National Synchrotron Light Source II

Project Progress Report

February 2010

The black and white crane in the foreground was positioning structural steel in this shot taken February 23.

report due date:
March 20, 2010

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Upton, New York 11973

OVERALL ASSESSMENT

The National Synchrotron Light Source II project maintained excellent technical progress and satisfactory cost and schedule performance. The DOE Independent Project Review (IPR) was conducted by the Office of Science on February 9–11. Due to a major snowfall, the second half of the review was moved offsite. The review was successfully completed despite this challenge; the committee concluded, *"Overall, the project is being properly managed for its successful execution and has made significant progress since the June 2009 DOE/SC review including staff hiring, conventional facility construction, and significant procurements in process for technical systems. In addition, the project has an excellent cost and schedule performance with robust contingency remaining."*

Despite abnormally cold weather and heavy snowfall in February, construction of the ring building and central chilled water plant expansion continued to progress well. Concrete work continued, completing the ring tunnel slab for pentant 4 and most of the right tunnel walls for pentant 3. Structural steel erection began for the RF and cooling tower buildings and service building 1, achieving a significant milestone. A Request for Proposals (RFP) for the Laboratory Office Buildings (LOB) was issued on February 9.

Progress was excellent in all areas of Accelerator Systems, maintaining its cost and schedule goals. The first sextupole was manufactured and being tested slightly ahead of schedule, and production approvals for five other magnet contracts were granted after rigorous design validation reviews. Production of the vacuum chambers also advances well, and substantial progress was made in remaining areas of vacuum system component production, power supply procurement, BPM electronics testing, and controls system design.

With details of technical scope clearly defined from the beamline conceptual design phase, preliminary design of the six project beamlines is progressing full speed. Excellent progress was made in the hard x-ray nanoprobe satellite building design and a number of R&D areas.

The activities funded by the American Recovery and Reinvestment Act (ARRA) continue on schedule and budget.

SCHEDULED EVENTS 2010

IXS Beamline Advisory Team (BAT)	Mar 23
Data Acquisition and User Interfaces workshop	April 19-20
NSLS-II Accelerator Systems Advisory Committee meeting	June
NSLS-II Conventional Facilities Advisory Committee meeting	June
Light Sources Scientific Advisory Committee meetings	Summer
Magnet Production Readiness Reviews (7)	May-July
Timing and Fast Orbit Feedback workshop	July

ACCELERATOR SYSTEMS DIVISION (ASD)

The end of February was marked by the first completed sextupole of the NSLS-II magnet production, a "wide" sextupole magnet (Fig. 1) manufactured by the Institute of High Energy Physics in Beijing, China. For six of the seven production lines, magnet production has begun, following review and approval by NSLS-II engineers of the design validation reports from the vendors.

The first two dipole vacuum chambers, which were received in January, have been successfully tested, with one chamber treated by ozone to reduce contamination. Three vacuum chambers for the quadrupole-sextupole girder of type "S2-odd" have been completed at APS and are being tested. Meanwhile, the Al-extrusions are in full production. Twenty-one multipole extrusions were received at BNL and are being inspected. The design of the S4A Inconel-625 chamber was finalized and reviewed. The design of the beam transport line bending chambers has started.

The contract for 350 sputter ion pumps has been placed with Gamma Vacuum, and the production plan agreed upon. The vendor's drawings for ion pumps and titanium sublimation pump manifolds have been checked for fitting with chambers and magnets on girders. The contract for ultrasonic cleaning facility is being placed with a vendor.

The main magnet power supply controls rack has been assembled and performance testing has started. There are 800 DCCT modules (out of a total of 1,850) in house. The system for automatic testing of these devices has been completed. After the final external design review of the equipment enclosures, all procurement documents have been completed and the procurement process can start. The design of power supplies for the beam transfer line is completed.

The complete procurement package for the damping wiggler, including drawings, specification, and SOW, is ready for RFP. A final agreement with APS on the construction of the damping wiggler is still pending.

The system for continuous calibration of BPM electronics has been worked out and implementation has begun. The layout routing for the digital filter electronics (DFE) is completed and all DFE parts are on order. Testing the full chain of the analog filter electronics has been completed, and tests of the clock distribution and calibration section are in progress. A manufacturing problem with the RF BPM buttons has been resolved and production is back on track. Procurement documents the for injector BPMs are done.

