Department of Energy
Washington, DC 20585

JUN 12 2002

MEMORANDUM FOR ROBERT G. CARD
UNDER SECRETARY

FROM: RAYMOND L. ORBACH
DIRECTOR
OFFICE OF SCIENCE

SUBJECT: ACTION: Approval of the Mission Need Justification for the Center for Functional Nanomaterials Project

ISSUE: As required by DOE Order 413.3 and the Deputy Secretary's November 15, 2001, memorandum on Project Acquisition Plans and Critical Decisions, this is to request your approval of a Mission Need Justification (Critical Decision Zero (CD-0)) for a new Office of Science (SC) construction project – the Center for Functional Nanomaterials at Brookhaven National Laboratory (BNL), Attachment 1.

BACKGROUND: The Center for Functional Nanomaterials is one of several proposed SC Nanoscale Science Research Centers that will comprise an important part of the Department's contribution to the National Nanoscience Initiative. Nanoscience is the creation and use of materials, devices, and systems through control of matter at the nanometer-length scale. When completed, this Center will function as a scientific user facility for the design, synthesis, processing, fabrication, and characterization of novel molecules and nanoscale materials. The project scope will be comprised of a new laboratory and office building that will include clean rooms, state-of-the-art nanofabrication facilities, and an initial set of scientific equipment.

The BNL proposal for this project has been thoroughly evaluated by a scientific peer review committee. It was found to be technically sound and ready to proceed toward the conceptual design phase.

Approval of the attached Mission Need Justification (CD-0) document will authorize preparation of a Conceptual Design

Report, which should be completed by mid-fiscal year 2003. SC has set the preliminary Total Project Cost range for the Center for Functional Nanomaterials at between $70 million and $85 million, and an expected completion date in late 2007 or 2008. The Associate Director for Basic Energy Sciences, Dr. Patricia M. Dehmer, will serve as the Acquisition Executive for this project and approve all subsequent Critical Decisions.

The Deputy Secretary's memorandum of November 15, 2001on Project Acquisition Plans and Critical Decisions requires the Office of Management, Budget and Evaluation (OMBE) to assess and validate independently the documentation justifying each Critical Decision-0. Their assessment and validation is Attachment 2.

SENSITIVITIES: The Secretary will be visiting BNL on Friday, June 14, 2002, accompanied by Congressman Felix J. Grucci (NY, 1st District) who represents eastern Long Island where the Laboratory is located. Because the Congressman is a strong supporter of BNL and has taken a keen interest in this project, the Secretary would like to take this opportunity to publicly announce that CD-0 has been approved.

POLICY IMPACT: This action does not impact Department policy.

RECOMMENDATION: It is recommended that the Under Secretary approve the Center for Functional Nanomaterials Mission Need Justification (CD-0) by signing below and on the signature page of the attachment.

Approve: _____

Disapprove: _____

Date: 6/12/02

Attachments

CD-0, Approve Mission Need
For the
Center for Functional Nanomaterials
at Brookhaven National Laboratory

Office of Basic Energy Sciences
Office of Science

A. Mission Need Analysis

The mission of the Basic Energy Sciences (BES) program – a multipurpose, scientific research effort – is to foster and support fundamental research in focused areas of the natural sciences in order to expand the scientific foundations for new and improved energy technologies and for understanding and mitigating the environmental impacts of energy use. As part of its mission, the BES program plans, constructs, and operates major scientific user facilities to serve researchers at universities, national laboratories, and industrial laboratories.

In fulfilling its mission, the BES program has taken the lead within the Department of Energy (DOE) in the National Nanotechnology Initiative (NNI). The research plan for the NNI was developed by the Interagency Working Group on Nanotechnology, committee of the National Science and Technology Council. In a similar timeframe, the BES program issued a report "Nanoscale Science, Engineering and Technology Directions" (referred to as NSET). Both the NNI and the BES NSET reports recommended the initiation of Nanoscale Science Research Centers (NSRCs), which were deemed essential for conducting research in support of the DOE missions. The Center for Functional Nanomaterials (CFN) at Brookhaven National Laboratory (BNL), the only NSRC proposed for the Northeastern United States, is a cornerstone of these NNI and BES program plans. This NSRC and all others were chosen by external peer review, were vetted by the Basic Energy Sciences Advisory Committee, and will receive continuing review as the science themes mature and as construction proceeds.

