities				1.6	2.3	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Total GPE				1.6	2.3	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
INFRASTRUCTURE LINE ITEM CONSTRUCTION (SLI)															
Fire Safety Improvements - Phase IV			8.4	2.0											
Mechanical and Control Systems Upgrades - Phase I			9.0	0.8	3.0	5.2*									
Building Electrical Service Upgrades - Phase II			8.7			8.7									
Site Wide Communications System (SWCS) Upgrade			7.5			7.5									
Building Roof Replacements			16.5				16.5								
Multiprogram Laboratory Office Building	50,000		12.0				12.0								
Mechanical and Control Systems Upgrades - Phase II			10.5				10.5								
Building Electrical Service Upgrades - Phase III			10.8					10.8							
Roads/Parking/Walks/Street Lighting Upgrade			13.5					13.5							
Fire Safety Improvements - Phase V			6.2					6.2							
Laboratory Space Upgrades - Phase I			12.9						12.9						
Multiprogram Computational Facility	40,000		32.3						32.3						
Mechanical and Control Systems Upgrades - Phase III			10.8							10.8					
General Purpose Laboratory Facility	25,000		5.9							5.9					
Building 362 Asbestos Abatement			5.4							5.4					
Building Electrical Service Upgrades - Phase IV			7.7								7.7				
Electrical System Upgrade - Phase IV			11.3								11.3				
Laboratory Space Upgrades - Phase II			13.6									13.6			
Central Heating Plant Auxiliaries Upgrade			8.0									8.0			
Mechanical and Control Systems Upgrades - Phase IV			9.9										9.9		
Building Electrical Service Upgrades - Phase V			7.9											7.9	
Laboratory Space Upgrades - Phase III			26.1												26.1
Total Line Items				2.8	3.0	16.2	39.0	30.5	45.2	22.1	19.0	21.6	9.9	7.9	26.1
Total GPP/GPE/GPF:				9.8	10.2	41.2	64.4	57.0	72.8	48.6	45.5	48.1	36.4	34.4	52.6

***Funded project, not included in the total for modernization needs.**

****Dollars shown to match DOE Infrastructure Cross-cut information provided to Congress, March 2002, where appropriate.**

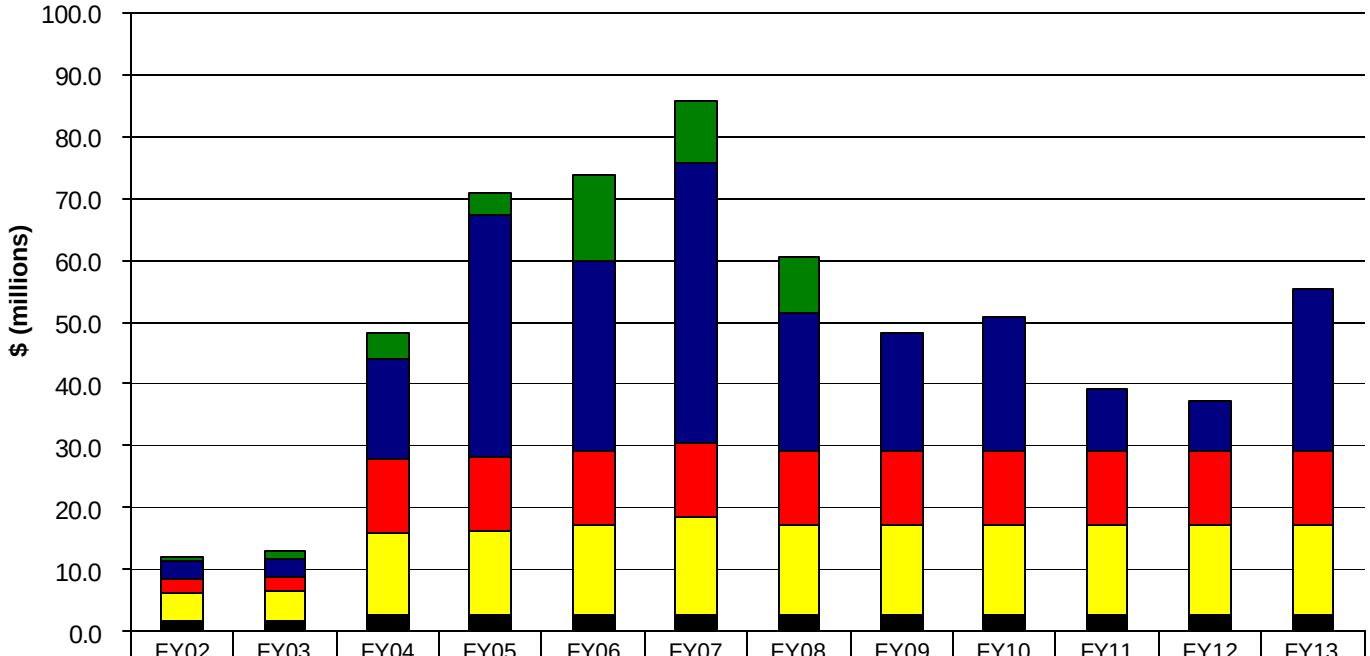
RESOURCE NEEDS SUMMARY TABLE (continued)