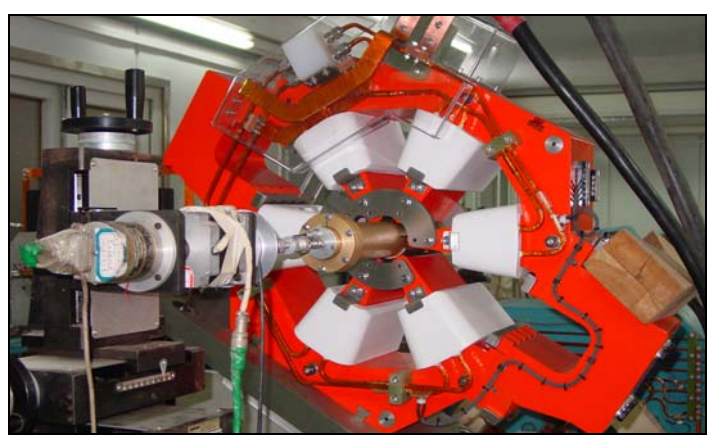


Figure 1: "Wide" sextupole magnet manufactured by the Institute of High Energy Physics in Beijing, China, on the test stand, ready for measurement of magnetic field quality.

The instrumentation group also received the first article of the beryllium copper RF shields for rogue mode mitigation. These were tested and the design was subsequently improved. The final production order is in preparation. Two prototypes of a carbon fiber composite vacuum chamber support were developed and ordered. This is considered as an alternative approach to the invar multi-pole chamber supports. Optical components for the Visible Synchrotron Light Monitor have been specified. A re-layout of the optical beamline was carried out to adapt to details of the ring-building.

The Controls group completed various hardware testing, such as tests on digital imaging devices. A wireless network for access to the control system in the tunnel has been designed. Recently completed frontend software development included communication blocks for the BPM cell controller. The core of the interface design is complete and has been simulated and tested. The software can be booted from the flash, ROM, and parallel ports.

The display manager in Control System Studio has been used to build a set of test screens from which a list of required changes was generated. The group deployed an SNS build of Control System Studio with selected clients.

EXPERIMENTAL FACILITIES DIVISION (XFD)

The Experimental Facilities Division (XFD) made progress on preliminary designs of the six project beamlines in February. One focus area is programmatic scope refinement of the hard x-ray nanoprobe satellite building design. Several design discussion meetings were held in February among XFD staff, CFD staff, and the design architect firm. The building design is aimed at providing an optimized operating environment for the nanoprobe endstation with maximum acoustic isolation and temperature stability. This key element of the nanoprobe beamline design will enable ~1nm spatial resolution for x-ray imaging experiments.

In the beamline controls area, detailed discussions were held to identify hardware and software options for beamline controls. A joint beamline controls working group consisting of staff from XFD, ASD, and NSLS organized several meetings since January, with excellent participations from local NSLS user groups.

In optics metrology, a preliminary plan for design and implementation of a next-generation long trace profiler is being developed, in communications and coordination with other synchrotron facilities in the U.S. A workshop on a slope measuring instrument is being planned at Lawrence Berkeley National Lab to discuss a preliminary design with modular options. NSLS-II will participate in the design and implementation effort, which will lead to a cutting-edge slope measurement device for developing and qualifying beamline optics for NSLS-II beamline and user groups.

In the optics R&D area, the high-precision rail (Fig. 2) has been aligned and inserted into the new Multilayer Laue lens (MLL) deposition system for production of ~1 nm optics.

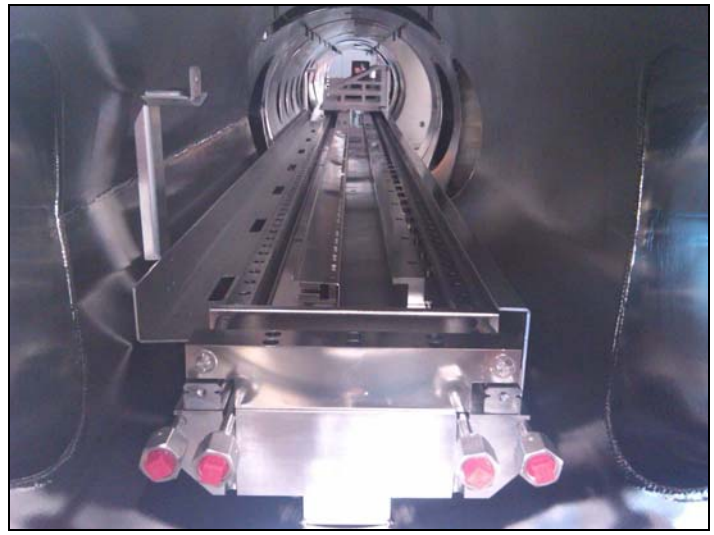


Figure 2: High-precision rail aligned and inserted into the new Multilayer Laue Lens deposition chamber for production of ~ 1 nm x-ray optics.

In MLL slicing technique development, significant progress has been made in using reactive ion etching (RIE) to fabricate MLL optics. In recent experiment runs, an etching depth of more than 6 microns has been achieved for Si/WSi2 multilayers (Fig. 3), showing the promise of this technique.