Outstanding facilities exist for the characterization and analysis of materials at the nanoscale. Within the U.S., most of these world-class facilities are owned and operated by the BES program. They include, for example, the synchrotron radiation light source facilities, the neutron scattering facilities, the electron beam microscope centers, and other specialized facilities. BNL is home to the National Synchrotron Light Source (NSLS), the Laser Electron Acceleration Facility (LEAF), and advanced electron beam microcharacterization instrumentation.

However, world-class facilities that are widely available to the scientific research community for nanoscale synthesis, processing, fabrication; for proximal probe imaging; and for studying temporal dynamics do not exist. NSRCs fill that need by serving the Nation's researchers and complementing university and industrial capabilities in the tradition of BES user facilities and collaborative research centers. NSRCs will build on the existing research and facility strengths of the host institutions in materials science and

chemistry research and in x-ray and neutron scattering. This powerful combination of collocated nanoscale research, fabrication, and characterization tools will provide an invaluable resource for the Nation.

The remarkable change in properties of a material when it is structured on the nanoscale is driving a revolution in materials science. In addition, the ability to "nanostructure" materials offers potentially novel – and enhanced – materials properties in a form that immediately lends itself to making new basic building blocks for nanodevices that use these enhanced properties. NSRCs are important because the impact of nanoscience discoveries will depend on being able to link across multiple length and complexity scales. This linking from molecular interactions to nanostructures to functional systems is a challenge of the first order, both scientifically and technologically. Emerging approaches of lithography and replication extend to 50 nanometers , providing the opportunity to form a seamless integration of nano- and microtechnology. Bringing together the broad range of processing tools, characterization equipment, and technical expertise needed to span these length scales is a significant challenge. The NSRCs would also provide a unique environment to explore new nanoscience developments and allow students, faculty, industrial researchers, and national laboratory scientists to work together to propose, design, and assemble these materials into useful devices.

The overriding need is to provide an organizational infrastructure open to external users based on peer review that will focus a truly national nanomaterials effort, thereby enabling breakthrough opportunities. The NSRC's also provide a long-term commitment to solving significant research problems and to developing the expertise of a new generation of researchers in research at the nanoscale.

B. Project Scope and Definition

B.1 Project Scope

The Center for Functional Nanomaterials will integrate BNL's existing capabilities in its synchrotron characterization techniques, its LEAF electron source, and its growing electron imaging facilities with new materials synthesis, imaging, materials temporal probes, and nanofabrication capabilities. The scientific goal of the CFN is to understand the chemical and physical response of nanomaterials, with the challenge being to attain the level of understanding needed to tailor or design new classes of functional materials. The CFN's programs will exploit the unique electronic and optical properties of nanoparticles and molecular nano-arrays to design chemical systems with specific functionality for diverse, energy-related applications such as catalysis, photo-induced energy conversion and storage, and molecular conductors. Another science emphasis will be to examine the behavior and fundamental properties of functional nanocomposite materials including ferro-electrics, magnetic and superconducting thin films to provide insights into their future applications. This capability and focus is complementary to the other planned NSRCs; it capitalizes on the National Synchrotron Light Source (NSLS) leadership in new materials probes; and it builds on the strengths of BNL's BES

programs in (1) strongly correlated electron systems, (2) catalysis, (3) molecular materials, (4) electrochemistry, and (5) nanostructure in complex functional materials.

In the CFN, a wide range of synthetic approaches will be explored to tune the photo or chemical activity and other properties of nanoscale objects through control of particle size, density, molecular functionality, and chemical environment. In addition, the CFN will house an expanded electron microscopy facility, a powerful suite of unique proximal probes for directly imaging atomic and molecular structure, and ultrafast laser sources for nanomaterials excitation and probing.

B.2 Project Description

The physical structure of the Center will be a new building located contiguous to the existing NSLS and the BNL Instrumentation Division buildings. The CFN structure will be a two- story building housing clean rooms, wet and dry laboratories, office space for BNL staff and users, and seminar and conference rooms.

The CFN will operate through major laboratory clusters: including facilities for lithography-based nanofabrication, scanning probe and surface characterization, electron microscopy, materials synthesis and fabrication, ultrafast optical sources, theory and computation, and beamlines at the NSLS. An initial set of scientific equipment for these laboratories will be purchased as part of the project.

