

**06-SC-02, Project Engineering and Design (PED), Electron Beam Ion Source,  
Brookhaven National Laboratory, Upton, New York**

**1. Significant Changes**

The Electron Beam Ion Source (EBIS) project received CD-0 approval in the 4Q FY 2004 and CD-1 was approved in the 4Q FY 2005. Cost estimates have been improved through a recent bottoms-up cost estimate, an external technical review of the project, and an internal cost review held in February 2005. As a result, the total estimated cost for PED has decreased from \$3,500,000 to \$2,100,000. A DOE review of technical scope, cost, schedule and management was held in July 2005 prior to CD-1 approval.

Construction funding is requested for EBIS in FY 2007 under project number 07-SC-02.

**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.....	1Q FY 2006	4Q FY 2007	N/A	N/A	N/A	N/A
FY 2007.....	1Q FY 2006	4Q FY 2007	N/A	N/A	N/A	N/A

**3. Baseline and Validation Status<sup>a</sup>**

(dollars in thousands)

	TEC	OPC, except D&D Costs	Offsetting D&D Costs	Total Project Costs	Validated Performance Baseline	Preliminary Estimate
FY 2006 .....	3,500	200	—	3,700	—	3,700
FY 2007 .....	2,100	800	—	2,900	—	2,900

**4. Project Description, Justification, and Scope**

This PED request provides for Architect-Engineering (A-E) services for the preliminary and final design for the Electron Beam Ion Source (EBIS) project. The design effort will be sufficient to assure project feasibility, define the scope, provide detailed estimates of construction costs based on the approved design, working drawings and specifications, and provide construction schedules including procurements. The design effort will ensure that construction can physically start and long-lead procurement items can be procured in FY 2007 when construction funding is first requested.

The flagship user facility at Brookhaven National Laboratory (BNL) is the Relativistic Heavy Ion Collider (RHIC), unique in the world for its ability to create a heretofore-unknown state of nuclear matter called quark-gluon plasma. The operation of RHIC supports the scientific mission of the DOE by providing a world-class facility for Nuclear Physics Research. The quark-gluon plasma is created through the collision of heavy ions accelerated to nearly the speed of light. This process is started at the

<sup>a</sup> The estimates in Section 3 are for PED only. The full Total Estimated Cost (design and construction) of the EBIS project at CD-0 ranged between \$12,000,000 and \$17,500,000; the full Total Project Cost at CD-0 ranged between \$16,000,000 to \$19,500,000. This estimate is based on pre-conceptual design and should not be construed as a project baseline.

RHIC pre-injector. The present pre-injector for heavy ions for RHIC uses the Tandem Van de Graaff, built around 1970. The beam is transported to the Booster via an 860 m long line.

The EBIS project will provide a new heavy ion pre-injector for RHIC based on a high charge state heavy ion source, a Radio Frequency Quadrupole (RFQ) accelerator, and a short Linear Accelerator (Linac). The highly successful development of an Electron Beam Ion Source at BNL now makes it possible to replace the present pre-injector that is based on electrostatic Tandems with a reliable, low maintenance Linac-based pre-injector.

**Compliance with Project Management Order**

The project is being conducted in accordance with the project management requirements in DOE Order 413.3 and DOE Manual 413.3-1, Program and Project Management for the Acquisition of Capital Assets. The project costs presented in this data sheet are preliminary estimates for project engineering and design only. Plans call for a cost and schedule Performance Baseline to be developed during FY 2006 and approved by the Acquisition Executive at the completion of preliminary design (Critical Decision 2 – Approve Performance Baseline). The preliminary schedule for project Critical Decisions is as follows:

- Critical Decision – 0: Approve Mission Need—4Q FY 2004
- Critical Decision – 1: Approve Preliminary Baseline Range—4Q FY 2005
- Critical Decision – 2: Approve Performance Baseline—4Q FY 2006
- External Independent Review Final Report—4Q FY 2006
- Critical Decision – 3: Approve Start of Construction—1Q FY 2007
- Critical Decision – 4: Approve Start of Operations—2Q FY 2010

**5. Financial Schedule**

	(dollars in thousands)		
	Appropriations	Obligations	Costs
Design by Fiscal Year			
2006 .....	1,980 <sup>a</sup>	1,980	1,900
2007 .....	120 <sup>b</sup>	120	200
Total, Design .....	2,100	2,100	2,100

<sup>a</sup> The FY 2006 PED funding was reduced by \$20,000 as a result of the FY 2006 rescission. This reduction is restored in FY 2007 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.....	2,100	3,500

### Other Project Costs

	(dollars in thousands)	
	Current Estimate	Previous Estimate
Conceptual Planning.....	200	200
R&D.....	500 <sup>a</sup>	—
Contingency for OPC other than D&D.....	100	—
Total, OPC.....	800	200

## 7. Schedule of Project Costs

	(dollars in thousands)							Total
	Prior Years	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	Outyears	
TEC (Design).....	1,900	200	—	—	—	—	—	2,100
OPC (Design).....	800	—	—	—	—	—	—	800
Total, Project Costs (Design).....	2,700	200	—	—	—	—	—	2,900

## 8. Related Operations and Maintenance Funding Requirements

Not applicable for project engineering and design.

### (Related Funding Requirements)

Not applicable for project engineering and design.

## 9. Required D&D Information

Not applicable for project engineering and design.

<sup>a</sup> Cost estimates and definition of project tasks have been improved through recent budget and technical reviews, which have led to a refined definition of the R&D needs for the project and more refined definitions of tasks as correlating to R&D vs. PED activities. The previous estimate for OPCs did not include planned R&D efforts, which are now articulated in this Project Data Sheet.

## **10. Acquisition Approach**

Design and inspection of the facilities and equipment will be by the operating contractor and Architect-Engineer (A-E) subcontractor as appropriate. A-E design services will be done by a combination of BNL and competitively bid lump sum contracts administered by the BNL. To the extent feasible, procurements will be accomplished by fixed-price contracts awarded on the basis of competitive bidding. Project and design management, inspection, coordination, tie-ins, testing and checkout witnessing, and acceptance will be performed by the BNL operating contractor.

An approved Acquisition Strategy was generated in 4Q FY 2005 and assessed as part of the CD-1 approval process.