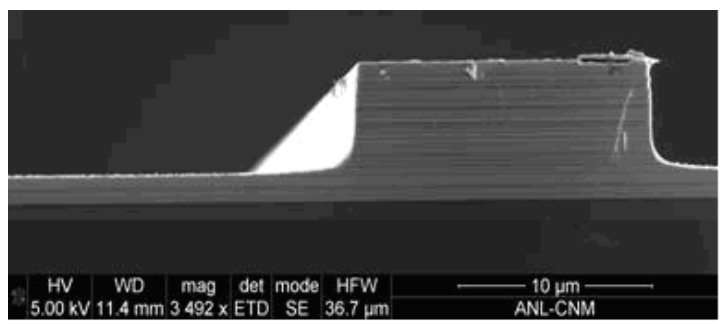


Figure 3: Scanning electron micrograph of a Si/WSi2 multilayer slice sectioned by reactive ion etching (RIE). The etch depth is 6.4 microns.

CONVENTIONAL FACILITIES DIVISION (CFD)

Construction of conventional facilities continued to progress in February despite continued unseasonably cold weather and major snowfall events. Although some activities were deferred until warmer weather, overall progress continues to be on schedule as the contractor has been able to complete key activities on the critical path.

Concrete work continues to be the primary critical path activity, and progress in key areas was maintained in February. The ring tunnel slab was extended into pentant 4 by utilizing winter mixes and temporary heating techniques. The ring tunnel walls have been extended through most of pentant 3. The ring tunnel roof did not advance in February due to delay in placing the last section of high-density concrete wall. These high-density concrete walls have since been placed and the tunnel roof should progress rapidly in March.

A significant milestone was achieved in February when structural steel erection began. All structural steel has been fabricated and deliveries are arriving at the site (Fig. 4).

Figure 4: The first steel delivery took place in February.

Erection of steel for the RF and Cooling Tower buildings and Service Building 1 began in late February (Fig. 5) and will be completed in early March. Mobilization of the large crawler crane is planned for early March and will enable the start of steel erection in pentant 1 shortly thereafter.

Figure 5: Steel erection began on the RF Building.

The continued cold weather has limited earthwork and backfill operations. February efforts focused on completing backfill in the RF, Cooling Tower, and Service Building 1 areas to enable positioning of the crane for steel erection. Backfill of the vehicle tunnel and footprints of the LOBs was deferred until warmer weather. This work is expected to resume in March and be completed during April.

Installation of utilities was slowed by February's weather, but much of this work was ahead of schedule so the impact is minimal. Electrical ductbanks are now completed to the locations of the RF and Injection buildings and Service buildings 1 through 3. The steam and water services piping in the utility tunnel is nearly complete. Installation of chilled water piping outside the ring and the various piping services in the inner ring courtyard will begin in March.

The electrical substation expansion continued, with interior work in Building 603 during February. The 15kV switchgear has been positioned in the equipment lineup, and fit-out of the gear is underway. Conduit from the gear to the transformer yard and from the gear to the 15kV ductbank has been installed. With the arrival of better weather in March, exterior work in the transformer yard will begin.

The expansion of the Chilled Water Plant continues to progress well. Steel erection is complete and the steel decking is in place. Placement of the composite concrete deck for the first and second floors is scheduled for the first week of March. Piping in the basement (the majority of project piping) is nearly complete. The cooling tower basins have been poured and the cooling tower steel structure has been erected. Foundations for the pumphouse are in place. The chillers have been fabricated, and witness testing and acceptance at the factory have been completed. Delivery and installation of the chillers will likely take place in April. Overall progress on the chilled water plant continues ahead of schedule.

The LOB procurement process is now underway, as DOE approval of the LOB RFP was received in early February and the RFP has been released to bidders. Interest among the contracting community remains high. A pre-proposal meeting is scheduled for early March, and bids are due March 25.

Figure 6: Injection Building foundation work progressed in February.

COST/SCHEDULE BASELINE STATUS

The cumulative Cost Performance Index (CPI) changed slightly, from 1.03 to 1.04, and the cumulative Schedule Performance Index (SPI) continues to remain at 0.99 for the third consecutive month. Both cumulative indices have green status and are well within the DOE acceptable range.

CPI for the month is 1.20 (yellow status), due to a correction of an error in the accrual for the chilled water plant. The monthly SPI is 1.15 (green status), due primarily to the completion of six Design Validation Reports for the storage ring magnets which were scheduled for previous months, as well as the additional vendor receipt of raw materials which had been planned for January. The critical path remains the same, from conventional construction through storage ring installation, test, and commissioning, with early completion in February of 2014.