The NSLS provides a wide range of imaging, spectroscopy, and diffraction/scattering techniques. To take advantage of these features, the CFN will have access to a suite of existing beamlines at the NSLS including: soft x-ray microscopy beamlines; UV, soft and hard x-ray spectroscopy beamlines; soft and hard x-ray scattering beamlines; an infrared spectro-microscopy beamline; an undulator insertion device microprobe beamline; and a wiggler insertion device small angle scattering beamline.

C. Environment, Safety and Health

The Department and Brookhaven National Laboratory will comply with the requirements of the National Environmental Policy Act (NEPA) and its implementing regulations (10CFR 1021 and 40 CFR 1500- 1508). The DOE Brookhaven Area Office (BAO) performed an environmental evaluation for the project and determined that no negative impacts to the environment are anticipated. A categorical exclusion (CX) from NEPA requirements was approved on March 26,2002.

D. Cost and Schedule Range

The preliminary Total Project Cost (TPC) range is $70-$85 million. This includes project management, building construction, an initial set of scientific equipment and instruments, quality assurance, contingencies, and commissioning. The confidence level for this TPC

range is high based on prior conceptual design estimates for three other NSRCs and on pre-conceptual design work completed to date at BNL.

It is planned that the engineering design, construction, capital equipment procurement, and commissioning will span four years starting in FY 2004 and culminating in an operating CFN in late FY 2007 or FY 2008. A preliminary schedule for procurement and installation of the scientific equipment will be prepared during Conceptual Design. As with the other NSRC projects, a phased approach to CD-4 (Start of Operations) is envisioned to enable programmatic research to begin shortly after beneficial occupancy of the building and prior to overall project completion (which will require installation of the final items of scientific equipment).

E. Project Funding Range and Budget Management

In order to meet the proposed schedule and achieve the Total Project Cost range ($70-$85 million), Project Engineering Design funds will be needed in FY 2004 and FY 2005, and construction funds will be needed in FY 2005 - FY 2007 to support procurement and construction activities leading to project completion in FY 2007 or FY 2008. The project scope includes some large instruments with long lead times of 1-2 years. For this reason, it is planned to have a phased CD-3 with long lead-time instruments ordered prior to the start of construction.

F. Technology Status and Engineering

This project consists of a laboratory/office building housing clean rooms and scientific equipment, which rely on proven technology. The instruments are commercially available (many are off-the-shelf and some will be built to customized specifications). The technical risks are low, and there is no research and development effort associated with the CFN. In addition, there are no operational constraints or safety, health and environmental issues that cannot be responsibly and economically addressed.

G. Project Interfaces and Integration Requirements

The project will receive program guidance and funding from BES. The Associate Director for BES will serve as the CFN's Acquisition Executive. A Federal Project Manager at BAO will carry out implementation and project management under the auspices of the DOE Chicago Operations Office. The Laboratory has assigned a CFN Director who will manage the project. The project will be integrated with site activities at BNL through the establishment of an Integrated Project Team that will include members from the scientific staff, operations, facilities management, project management, and other organizations that will be affected by the project.

H. Safeguards and Security

The CFN project activities will create no new security issues during design and construction. No laboratory safeguards and security requirements will need to be changed for operations. The facility is expected to be a low-hazard, non-nuclear facility. Access to BNL is controlled to ensure worker and public safety and for property protection.

I. Project Location and Site Conditions

The intended location of the CFN within the BNL site is ideal for the following reasons:

- It is in close proximity to key staff and facilities, i.e., the NSLS and the Materials Science, Chemistry and Physics research buildings.
- The site is in close proximity to the existing user support infrastructure provided by the NSLS.
- The intended site meets all construction requirements.
- The plans are in conformance with BNL's strategic planning goals.
- The proposed site is environmentally sound.

J. Legal and Regulatory Assessment

The project will be in full compliance with all applicable federal, state and local requirements. Project activities will require typical construction permits. As mentioned earlier, an environmental evaluation has already been conducted and it was determined that no negative impacts are anticipated as part of this project. Consequently, a categorical exclusion from NEPA requirements has been approved by BAO. There should be no difficulty with obtaining modifications to the existing site air and ground discharge permits. There are no known legal or regulatory issues that could impact the project.