Laboratory: Argonne National Laboratory - East

Project/Activity	Space Added (sq. ft.)	Space Removed (sq. ft.)	TEC	2002**	2003**	Modernization Needs 2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
DOE Direct Funded Excess Facilities Clean-up and Disposition															
Non or Slightly Contaminated															
Bldg. 205 Sample Carousel		130	0.5	0.5											
Bldg. 315 Cell 6 Pit Cleanup		576	0.2	0.2											
Bldg. 315 Radiochemistry Lab D&D		600	0.1	0.1											
Bldg. 205 H-125/H-126 Cell Decontamination		2360	0.4		0.4										
Bldg. 306 C132 A&B Decontamination		130	0.3		0.3										
Bldg. 202 (Kennels) Partial Disposal		8000	0.2		0.2										
Bldg. 306 Rm. D0001, Cell 2 Decontamination		275	0.2		0.2										
Bldg. 203 Service Floor Radium Clean-up			4.0			0.5	2.0	1.5							
Bldg. 40 (Instrument Calibration) Disposal		4929	0.5				0.5								
Bldg. 329 Waste Storage Facility		960	0.5					0.5							
Bldg. 325C Waste Storage Facility		700	0.3					0.3							
Bldg. 374A Waste Storage Facility		1596	0.7					0.7							
Bldg. 333 (Central Fire Station)		11382	0.1					0.1							
Bldg. 604		560	0.1						0.1						
Subtotal for Non or Slightly Contaminated				0.8	1.1	0.5	2.5	3.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
All Other Contaminated															
Building 330 (Demolition)			3.7			3.7									
Building 301 (Demolition:Funds for S&M in EM Baseline)			1.0					1.0							
Hot Cells, Building 200 M-Wing D&D (incl. Demolition)			30.0				1.0	10.0	10.0	9.0					
Subtotal for All Other Contaminated				0.0	0.0	3.7	1.0	11.0	10.0	9.0	0.0	0.0	0.0	0.0	0.0
Total Excess Facilities				0.8	1.1	4.2	3.5	14.1	10.1	9.0	0.0	0.0	0.0	0.0	0.0
Environmental Management															
Continued O&M Requirements, Contaminated Sites						0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Hydrological Characterization					0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Environmental Monitoring Program				1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Long Term Stewardship						0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Wetlands Management				0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total for Environmental Management				1.6	1.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
EM Funded Commitments, Baseline and Proposed															
EM-Funded D&D Baseline Projects (Incl. S&M)				2.7	0.4	7.2	7.2	7.2							
EM Funded Environmental Remediation Activities (Projects)				3.8	3.8										
Subtotal for EM Funded Commitments, Baseline and Proposed				6.5	4.2	7.2	7.2	7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Third Party Funding															
Energy Savings Performance Contract Projects				2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0
Total Third Party				2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0	0.0

****Dollars shown to match DOE Infrastructure Cross-cut information provided to Congress, March 2002, where appropriate.**

Argonne National Laboratory - East
Infrastructure Modernization Neeeds Chart



	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
Total Excess Facilities	0.8	1.2	4.2	3.5	14.1	10.1	9.0	-	-	-	-	-
Total Line Items	2.8	3.0	16.2	39.0	30.5	45.2	22.1	19.0	21.6	9.9	7.9	26.1
Total GPE	2.2	2.3	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Total GPP	4.8	4.9	13.0	13.4	14.5	15.6	14.5	14.5	14.5	14.5	14.5	14.5
Total Envrionmental Management*	1.6	1.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Total Direct DOE Investment ($)	12.3	13.1	48.2	70.7	73.9	85.7	60.4	48.3	50.9	39.2	37.2	55.4
Indirect Funded Maintenance ($)	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0

**Environmental Management funded through indirect in FY02-03.*

Site Master Plan