ENVIRONMENT, SAFETY, AND HEALTH (ESH)

Radiological analysis for the supplementary shielding at high beam loss locations inside the accelerator enclosures is continuing. Supplementary shielding analysis for the linac beam dumps, booster beam dump, injection, and extraction septa has been completed and is in an advanced stage of engineering design. The ratchet wall shielding and the ratchet wall collimator shielding for six project beamlines has been designed and sent for pricing options. FLUKA Monte Carlo simulations for the injection scrapers to determine additional shielding required at the scraper locations is ongoing. Radiation dose that would be released during a hypothetical top-off injection accident (when injected beam comes down to the first optics enclosure of the beamlines) has been calculated using FLUKA simulations. Based on these, top-off injection interlock options were recommended to the top-off task force.

The project is in the process of closing out the three remaining open corrective actions from the injury that occurred at the ring building construction site on September 30, 2009. These actions include hiring a third construction safety engineer (interviews are in progress); conducting an assessment of the contractor's suspect/counterfeit parts program; and modifying the contractor's safety incentive to provide a better flow down to the staff. These corrective actions are expected to have been completes by the end of March 2010.

PROCUREMENT ACTIVITIES

The booster solicitation was released to industry on January 19, 2010. Booster responses are due March 30, 2010. Design Validation Reviews for all five magnet suppliers have been completed. With the exception of the Buckley Systems dipole magnet, all magnet first articles are currently in production. Dipole first article "authorization to proceed" is expected by March 12, 2010. The Laboratory Office Buildings (LOB) solicitation was issued on February 9, 2010. The solicitation closing date is set for March 25, 2010, with award expected by mid-May. Linac proposals were received and are currently under evaluation.