K. Stakeholder Issues

There are no significant stakeholder issues anticipated. Local and regional businesses and universities are strongly in favor of the CFN. Furthermore, BNL has good relations with the local community. Finally, New York State and local government officials are strongly in favor of the CFN and have voiced this support on numerous occasions. The BNL CFN will have a positive impact on the local economy. Through its existing outreach and community programs, BNL will keep stakeholders informed about initiation of and progress toward completion of the CFN project.

CONCURRENCES:

Robert Desmarais
BNL Center for Functional Nanomaterials
Federal Project Manager
DOE Brookhaven Area Office

Date: 6-06-02

Frank J. Crescenzo
Acting Manager, DOE Brookhaven Area Office

Date: 6/6/02

Jeffrey C. Hoy
BNL Center for Functional Nanomaterials
Program Manager

Date: 6-7-02

Patricia M. Dehmer
Associate Director for Basic Energy Sciences

Date: 6/7/02

Raymond L. Orbach
Director, Officer of Science

Date: 6/12/02

APPROVED:

Robert G. Card
Undersecretary for Energy, Science and Environment

Date: 6/12/02

DOE F 1325.8
(08-93)

United States Government **Department of Energy**

memorandum

DATE: JUN 12 2002

REPLY TO ATTN OF: James G. Powers, Director, Office of Program Analysis and Evaluation

SUBJECT: Analysis of Justification of Mission Need (CD-0) for the Brookhaven Area Office Center for Functional Nanomaterials

TO: Robert G. Card, Under Secretary for Energy, Science, and the Environment

As required by the Deputy Secretary's memorandum of November 15, 2001 (subject: Project Acquisition Plans and Critical Decisions), the Office of Program Analysis and Evaluation has completed an independent assessment of the subject CD-0. Our analysis has determined that this nanoscience project is mission critical and furthers the capabilities of basic science to work at the molecular level. Nanotechnology, while still in its early developmental stages, is recognized by the international, academic, scientific, government, and private industry to provide profound impacts to society, the economy, and national security.

Our recommendation is that the Acquisition Executive approve this CD-0.

Should you need additional information, please contact Ann Morimizu, in my office at (202) 586-0381.

cc:
Bruce M. Carnes, Director, Management, Budget, and Evaluation/Chief Financial Officer
Raymond L. Orbach, Director, Office of Science
James Rispoli, Acting Director, Office of Engineering and Construction Management

Center for Functional Nanomaterials
Approval of Mission Need
Critical Decision – 0 (CD-0) Review & Analysis
Office of Program Analysis and Evaluation
June 10, 2002

Executive Summary

The Office of Basic Energy Sciences, within the Office of Science, is requesting approval of CD-0 for the Center for Functional Nanomaterials (CFN) at Brookhaven National Laboratory (BNL). The CFN, one of five currently planned Nanoscale Science Research Centers (NSRCs) within the DOE complex, provides the scientific research community with nanoscale synthesis, processing, and fabrication capabilities and ensures continued U.S. leadership in nanoscience and nanotechnology.

PA&E concludes that this project is mission critical and recommends that CD-0 be approved.

Background

Definition of Nanotechnology

"Nanotechnology is the ability to work at the molecular level, atom by atom, to create large structures with fundamentally new molecular organization. . . it is concerned with materials and systems whose structures and components exhibit novel and significantly improved physical, chemical, and biological properties, phenomena, and processes due to their nanoscale size. The goal is to exploit these properties by gaining control of structures and devices at atomic, molecular, and supramolecular levels and to learn to efficiently manufacture and use these devices"[1]

Nanoscience and nanotechnology provides unprecedented understanding and control over the fundamental building blocks of all physical things. The emerging fields of nanoscience and nanoengineering continue to be recognized by the international, academic, scientific, government, and private industry to provide profound impact on global society and global economy.

Recognizing the economic and national security implications of nanotechnology, the United States (U.S.) has created the National Nanotechnology Initiative (NNI) to coordinate federal nanoscience initiatives. Currently, the U.S. government estimates that there is at least twice the amount of government funded nanotechnology research going on outside of the U.S. as there is within it. Japan, Germany, and the United Kingdom have initiated major national programs to assets its companies as leaders in nanotechnology[1]. Other major players in nanotechnology include: China, Australia, France, India, Taiwan, Korea, Singapore, Russia, Switzerland, and Canada.

