National Synchrotron Light Source II

Diane R. Hatton
Project Support Division Director
August 14, 2009
Outline

• NSLS-II Overview
• Organizational Structure
• NSLS-II Early Planning
• Progress
NSLS: Outstanding Scientific Productivity

- Operating since 1982
- Many Scientific Programs
  - Material & Chemical Sciences, Life Sciences, Geological & Environmental Sciences, Applied Science & Engineering, and others
- 2400 users/year
- Highly Productive & High Impact
  - 900 publications per year

However, restricted capabilities of present NSLS limit the productivity and impact of its large user community.
National Synchrotron Light Source II

The world’s finest capabilities for x-ray imaging and high-resolution energy analysis, ~10 times better than any other synchrotron now operating or under construction.
Project Scope & Cost

Accelerator Systems
• Storage Ring (~ ½ mile in circumference)
• Linac and Booster Injection System

Conventional Facilities
• Ring Building and Service Buildings
• Laboratory/Office Buildings (LOBs) to house beamline staff & users
• Total of ~ 400,000 gsf new construction

Experimental Facilities
• Initial suite of beamlines and instruments
• Capable of hosting at least 58 beamlines

Research & Development
• Advanced optics
• Nanopositioning and mirror metrology
• Accelerator components

Total Project Cost = $912M
Facility Site Plan

Circumference of Present NSLS: 170 m
Circumference of NSLS-II: 780 m
~ 400,000 sf of building construction
Aerial View: NSLS-II, NSLS & CFN
Front Entrance
Laboratory and Office Building
Sustainable Design

• Approach is to obtain LEED (Leadership in Energy and Environmental Design) Certification with possible silver rating.

• Facility design will strive to meet guiding principles of sustainable design
  • Employ Integrated Design Principles
  • Optimize Energy Performance
  • Protect and Conserve Water
  • Enhance Indoor Environmental Quality
  • Reduce Environmental Impact of Materials

• Current LEED checklist status

<table>
<thead>
<tr>
<th>Y</th>
<th>M</th>
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<td>28</td>
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**Project Totals (pre-certification estimates)**

- **Certified**: 26-32 points
- **Silver**: 33-38 points
- **Gold**: 39-51 points
- **Platinum**: 52-69 points
Work Breakdown Structure (WBS)
# Schedule

<table>
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<th>FY05</th>
<th>FY06</th>
<th>FY07</th>
<th>FY08</th>
<th>FY09</th>
<th>FY10</th>
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<td>CD-2</td>
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## Design

- **Conceptual Design**: Aug 05 - Jul 07
- **Conventional Facilities**: Sep 08
- **Accelerator Systems**: Aug 11
- **Experimental Facilities**: Feb 12

## Construction & Installation

- **Long Lead**: Oct 08
- **Procurement and Fabrication**: Nov 12
- **Construction and Installation**: Sep 13

## Commissioning and Pre-ops

- **Commissioning & Pre-Ops**: Dec 12

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**Legend**

- (A) Actual
- Completed
- Planned
- Today
- Level 0 Milestone
- CD4 Range
- Schedule Contingency
- Critical Path
## Key Project Milestones

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<td>CD-1, Approve Alternative Selection and Cost Range</td>
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<td>CD-2, Approve Performance Baseline</td>
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<td>Jan 2009</td>
<td>CD-3, Approve Start of Construction</td>
<td>Complete</td>
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<td>Feb 2009</td>
<td>Contract Award for Ring Building</td>
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<tr>
<td>Aug 2009</td>
<td>Contract Award for Storage Ring Magnets</td>
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<td>Mar 2010</td>
<td>Contract Award for Booster System</td>
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<tr>
<td>Feb 2011</td>
<td>1st Pentant Ring Building Beneficial Occupancy; Begin Accelerator Installation</td>
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<td>Feb 2012</td>
<td>Beneficial Occupancy of Experimental Floor</td>
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<td>Oct 2013</td>
<td>Start Accelerator Commission</td>
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<td>Jun 2014</td>
<td>Early Project Completion; Ring Available to Beamlines</td>
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<td>Jun 2015</td>
<td>CD-4, Approve Start of Operations</td>
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CD-1 Project Organization

NATIONAL SYNCHROTRON LIGHT SOURCE-II
S. Dierker
ASSOCIATE LABORATORY DIRECTOR FOR LIGHT SOURCES
NSLS-II PROJECT DIRECTOR

SENIOR ADMINISTRATIVE ASSISTANT L. Miller
DEPUTY PROJECT DIRECTOR J. Yeck
ENVIRONMENT, SAFETY, SECURITY & HEALTH MGR R. Casey
QUALITY ASSURANCE MANAGER M. Ruckley