RECENT HIRES

Paula Callejas-Lynn – Administrative Services Assistant, ASD

Frank DePaola –Manufacturing Engineer, Mech. Engineering, ASD

Charles Kitegi – Assistant Physicist, Insertion Devices, ASD

Ajesh Prabhu – FPGA Engineer, Diagnostics & Instrumentation, ASD

Vladislav Ruchinsky – Staff Engineer, Insertion Devices, ASD

Xianbo Shi – Research Associate, XPD Beamline, XFD

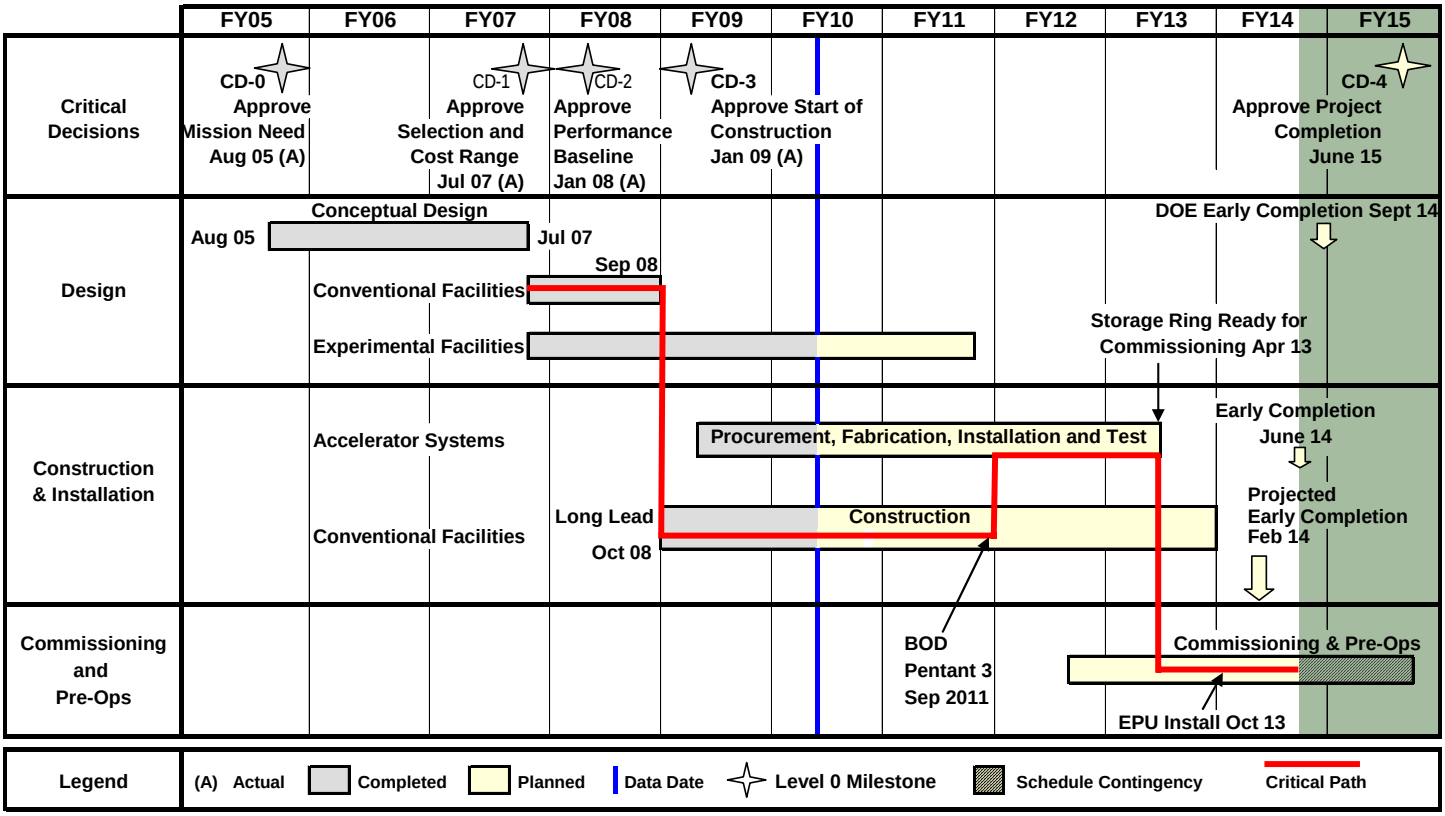
RECENT PROJECT ACCOMPLISHMENTS

- The first NSLS-II sextupole was completed.
- The first two dipole vacuum chambers have been successfully tested.
- Three vacuum chambers for the quadrupole-sextupole girder have been completed at APS and are being tested.
- The main magnet power supply controls rack has been assembled and performance testing has started.
- Nearly half of the 1,850 DCCT modules have been delivered.
- The complete procurement package for the damping wiggler—including drawings, specification, and SOW—is ready for the RFP release.
- In the optics R&D area, a high-precision rail has been aligned and inserted into the new Multilayer Laue Lens deposition system for production of ~1 nm optics.
- Structural steel erection began. All structural steel has been fabricated and deliveries are arriving at the site.
- Steel erection for the Chilled Water Plant is complete.
- The ring tunnel slab was extended into pentant 4 and the ring tunnel walls have been extended through most of pentant 3.
- Electrical ductbanks are now completed to the locations of the RF and Injection buildings, and Service buildings 1 – 3.

PROJECT DESCRIPTION

The NSLS-II project is being carried out to design and build a world-class user facility for scientific research using synchrotron radiation. The project scope includes the design, construction, and installation of the accelerator hardware, civil construction, and experimental facilities required to produce a new synchrotron light source. It will be highly optimized to deliver ultra-high brightness and flux and exceptional beam stability. These capabilities will enable the study of material properties and functions down to a spatial resolution of 1 nm, energy resolution of 0.1 meV, and with the ultra-high sensitivity necessary to perform spectroscopy on a single atom.

DOE Project Milestone Schedule



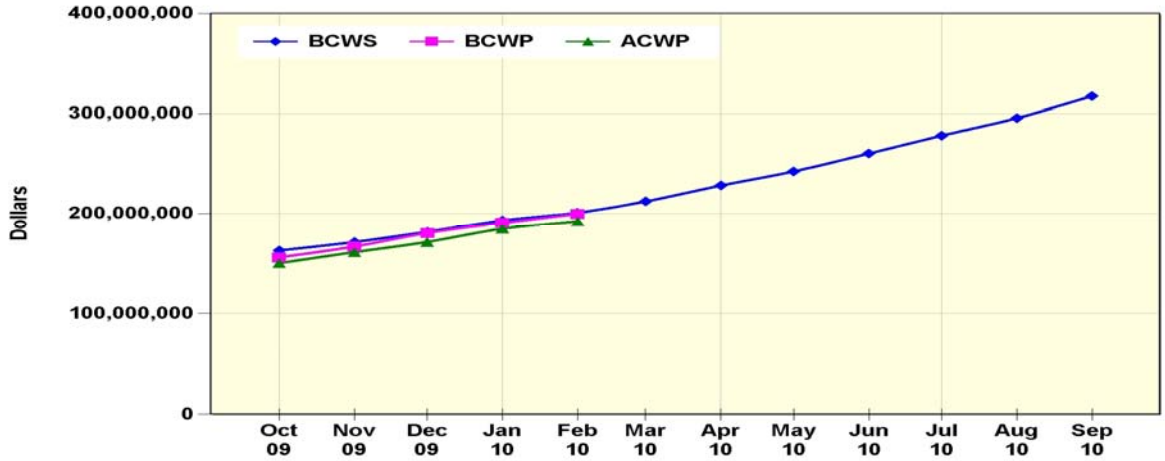
Funding Profile

Fiscal Year	NSLS-II Funding Profile ($M)											
	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	TOTAL
R&D			3.0	20.0	10.0	2.0	0.8					35.8
OPC	1.0	4.8	19.0									24.8
PED			3.0	29.7	27.3							60.0
Construction					216.0	139.0	151.6	151.4	46.9	26.3		731.2
Pre-Ops							0.7	7.7	24.4	22.4	5.0	60.2
Total NSLS-II Project	1.0	4.8	25.0	49.7	253.3	141.0	153.1	159.1	71.3	48.7	5.0	912.0