The President's Council of Advisors on Science and Technology (PCAST) , was established through Executive Order 13226 on September 30, 2001, and advises the President, through the PCAST Official, on matters involving science and technology policy. The PCAST also assists the National Science and Technology Council (NSTC)[2], in securing private sector involvement in it's activities.

The NSTC, as a cabinet-level council, is the principle means for the White House to coordinate science, space, and technology policies across the Federal Government. The President chairs

[1] Reference: National Nanotechnology Initiative: The Initiative and its Implementation Plan, National Science and Technology Council, July 2000.
[2] NSTC was established by Executive Order in 1993.

the NSTC; membership includes the Vice President, Assistant to the President for Science and Technology, Cabinet Secretaries and Agency Heads with significant science and technology responsibilities, and other White House officials.

Through the NSTC, Federal departments and agencies work cooperatively to ensure that Federal science and technology investments support national goals. NSTC Committees prepare R&D strategies that are coordinated across the Federal government to form a comprehensive investment package. In total here are 17 Federal agencies involved with the National Nanotechnology Initiative (NNI) including DOE[3].

NSTCs Committee on Technology (CT) manages the NNI. CT, comprised of senior level representatives from the Federal government's research and development departments and agencies, provides policy leadership and budget guidance for NNI and other multi-agency technology Program.

CT's Subcommittee on Nanoscale Science, Engineering, and Technology (NSET) coordinates the Federal government's multi-agency nanoscale R&D programs, including the NNI. NSET, co-chaired by the White House National Economic Council (NEC), is comprised of White House and representatives from agencies participating in the NNI, and is responsible for coordinating multi-agency planning, budgeting, implementing, and reviewing of the NNI, ensuring that the nation maintains a broad and balance technology initiative.

Under the NNI, each agency invests in those R&D projects that support its own mission as NNI goals. While each agency consults with NSET, the agency retains control over how it will allocate resources against its proposed NNI plan based on the availability of funding. Each agency uses its own methods for inviting and evaluating proposals; each agency evaluates its own NNI research activities according to its own Government Performance Review Act (GPRA) policies and procedures.

The NNI is a cooperative, national program comprised of government organizations, academia, industry, professional societies, foreign organizations, and others to exchange technical and programmatic information. The five (5) R&D Categories NNI are focused upon include:

- Nanostructure Properties
- Synthesis and Processing
- Characterization & Manipulation
- Modeling & Simulation
- Device & System Concepts

Within DOE, the Office of Basic Energy Sciences (BES) sponsors the fundamental research supporting the NNI. The four (4) fundamental research goals of DOE's NNI include:

- Fundamental scientific understanding of structures and interactions of nanoscale, particularly collective phenomena;
- The design and synthesis of materials at the atomic level for desired properties and functions;
- Fundamental understanding of the processes by which living organisms create materials and functional complexes; and
- Development of experimental characterization tools and theory/modeling/simulation tools.

[3] Federal agencies include: OSTP; OMB; CIA; DOA; DOC; DOD; DOE; DOJ, DOS; DOT; DOTreas; EPA, NASA; NIH; NRC; NIST; and the NSF.

In order to support nanoscale science, engineering, and technology, DOE, through the Office of Basic Energy Science (BES), has constructed and operated facilities that characterize and analyze materials at the nanoscale level. At this time, facilities that research nanoscale synthesis, processing, and fabrication do not exist. Nanoscale Science Research Centers (NSRCs) are currently being designed to fill this need. NSRCs will provide the national and international scientific community – academics, public, and private industry with user facilities and collaborative research centers. There are five (5) DOE laboratories planning on developing NSRCs:

NATIONAL LABORATORY	FACILITY	MISSION
Brookhaven National Laboratory	Center for Functional Nanomaterials (CFN)	• Fabricate and study nanoscale materials.
Argonne National Laboratory	Center for Nanoscale Materials (CNM)	• Fabricate and study nanomaterials, in particular, spintronics.
Oak Ridge National Laboratory	Center for Nanophase Materials Sciences (CNMS)	• Direct access to sample preparation for neutron scattering which is ideal for magnetic structures and for soft materials and residual stress in materials. • Electron beam microcharacterization instruments that are needed to characterize nanoscale and dislocations.
Lawrence Berkeley National Laboratory	The Molecular Foundry	• Synthesis capabilities to the phenomena of macromolecular conformation and assembly and will provide ready access to the Advanced Light Source and other characterization instruments.
Sandia National Laboratory – Los Alamos National Laboratory	The Center for Integrated Nanotechnologies (CINT)	• Sample preparation capabilities for thin films, electron transport, patterning, and magnetic layered structures.