ACCELERATOR SYSTEMS
S. Ozaki
DIVISION DIRECTOR

INJECTOR SYS.
WBS MGR

STORAGE RING
SYSTEM
WBS MGR

GLOBAL
SYSTEMS
WBS MGR

ACCELERATOR
PHYSICS

MECHANICAL
ENGINEERING
S. Sharma
GROUP LEADER

ELECTRICAL
ENGINEERING

RF

DIAGNOSTICS &
CONTROLS

INJECTION DEVICES

EXPERIMENTAL FACILITIES
J. Hilt
DIVISION DIRECTOR

IMAGING

INELASTIC

TRUST FUND
BEAMLINES

CONVENTIONAL FACILITIES
M. Feiler
DIVISION DIRECTOR

COMMISSIONING
CONTRACTOR

CONSTRUCTION
MANAGEMENT

RIII RNG
PROJECT MANAGER

EC DESIGN
J. Mills
SUPERVISOR

PROJECT SUPPORT
D. Hatton
DIVISION DIRECTOR

PROCUREMENT
D. Dole
MANAGER

INFORMATION
TECHNOLOGY
A. Levine
MANAGER

PROJECT CONTROLS
C. Lavelle
MANAGER

BUSINESS
OPERATIONS
D. Halton
MANAGER

FACILITIES
G. Vandermark
MANAGER

HUMAN
RESOURCES
S. Foster
MANAGER

CONSTRUCTION
PROJECT MANAGER

CHW PROJ
PROJECT MANAGER

40 NSLS-II Staff
CD-2 Project Organization

90 NSLS-II Staff
CD-3 Project Organization

140 NSLS-II Staff
NSLS-II Current Organization Chart

212 NSLS-II Staff
NSLS-II Management Team

Steven Dierker
Associate Lab Director for Light Sources
Project Director

Aesook Byon
Deputy Project Director

James Yeck
Assistant Project Director for Conventional Construction

Satoshi Ozaki
Senior Project Advisor

Ferdinand Willeke
Accelerator Division

Qun Shen
Experimental Facilities Division

Martin Fallier
Conventional Facilities Division

Diane Hatton
Project Support Division
NSLS-II Early Planning

- Information exchanges
  - APS
  - SNS

- Draft documents
  - PEP
  - Organization Guide
  - Project Controls Manual
  - Risk Management Plan
  - QA Plan
  - Configuration Management Plan
NSLS-II Early Planning

- Parametric Estimate
- Proposed WBS
NSLS-II Early Planning

• Cost Estimate Tool
  • Developed In-house
  • Gathered
    – Estimate info
    – Risk info
    – Backup documentation
    – Auto feed to Schedule
• Primavera & Cobra chosen
• Advisory Committees established
• Conceptual Design Report written
NSLS-II Early Planning

- Incentive Plan Drafted
  - Service based benefits (transfer of time)
    - Vacation, LOA, severance
  - Variable Pay Options (enhance base salary with tools)
    - Sign-on bonus
    - Performance bonus
  - Additional relocation assistance
- Final approval received in July of 2007
NSLS-II Early Planning

• Negotiations with Brookhaven National Laboratory
  • Support Staff
    – Co-located groups
    – Requested specific staff
  • Overhead Rates
    – Lessons Learned: Assumptions Document
• Seed Funds
• Space
NSLS-II Facilities Established With Support From BNL
Previous NSLS-II Site Usage

- WW-II wooden structures used for warehousing operations were in the footprint of NSLS-II
- On-going GPP and Ops funded projects demolished these and built new structures elsewhere
BNL EVMS Certification

- Lab-wide committee formed
- Contract with outside firm to prepare BNL for certification and training
- BNL EVMS System Description completed
- Project EVMS procedures developed
- Readiness Assessment – June 2007
- Full EVMS Review – October 2007
- Re-visit – June 2008
- Certification received June 2008
Project Management Systems

- Project controls systems developed, instituted and being successfully used to measure progress
- Primavera used for scheduling; Cobra for cost baseline maintenance; PeopleSoft for actual costs
Lessons Learned - Project Management Systems

- Software development carried out in-house to support reporting efforts
Project Management Systems

- Configuration Management / Change Control
- 60 changes approved to date
  - 30 in FY08, 30 so far in FY09

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<td>Transfer of Undulator Scope &amp; Budget From SRX B/L to ASD</td>
<td>Andy Broadbent</td>
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<td>Total Project Cost NSLS-II</td>
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Great Progress So Far

Light Sources Directorate Picnic
Procurement

• 70 Advance Procurement Plans developed for FY08-FY10
• 5 Acquisition Plans developed for procurements > $5M
• Procurement milestones tracked through the schedule
• Processed 150 purchase requisitions in FY07 for a total of $2M
• Processed 500 purchase requisitions in FY08 for a total of $8M
• Processed 550 purchase requisitions so far for FY09 for a total of $50M
Procurement – Lessons Learned

• Anthony Guadagni, NSLS-II Procurement Manager
• David Paveglio, Deputy Manager and NSLS-II Construction Lead
  • Extensive contractor outreach for ring building procurement
  • Five “best value” offerors submitted bids
  • Highest technical score was also lowest price
  • Contract awarded to Torcon, Inc. on February 18, 2009
Construction Progress