Key Personnel

Title	Name	Email	Phone
Federal Project Director	Frank Crescenzo	crescenzo@bnl.gov	631-344-3433
NSLS-II Project Director	Steve Dierker	dierker@bnl.gov	631-344-4966

EV for WBS 1 (NSLS-II Project) as of February 28, 2010



Cumulative to Date (K$)	Oct 09	Nov 09	Dec 09	Jan 10	Feb 10	Mar 109	Apr 10	May 10	Jun 10	Jul 10	Aug 10	Sep 10
BCWS	162,854	171,323	181,553	193,298	201,337	212,715	228,690	242,832	260,716	278,549	295,998	317,766
BCWP	155,908	166,818	180,426	190,699	199,953							
ACWP	150,173	161,209	171,370	184,693	192,382							

Project as of 2/28/10	Current Period	Cum-to-date
Plan (BCWS) $K	8,038	201,337
Earned (BCWP) $K	9,254	199,953
Actual (ACWP) $K	7,688	192,382
SV $K	1,216	-1,383
CV $K	1,566	7,571
SPI	1.15	0.99
CPI	1.20	1.04
Budget at Completion $K (PMB (UB))		762,032
Planned % Complete		26.4%
Earned % Complete		26.2%
Mgmt Reserve/Cont as % of BAC remaining		26.7%
Mgmt Reserve/Cont as % of EAC remaining		25.5%

The IPT can find further details on NSLS-II cost and schedule data at http://www.bnl.gov/nsls2/project/IPT/default.asp.

Milestones – Near Term	Baseline Date
L3-Begin Ring Building Steel Erection	09/14/09 ✓
L3-External Tech. review of concept. design for project BLs done	11/16/09 ✓
L3-Clean Room contract awarded	12/30/09
L3-Linac contract awarded	2/05/10
L3-APS Welding S2 ODD – first chamber ready for assembly	3/17/10
L3-Pentant 1 structural steel erected	3/31/10
L3-Initial test of new MLL deposition system completed	6/30/10
L3-LOB construction contract awarded	7/01/10
L3-LOB construction Notice to Proceed (NTP) issued	7/01/10
L3-SR Magnet – Quads First Article ready for integration	7/19/10
L2-Pentant 2 structural steel erected	8/05/10
L3-Safety review of prelim. designs for project BLs completed	8/30/10
L2-BAT Reviews of 100% prelim. designs for project BLs completed	9/15/10

L2 = Level 2 Milestone, L3 = Level 3; ✓ = Completed

Schedule Performance Index, Project to Date:

SPI **0.99**

Cause & Impact: No reportable variance.
Corrective Action: None Required.

Cost Performance Index, Project to Date:

CPI **1.04**

Cause & Impact: No reportable variance.
Corrective Action: None Required.

ACWP = Actual Cost of Work Performed
BAC = Budget at Completion
BCWP = Budgeted Cost of Work Performed
BCWS = Budgeted Cost of Work Scheduled
CPI = Cost Performance Index (BCWP/ACWP)
EV = Earned Value
IPT = Integrated Project Team
PMB = Performance Measurement Baseline
SPI = Schedule Performance Index
WBS = Work Breakdown Structure

SPI or CPI in the range of:	
	0.9 – 1.15 is green
	0.85 – 0.89 or 1.16 – 1.25 is yellow
	<0.85 or >1.25 is red

Two PCRs were approved in February 2010:

PCR #	Area	Δcost	Title or Description
10_130	CF	$0	Ring Bldg Cost/Schedule changes for Metal Roof & Safety Tie Back Contract Award
10_132	ASD	$389K	Re-plan Insertion Devices

ARRA DETAILS

This Recovery Act project will provide advanced funding for NSLS-II construction, create jobs, and substantially reduce the cost and schedule risks for the project. The overall schedule for the ring building completion will not be accelerated; however, Recovery Act funds allow for re-ordering of the work sequence with a six-month acceleration of the injection building completion. Acceleration of the injection building allows for earlier installation and commissioning of the injector, which had been close to critical path. This addition of schedule float will significantly reduce the schedule risk for the accelerator. In addition, Recovery Act funds will accelerate completion of the Laboratory Office Buildings by 15 months, which will enable the project to maximize the cost advantage of the depressed construction market.