Brookhaven National Laboratory was established in 1947 as a multi-program national laboratory by Brookhaven Science Associates for DOE. It currently employs over 3,000 scientists, engineers, technicians, and support staff. On an annual basis, over 4,000 guest researchers use these facilities located on Long Island, in Upton, New York.

BNL's mission is to produce excellent science in a safe, environmentally sound manner with the cooperation, support and appropriate involvement of its many communities. BNL supports DOE's strategic missions in carrying out basic and applied research at the frontiers of science. Additionally, BNL:

- Conceives, constructs and operates complex, leading-edge, user-oriented research facilities
- Develops advanced technologies that address national needs and initiates their transfer to other organizations and to the commercial sector
- Disseminates technical knowledge to educate future generations of scientists and engineers
- Maintains technical currency in the nation's workforce and encourages scientific awareness in the general public

The major programs at BNL include: nuclear and high-energy physics; physics and chemistry of materials; environmental and energy research; nonproliferation; neurosciences and medical isotopes; structural biology. The major facilities at BNL include the: Relativistic Heavy Ion Collider (RHIC); National Synchrotron Light Source (NSLS); Alternating Gradient Synchrotron, Accelerator Test Facility, and the Tandem Van de Graaff Facility.

The scientific goal of CFN at BNL is to understand the chemical and physical response of nanomaterials, with the challenge being to attain the level of understanding needed to tailor or design new classes of fundamental materials. The CFN will utilize existing NSLS[4] beam lines for characterization of nanostructures.

Consideration of Alternatives

In FY 2000, the Office of Basic Energy Science (BES) solicited proposals from the national laboratories for Nanoscale Science Research Centers (NSRCs). Five (5) proposals from five (5) national laboratories were received in FY 2001 and were subjected to peer reviews. Of the five (5) proposals submitted, three (3) were initially approved (including proposals from Lawrence Berkeley National Laboratory, Sandia-Los Alamos, and Oak Ridge National Laboratory). These three projects are now part of the DOE Capital Asset Acquisition process, and have subsequently moved through the Critical Decision – 0 (Approve Mission Need), Conceptual Design Review, and are currently in CD-1 (Approve Preliminary Baseline Range).

The two (2) remaining proposals (from Brookhaven National Laboratory and Argonne National Laboratory) were required to be modified and resubmitted. New proposals have been received and they were peer reviewed in Spring of 2002. BES has recommended that projects for both laboratories proceed through DOE's Capital Asset Acquisition process.

Project Scope and Definition

The BNL CFN will focus on six areas including:

- Strongly correlated oxides: examining changes in the response of metal oxides with nanoscale dimensions
- Magnetic nanoassemblies: probing magnetic interaction of nanomaterials
- Nanocatalyst materials: studying new ways to form nanocatalysts and look at their electronic structure and reactivity
- Charge injection and transport: understanding electronic conduction in molecular wires and dots
- Nanometer-thick organic films: studying how thin films self-assemble as well as their molecular and electronic substructure

[4] The National Synchrotron Light Source (NSLS) is used for basic and applied research in physics, chemistry, medicine, geophysics, environmental, and materials science. The intensity of synchrotron light (up to 10,000 times greater than conventional beams generated in a laboratory) allows scientists to gain information about the electronic and atomic structures of materials, analyze very small samples, or study surfaces at the atomic level. Using sophisticated imaging techniques, scientists can get highly detailed "pictures' of a wide variety of materials, from biological molecules to semiconductor devices. One of the world's most widely used scientific research facilities, this facility hosts approximated 2,500 researchers from more than 400 universities, laboratories, and companies.

- Nanoscience applications: building new devices and biological assemblies, such as nanoscale electronic devices, ultra thin film optical devices, and advanced fuel cell catalysts.

