05-R-321, Center for Functional Nanomaterials, Brookhaven National Laboratory, Upton, New York

1. Significant Changes

There have been no significant changes to scope, cost, or schedule.

2. Design, Construction, and D&D Schedule

(fiscal quarter)

	Preliminary Design start	Final Design Complete	Physical Construction Start	Physical Construction Complete	D&D Offsetting Facilities Start	D&D Offsetting Facilities Complete
FY 2006	4Q FY 2003	4Q FY 2004	3Q FY 2005	3Q FY 2008	N/A	N/A
FY 2007	4Q FY 2003	1Q FY 2005	4Q FY 2005	3Q FY 2008	N/A	N/A
FY 2008	4Q FY 2003	1Q FY 2005	4Q FY 2005	3Q FY 2008	N/A	N/A

3. Baseline and Validation Status

(dollars in thousands)

	TEC[a]	OPC, except D&D Costs	Offsetting D&D Costs	Total Project Costs[a]	Validated Performance Baseline	Preliminary Estimate
FY 2006	79,700	1,300	N/A	81,000	81,000	N/A
FY 2007	79,700	1,300	N/A	81,000	81,000	N/A
FY 2008	79,700	1,300	N/A	81,000	81,000	N/A

4. Project Description, Justification, and Scope

This project will establish a Nanoscale Science Research Center (NSRC) at BNL. The scientific theme of the BNL Center for Functional Nanomaterials (CFN) is "atomic tailoring of functional nanomaterials to achieve a specific response." The CFN will be a user facility designed to provide a wide range of tools for the preparation and characterization of nanomaterials. The CFN will seek to integrate these unique capabilities with other BNL facilities, including the broad range of synchrotron characterization techniques available at the National Synchrotron Light Source (NSLS).

The CFN will be a new building, located across the street from the existing NSLS. Siting of the CFN will take advantage of close proximity to the Instrumentation Division and the Departments of Physics, Materials Science, and NSLS, which are key interdisciplinary participants in nanoscience research.

The design and scope of the CFN will fulfill DOE mission needs and incorporate input from potential users, gained through many channels including outreach efforts such as workshops. An essential component of the project is to establish an organizational infrastructure open to external users based on peer review. In this way a truly national nanomaterials effort can create breakthrough opportunities. The laboratory areas are organized into seven facilities established to provide the necessary primary user service. The facility theme functions cover a wide range of physical and chemical synthesis and

[a] The full project TEC and TPC, established at Critical Decision 2 (Approve Performance Baseline), are $79,700,000 and $81,000,000 respectively, and include the cost for PED from project 02-SC-002.

characterization. They are designated Nanopatterning, Ultrafast Optical Sources, Electron Microscopy, Materials Synthesis, Proximal Probes, Theory and Computing, and CFN Endstations at NSLS. The CFN will allow users to control processes, tailoring the properties of materials structured on the nanoscale. Some of these materials, all relevant to the BES mission, include piezoelectrics, ferroelectrics, organic films and conductors, magnetic nanocomposites, and catalysts.

The preliminary engineering and detailed engineering design necessary to construct a BNL Center for Functional Nanomaterials have been completed. The engineering effort included all engineering phase activities, including field investigation, preliminary design, specifications and drawings for conventional construction, final design, preparation of procurement documents for experimental equipment, and construction/equipment procurement estimates.

The completed design will enable construction of a new two-story Laboratory/Office building of approximately 94,500 gross square feet. The facility will include clean rooms, general laboratories, wet and dry laboratories for sample preparation, fabrication, and analysis. Included will be some of the equipment necessary to explore, manipulate, and fabricate nanoscale materials and structures. Also included are individual offices and landscape office areas, seminar area, transient user space for visiting collaborators with access to computer terminals, conference areas on both floors, and vending/lounge areas. In addition, it will include circulation/ancillary space, including mechanical equipment areas, corridors, and other support spaces.

Technical procurement for the project will include an initial suite of laboratory equipment for the CFN laboratory themes: Nanopatterning, Ultrafast Optical Sources, Electron Microscopy, Materials Synthesis, Proximal Probes, and Theory and Computing as well as for the designated CFN Endstations at NSLS.

The building will incorporate human factors into its design to encourage peer interactions and collaborative interchange by BNL staff and CFN users and visitors. In addition to flexible office and laboratory space it will provide “interaction areas,” a seminar room and a lunch room for informal discussions. This design approach is considered state-of-the-art in research facility design as it leverages opportunities for the free and open exchange of ideas essential to creative research processes.