ARRA$ as of 2/28/10	Current Period	Cum-to-date
Plan (BCWS) $K	2,612	34,335
Earned (BCWP) $K	2,939	39,126
Actual (ACWP) $K	1,745	36,753
SV $K	327	4,791
CV $K	1,194	2,373

ARRA Milestones		
Description	Baseline Date	Status
BNL review and approval of heat exchangers (HX).	7/31/09	In progress. No change since last month. The disapproved HX units have been resubmitted and are being reviewed.
Fabricate concrete embeds, Phase 3.	8/26/09	Completed. All embeds had been delivered by 11/5/09.
Install ductbank storm pump station to HH44, HH3.	9/2/09	In progress. No change since last month. Waiting for vehicle tunnel to be backfilled.
Pour concrete walls for vehicle tunnel.	9/10/09	Completed 9/24/09.
Pour cooling tower walls and piers.	9/22/09	Completed 1/14/10
Pour tunnel walls at Ratchet 23A.	10/5/09	Completed 10/16/09.
Start chilled water concrete foundations.	10/7/09	Completed.
Install manhole G6C.	10/13/09	Completed 12/4/09.
Pour tunnel slab CL 120-006.	10/20/09	Completed 9/29/09.
Pour tunnel slab CL 006-012.	10/20/09	Completed 10/7/09.
Backfill utility tunnel and vehicle tunnel.	10/27/09	In progress. No change since last month. Utility tunnel backfill completed. Vehicle tunnel backfill in progress
Install manholes G6 and G6A.	11/11/09	Completed 11/18/09.
Pour tunnel slab CL 012-018.	11/24/09	Completed 10/15/09.
Pentant 1 tunnel walls complete.	11/19/09	Completed 11/11/09.
Pour tunnel walls at ratchet 28A.	12/03/09	Completed 11/11/09.
Install sanitary UG piping SB3 footings.	12/08/09	Completed 12/10/09.
Pour tunnel slab CL 018-024.	12/14/09	Completed 11/02/09.
Excavate booster svc bldg. foundations.	12/24/09	Completed 10/7/09.
Pour tunnel slab CL 024-030.	12/30/09	Completed 11/25/09.
Begin concrete tunnel roof pentant 1.	12/10/09	Completed 11/12/09.
Complete tunnel slab pentant 2.	1/15/10	Completed 1/15/10.

CLASSIFICATION (When Filled In)

CONTRACT PERFORMANCE REPORT
FORMAT 1 - WORK BREAKDOWN STRUCTURE

FORM APPROVED
OMB No. 0704-0188

1. CONTRACTOR	2. CONTRACT		3. PROGRAM	4. REPORT PERIOD
a. NAME Brookhaven Science Associates	a. NAME NSLS-II		a. NAME NSLS_EV8 - NSLS II Project	a. FROM (YYYYMMDD) 2010 / 02 / 01
b. LOCATION (Address and ZIP Code) Brookhaven National Laboratory, Upton,NY	b. NUMBER		b. PHASE	b. TO (YYYYMMDD) 2010 / 02 / 28
	c. TYPE	d. SHARE RATIO	c. EVMS ACCEPTANCE NO YES X (YYYYMMDD)	

5. CONTRACT DATA

a. QUANTITY	b. NEGOTIATED COST	c. ESTIMATED COST OF AUTHORIZED UNPRICED WORK	d. TARGET PROFIT/ FEE	e. TARGET PRICE	f. ESTIMATED PRICE	g. CONTRACT CEILING	I. DATE OF OTB/OTS (YYYYMMDD)
1	912,000,000	0	0	912,000,000	0	0	