The physical layout of CFN includes clean rooms, general laboratories, wet and dry laboratories for sample preparation, fabrication, and analysis. Equipment procurement will include: equipment for e-beam lithography, transmission electron microscopy, scanning probes and surface characterization, material synthesis and fabrication, and spectroscopy. It is anticipated that the CFN will be similar to the other NSRCs and is estimated to be approximately 85,000 square feet.

Project Location and Site Conditions

Using NEPA guidelines, a Categorical Exclusion[5] has been granted for the CFN by the BAO NEPA Compliance Officer and approved by the BAO Area Manager.

As per Conference Committee Report 107-258, the Energy and Water Development Appropriations Act, 2002, the new construction increase of 85,000 square feet for the CFN project will be offset by a reduction of square footage from any existing BNL square footage credits, or square footage from any other site.

Technology Status and Engineering

No research and development is associated with the design and construction of the CFN project. The CFN is a basic laboratory facility that includes commercially available items, some of which will be customized to CFN specifications. Most of the equipment will be procured through open competition. There may be some specialized equipment, however, that may require sole sourcing.

Project (Organizational) Interfaces and Integration Requirements

CFN receives program guidance and funding from BES. A Federal Project Manager at BAO will carry out implementation and project management under the auspices of the DOE Chicago Operations Office. The Laboratory has assigned a CFN Director who will manage the project. The project will be integrated with site activities at BNL through the establishment of an Integrated Project Team (IPT) that will include members from the scientific staff, operations, facilities management, project management, and other organizations that will be affected by the project.

Project Funding Range and Budget Management

The pre-conceptual project cost estimate range (Total Project Cost) was developed using the following assumptions:

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[5] Note: For planning purposes, an Environmental Evaluation Notification Form was prepared for the CFN. It was determined by the BAO Area Manager, to be a Categorical Exclusion to the NEPA process. A Categorical Exclusion, as defined by NEPA Part 1501 section 1508.4, is a category of actions which do not individually or cumulatively have a significant effect on the human environment and which have been found to have no such effect in procedures adopted by a federal agency in implementation of these regulations and for which, therefore, neither an environmental assessment nor an EIS is required.

- Operational need date[6]: FY 2007 – FY 2008
- Construction schedule estimate range: 3 – 4 Years
- Laboratory space: approximately 85,000 sq. ft.
- Scientific equipment list

The total project cost estimates range from $70 - $85 million. Scope options, acquisition strategies, future funding availability, and escalation rates will influence refinement of cost estimates in the future.

Environmental, Safety, & Health

There are no environmental, safety, and health issues anticipated by BNL at this time.

Safeguards and Security

The CFN is a non-nuclear facility. It will not have a Hazard or Security Category classification.

Legal and Regulatory Assessment

Two areas of consideration include:

- Intellectual property and technical transfer issues.

  Disposition of patent rights and inventions and technical data and the authority to engage in technology transfer are governed by provisions in the BNL contract. Special provisions may be applied upon request and with DOE approval. Related DOE Orders supporting intellectual property and technology transfer include:

  - DOE G 481.1-1, Work for Others Guide
  - DOE M 481.1-1A, Reimbursable Work for Non-Federal Sponsors Process Manual
  - DOE O 481.1B, Work for Others (Non-Department of Energy Funded Work)
  - DOE O 482.1 DOE Facilities Technology Partnering Programs
  - DOE O 483.1 DOE Cooperative Research and Developments Agreements
  - DOE M 483.1-1, DOE Cooperative Research and Developments Agreements Manual

- National Environmental Policy Act

  As stated earlier, the CFN has been granted a Categorical Exclusion under the NEPA guidelines.

Stakeholder Issues

BAO does not appear to have any special interest groups that will hold an adverse position to the non-nuclear CFN facility.

[6] Operational need date and construction schedule are dependent upon funding scenario.

In 1998, BNL belatedly acknowledged contamination of the local water supply with tritium. DOE is continuing to repair community relations in the neighborhood surrounding BNL and continues to provide water hook-ups to 300 homes in the surrounding area.

Recommendation

Maintaining technological lead in basic science is imperative to maintaining economic, industrial, and national security objectives. From PA&E analysis, it is clear that the capabilities to be provided by the CFN project are a necessary and integral component of the National Nanotechnology Initiative and therefore essential to the science, economic, and security goals of the United States. From PA&E analysis, it is our recommendation that the Acquisition Executive approve the CD-0 for this project.