- Ring Building construction contract awarded to Torcon, Inc
  - Price consistent with baseline - enables retirement of significant risk

Contract Signing – February 18, 2009
Construction Progress


Demolition Debris  Field Offices  Ring Bldg Footprint  Taking Shape

Conventional Facilities Field Office  Ring Building Construction Site  Concrete Work Progressing
Construction Progress

- Storm Drain Installation
- Utility Tunnel Concrete 1st Pour
- Survey Monument Pour
- Water Main Installation
Tracking Construction

- Web Camera
Proposed Funding Profile for NSLS-II Facility
Strong Federal, State, and DOE Support

Senator Schumer & Representative Bishop visited NSLS on Feb 17, 2009 & announced that final FY09 Appropriation will have full funding of $103.3M for NSLS-II.

Governor Paterson visited BNL on Feb 27, 2009 & announced an agreement to allocate low-cost electricity for BNL to support the construction of NSLS-II.

DOE Secretary Chu visited BNL on Mar 23, 2009 & announced $184.3M in American Recovery & Reinvestment Act (ARRA) funding for BNL, including $150M for NSLS-II.
American Recovery and Reinvestment Act
Before and After

- Final ARRA activities being coded in the schedule
  - 4000 Torcon activities in schedule; 2500 activities coded ARRA
- Torcon will provide monthly invoices that separate ARRA and non-ARRA Activities
- Weekly ARRA Reporting is ongoing
- Other ARRA reports provided as required
Earned Value Management

NSLS-II Performance through June 2009
On Budget -- On Schedule

- Scheduled Work: 16.6%
- Performed Work: 15.9%
- Actual Cost: 15.3%
Cost & Schedule Performance

- **Cost:** Project Management is on Budget – CPI = 1.04
- **Schedule:** Level of Effort – SPI = 0.96

\[
\text{CPI} = \frac{\text{Earned Value}}{\text{Actual Cost}}
\]

\[
\text{SPI} = \frac{\text{Earned Value}}{\text{Planned Value}}
\]
Contingency Tracking

NSLS-II Contingency; % of Remaining Work

Approved Contingency Allocations:
1. Storage Ring Height Change and Ring Building Expansion
2. Accelerator System Changes
3. Ring Building, Contract and A/E Price Adjustments
   Project Support Staffing Refinements and Space Increases

Approved Management Reserve Allocations:
4. RF BPM Adjustments
   Sextupole Powering Around Damping Wiggler
   RF BPM Button Changes
   Booster RF Cavity Cost Correction
   DCT and FCM Cost Corrections
   Accelerator Systems Schedule Revisions

Graph shows percentage changes over time from Baseline to 3rd Qtr FY09.
Overall Monthly Spending

Spending Projection for FY09

- Materials/Contracts
- Salaries
NSLS-II Current Staffing Status

NSLS-II Staffing Plan vs. Project Requirements (FTEs)

- FY2008: Required 100, Hired 100, Planned Hires 75, Job Shoppers 25, MOU/BNL 25
- FY2009: Required 150, Hired 150, Planned Hires 125, Job Shoppers 25, MOU/BNL 25
- FY2010: Required 200, Hired 200, Planned Hires 175, Job Shoppers 25, MOU/BNL 25
- FY2011: Required 250, Hired 250, Planned Hires 225, Job Shoppers 25, MOU/BNL 25
- FY2012: Required 300, Hired 300, Planned Hires 275, Job Shoppers 25, MOU/BNL 25
- FY2013: Required 150, Hired 150, Planned Hires 100, Job Shoppers 25, MOU/BNL 25
- FY2014: Required 100, Hired 100, Planned Hires 50, Job Shoppers 25, MOU/BNL 25
Staffing Progress

- Human Resources
  - 18 Open Requisitions with 1 offer in process
  - Total hires now at 212
  - 58 Offers accepted so far this fiscal year plus 9 students for summer ‘09

![Cumulative New Hires by Month graph]

- 20 Staff at 9/06
- 80 Staff at 9/07
- 139 Staff at 9/08
- 212 Staff Today
Staffing Progress

New Hires by Month

Heads

- Project Management
- Accelerator Systems
- Experimental Facilities
- Conventional Facilities
Staffing – Lessons Learned

- Career Open House – March 29, 2008
  - 500 attendees
  - 400 NSLS-II candidates interviewed by Recruiters
  - 150 NSLS-II candidates interviewed by Technical Managers
  - 40 candidates invited back for second interviews
  - 6 offered positions

Open House Hires
- Civil/Architectural Inspector
- Construction Project Engineer
- Lead Mechanical Engineer for Conventional Facilities
- Mechanical Engineer for Beamline Diagnostics
- Electronic Technical Specialist
Summary

• NSLS-II early planning key to initial successes
• Strong laboratory, federal, state support critical
• NSLS-II project support being used as a model at BNL
• www.bnl.gov/nsls2