The FY 2006 funds were used to continue conventional construction and technical equipment procurement. The FY 2007 funds are being used to complete the building construction and procure additional technical equipment. The FY 2008 funds will be used to procure and install the remainder of the technical equipment.

The project will be conducted in accordance with the project management requirements in DOE Order 413.3A and DOE Manual 413.3-1, Program and Project Management for the Acquisition of Capital Assets.

Compliance with Project Management Order

- Critical Decision-0: Approve Mission Need—3Q FY 2002
- Critical Decision-1: Approve Alternative Selection and Cost Range—4Q FY 2003
- External Independent Review (EIR) Final Report—3Q FY 2004
- Critical Decision-2: Approve Performance Baseline—3Q FY 2004
- Critical Decision-3: Approve Start of Construction—4Q FY 2005

- Critical Decision-4a: Approve Beneficial Occupancy—3Q FY 2007
- Critical Decision-4b: Approve Start of Full Operations—3Q FY 2008

5. Financial Schedule

(dollars in thousands)

	Appropriations	Obligations	Costs
Design/Construction by Fiscal Year			
Design			
2003	988[a]	988[a]	733
2004	2,982[a]	2,982[a]	2,721
2005	1,996[a]	1,996[a]	1,676
2006	—	—	702
2007	—	—	134
Total, Design PED (02-SC-002)	5,966	5,966	5,966
Construction			
2005	18,317[b]	18,317[b]	651
2006	36,187[b]	36,187[b]	30,505
2007	18,864[b]	18,864[b]	35,535
2008	366[b]	366[b]	7,043
Total, Construction	73,734	73,734	73,734
Total, TEC	79,700	79,700	79,700

[a] PED funding was reduced $12,000 as a result of the FY 2003 general reduction and rescission and by $18,000 as a result of the FY 2004 rescission. This total reduction was restored in FY 2005 to maintain the TEC and project scope. A rescission reduced FY 2005 PED funding by $16,000.

[b] Construction funding was reduced by $148,000 as a result of the FY 2005 rescission and by $366,000 as a result of the FY 2006 rescission. This total reduction is restored in FY 2007 and FY 2008 to maintain the TEC and project scope.

6. Details of Project Cost Estimate

Total Estimated Costs

(dollars in thousands)

	Current Estimate	Previous Estimate
Preliminary and Final Design (PED 02-SC-002)	5,966	5,966
Construction Phase		
Site Preparation	1,920	1,920
Equipment	21,291	21,279
All other construction	40,718	39,922
Contingency	9,805	10,613
Total, Construction	73,734	73,734
Total, TEC	79,700	79,700

Other Project Costs

(dollars in thousands)

	Current Estimate	Previous Estimate
Conceptual Planning	300	300
Start-up	1,000	1,000
Total, OPC	1,300	1,300

7. Schedule of Project Costs

(dollars in thousands)

	Prior Years	FY 2008	FY 2009	FY 2010	FY 2011	FY 2011	Outyears	Total
TEC(Design)	5,966	—	—	—	—	—	—	5,966
TEC (Construction)	66,691	7,043	—	—	—	—	—	73,734
OPC Other than D&D	775	525	—	—	—	—	—	1,300
Total, Project Costs	73,432	7,568	—	—	—	—	—	81,000

8. Related Operations and Maintenance Funding Requirements

Start of Operation or Beneficial Occupancy (fiscal quarter)	3Q FY 2008[a]
Expected Useful Life (number of years)	40
Expected Future start of D&D for new construction (fiscal quarter)	N/A

(Related Funding Requirements)

(dollars in thousands)

	Annual Costs		Life cycle costs	
	Current estimate	Prior Estimate	Current estimate	Prior Estimate
Operations	17,500	17,500	N/A	N/A
Maintenance	1,000	1,000	N/A	N/A
Total Related funding	18,500	18,500	821,000	821,000

9. Required D&D Information

Not applicable.

10. Acquisition Approach

Design and inspection of the facilities and equipment is being performed by the operating contractor and A/E subcontractor as appropriate. Technical construction will be competitively bid, lump sum contracts. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bidding.

[a] Experimental research will begin between CD-4a (approved start of initial operation) and CD-4b (approve start of full operation of the facility). These research costs are not part of the TPC and will be provided by BES.