

# 5 Budget for Conceptual Design of NSLS-II and Preliminary Budget for the Project

## 5.1 Project and Operating Costs

Based on the pre-conceptual design outlined in this proposal, the preliminary total estimated cost (TEC) is \$392.8M and the preliminary total project cost (TPC) is \$423.5M, in FY04 dollars. The breakdown of these costs is shown in Table 5.1.1. They include all costs associated with R&D, CDR preparation, project management, project engineering and design (PED), technical and conventional construction, contingencies, and commissioning. The costs also include provision for four insertion device beamlines, including front ends and undulators. The preliminary funding profile for this TPC extends over eight years (FY2005-FY2012). The performance cost baseline will be established at CD-2b. The complete project funding profile, TEC, and TPC will be developed during Title I design and will be approved at CD-2b.

The preliminary annual operating costs are estimated to be \$70M, which includes staff, and facility and equipment operating and maintenance costs. This is estimated based on experience with operating the present NSLS, taking into consideration the significantly larger and more complex NSLS-II complex compared to the present NSLS. It is expected that the facility will be responsible for operating, maintaining, and upgrading the majority of the beamlines at NSLS-II and those costs are also included in the estimated operating costs.

## 5.2 Schedule

A preliminary schedule for the project's Critical Decision (Level 1) milestones is shown in Table

<b>Project Support</b>	<b>48.2</b>
Project Management	10.6
Project Engineering	32.6
Construction Management	2.1
ESH Management	2.6
<b>Technical Construction</b>	<b>145.3</b>
Injection System	32.7
Storage Ring	94.1
Machine Service Systems	16.1
<b>Conventional Construction</b>	<b>120.2</b>
Improvements to Land	1.6
Buildings	83.6
Utilities	33.4
Standard Equipment	1.6
<b>ESH</b>	<b>0.5</b>
<b>Contingency (25%)</b>	<b>78.6</b>
<b>TOTAL TEC</b>	<b>\$392.8</b>
<b>R&amp;D &amp; CDR</b>	<b>3.2</b>
<b>Commissioning</b>	<b>27.5</b>
<b>TOTAL TPC</b>	<b>\$423.5</b>

**Table 5.1.1** Breakdown of preliminary total estimated cost and total project cost for NSLS-II in FY04 M\$.

5.1.2. It is planned that R&D and development of the conceptual design report (CDR) take place in FY2004-FY2005. Project engineering and design of NSLS-II would occur during FY2006 and FY2007. Detailed baseline schedule milestones will be developed during Title I design and approved at CD-2b. During the PED phase, the schedule will be tracked and performance will be measured against PED schedule milestones. CD-2 and CD-3 are phased to permit long-lead procurements to be initiated in FY2008. Actual construction would occur during FY2009 through FY2012.

During FY2012, activities would shift from construction to commissioning. A commissioning plan will be prepared to test and evaluate system performance, both individually and collectively, as compared to approved design criteria. Functional performance tests will be established and all designated systems will be tested against the performance criteria. NSLS-II will be commissioned in phases starting with the NSLS-II injection system. As each stage is completed, it will be commissioned. The top-level commissioning goal is to generate x-rays in an NSLS-II undulator and detect them in an x-ray endstation enclosure.

When inspection, acceptance, and commissioning have been completed, technical equipment is installed and operational, and CD-4 has been approved, the project will formally transition to the operational phase. This is expected to occur in late FY2012.

<u>Milestones</u>	<u>Milestone Description</u>	<u>Scheduled Date</u>	<u>Phase</u>
CD-0	Mission Need	May, 2004	Conceptual
CD-1	Preliminary Baseline Range	September, 2005	PED
CD-2a	Long-Lead Procurement Baseline	February, 2006	PED
CD-2b	Performance Baseline	April, 2007	PED
CD-3a	Start Long-Lead Procurement	August, 2007	PED/LLP
CD-3b	Start Construction	July, 2008	Construction
CD-4	Start Operations	June, 2012	Operation

**Table 5.1.2** *Preliminary Critical Decision Milestones.*

## 5.3 Acquisition Plan

The acquisition of NSLS-II will be conducted through Brookhaven Science Associates as the management and operation contractor. BNL management will be responsible for the research and development, conceptual and engineering design, construction, and operation of NSLS-II. The project will make extensive use of existing expertise at the present NSLS facility. The installation must be carefully coordinated with other research activities at Brookhaven National Laboratory (BNL). Therefore, it is infeasible to have a separate subcontract with another organization to manage the project. The project is similar in scope to the recently completed RHIC facility at BNL, which was conducted successfully by BNL management. BNL has the resources to direct and execute the project.

At BNL, the Light Sources Division, in close cooperation with the Facilities and Operations Division, will be responsible for accomplishing the project under the terms of BSA's contract with DOE. BNL will execute all parts of the project.

Project activities will be accomplished to the extent feasible using fixed-price subcontractors selected on the basis of best value, price, and other factors.

## 5.4 Environment, Safety, and Health

### **5.4.1 Integrated Safety Management System**

Environment, safety and health (ES&H) requirements will be systematically integrated into management and work practices at all levels so that the NSLS-II project is executed while protecting the public, the worker, and the environment. NSLS-II Safety Management System documents and policies will make it clear that the responsibility for safety and environmental protection starts with the NSLS-II Director and flows through the management chain to Associate Directors, to Department Heads and Group Leaders, to line supervisors, and finally to the workers. It is the responsibility of NSLS-II management to ensure that staff are trained and are responsible for ES&H in their assigned areas.

The NSLS-II project work at BNL will be executed in accordance with BNL ES&H policies to ensure hazards are identified and mitigated; work is authorized after ES&H analysis is completed; and oversight of work is conducted by NSLS-II management and staff. The BNL ES&H Division will provide technical support to the project and conduct independent oversight and review of project activities.

### **5.4.2 National Environmental Policy Act**

In compliance with the National Environmental Protection Act (NEPA), DOE will issue a determination to prepare an Environmental Assessment (EA). The effects of the NSLS-II project on the environment will be assessed in the EA. This project will be executed in conformance with existing BNL ES&H policies, systems and procedures to assure a minimum impact on the environment. The EA will serve as the basis for determining whether the NSLS-II project will require an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI) will be issued. The EA is currently planned to be completed by the end of 2005.

### **5.4.3 Fire Hazard Analyses**

A fire hazard analyses (FHA) will be developed to determine the fire safety risks associated with the NSLS-II project. The conclusions of the FHA should be incorporated into the Safety Assessment Document and into the design of the NSLS-II.

### **5.4.4 Safety Assessment Document**

Specific ES&H hazards and the means for their mitigation will be detailed in the NSLS-II safety assessment. The NSLS-II Preliminary Safety Assessment Document (PSAD) will address the ES&H considerations in the design, fabrication, and installation of NSLS-II. The PSAD will be completed prior to starting NSLS-II construction (i.e., before CD-3b). The PSAD will form the basis for the NSLS-II Final Safety Assessment Document (FSAD). The FSAD will evaluate the ES&H considerations for operation of NSLS-II. The FSAD will be completed prior to operation and will serve as the basis for the Accelerator Readiness Review (ARR). The ARR will be accomplished in phases prior to commissioning and completed prior to starting operations (i.e., before CD-4).