8. PERFORMANCE DATA

WBS[2] WBS[3] Control Acct ITEM (1)	CURRENT PERIOD BUDGETED COST WORK SCHEDULED (2)	BUDGETED COST WORK PERFORMED (3)	ACTUAL COST WORK PERFORMED (4)	VARIANCE SCHEDULE (5)	VARIANCE COST (6)	CUMULATIVE TO DATE BUDGETED COST WORK SCHEDULED (7)	BUDGETED COST WORK PERFORMED (8)	ACTUAL COST WORK PERFORMED (9)	VARIANCE SCHEDULE (10)	VARIANCE COST (11)	AT COMPLETION BUDGETED (14)	ESTIMATED (15)	VARIANCE (16)
1.01 Project Management													
1.01.01 Project Management													
WBS[3]Totals:	143,623	143,623	89,611	0	54,012	3,164,849	3,164,849	2,957,064	0	207,785	7,445,412	7,445,412	0
1.01.02 Environmental, Safety & Health													
WBS[3]Totals:	76,003	76,003	91,791	0	-15,787	2,085,240	2,085,240	2,437,689	0	-352,449	6,662,820	6,662,820	0
1.01.03 Project Support													
WBS[3]Totals:	671,864	671,864	954,182	0	-282,318	17,209,103	17,209,103	17,904,868	-0	-695,765	37,878,194	39,305,194	-1,427,000
1.01.04 Quality Assurance													
WBS[3]Totals:	49,244	49,244	48,779	0	465	1,275,147	1,275,147	918,560	0	356,587	3,073,212	3,073,212	-0
1.01.05 Configuration Management & Document Contro													
WBS[3]Totals:	25,659	25,659	24,166	0	1,493	776,154	776,154	611,090	0	165,064	1,972,567	1,972,567	0
WBS[2]Totals:	**966,393**	**966,393**	**1,208,529**	**0**	**-242,136**	**24,510,493**	**24,510,493**	**24,829,270**	**-0**	**-318,778**	**57,032,204**	**58,459,204**	**-1,427,000**
1.02 R&D and Conceptual Design													
1.02.01 Accelerator Systems R&D													
WBS[3]Totals:	178,640	89,617	29,372	-89,023	60,245	9,770,562	9,321,559	9,310,870	-449,003	10,689	11,460,076	11,460,078	-2
1.02.02 Experimental Systems R&D													
WBS[3]Totals:	185,569	202,699	223,213	17,131	-20,514	12,548,741	12,110,499	11,431,646	-438,241	678,854	19,166,550	19,163,545	3,005
1.02.03 Conceptual Design - Accelerator Systems													
WBS[3]Totals:	0	0	0	0	0	12,998,214	12,998,214	12,953,517	0	44,697	12,998,214	12,998,214	0
1.02.04 Conceptual Design - Experimental Facilities													
WBS[3]Totals:	0	0	0	0	0	709,445	709,445	712,450	0	-3,005	709,445	712,450	-3,005
1.02.05 Conceptual Design - Conventional Facilities													
WBS[3]Totals:	0	0	0	0	0	3,886,952	3,886,952	3,872,878	0	14,074	3,886,952	3,886,952	0
1.02.06 Conceptual Design - Project Management & Suppor													
WBS[3]Totals:	0	0	0	0	0	7,086,188	7,086,188	7,325,314	0	-239,126	7,086,188	7,325,314	-239,126
1.02.07 Project Management - R&D													
WBS[3]Totals:	32,139	32,139	15,808	0	16,330	4,843,025	4,843,025	4,811,492	0	31,533	5,305,339	5,066,213	239,126
WBS[2]Totals:	**396,347**	**324,455**	**268,393**	**-71,893**	**56,062**	**51,843,127**	**50,955,882**	**50,418,166**	**-887,244**	**537,716**	**60,612,763**	**60,612,765**	**-2**
1.03 Accelerator Systems													
1.03.01 Accelerator Systems Management													
WBS[3]Totals:	81,543	81,543	110,270	0	-28,727	2,616,231	2,616,231	2,559,377	0	56,854	6,019,099	6,298,099	-279,000
1.03.02 Accelerator Physics													
WBS[3]Totals:	198,643	198,643	208,439	0	-9,796	3,805,593	3,805,593	3,352,521	0	453,072	10,071,767	10,071,767	-0
1.03.03 Injection System													
WBS[3]Totals:	235,452	240,340	164,248	4,888	76,091	3,103,181	2,548,635	1,858,780	-554,546	689,855	42,691,324	42,121,324	570,000
1.03.04 Storage Ring													
WBS[3]Totals:	1,196,970	2,386,504	1,676,073	1,189,534	710,431	23,531,534	19,893,027	19,267,115	-3,638,507	625,912	148,362,313	152,715,313	-4,353,000
1.03.05 Controls Systems													
WBS[3]Totals:	254,067	202,496	231,219	-51,571	-28,723	4,854,834	3,947,545	4,084,360	-907,289	-136,815	20,207,065	20,207,065	0
1.03.06 Accelerator Safety Systems													
WBS[3]Totals:	84,519	60,402	63,248	-24,118	-2,846	1,002,049	716,640	738,393	-285,409	-21,753	4,471,232	4,471,232	-0
1.03.07 Insertion Devices													
WBS[3]Totals:	27,522	72,831	41,723	45,309	31,108	1,518,522	1,086,008	584,863	-432,514	501,144	24,613,697	24,613,697	0
1.03.08 Accelerator Fabrication Facilities													
WBS[3]Totals:	72,214	99,667	85,870	27,453	13,797	5,835,615	4,422,054	4,284,340	-1,413,561	137,714	6,961,411	7,381,411	-420,000
WBS[2]Totals:	**2,150,930**	**3,342,426**	**2,581,090**	**1,191,496**	**761,336**	**46,267,559**	**39,035,733**	**36,729,750**	**-7,231,825**	**2,305,983**	**263,397,909**	**267,879,909**	**-4,482,000**
1.04 Experimental Facilities													
1.04.01 Experimental Facilities Management													
WBS[3]Totals:	107,581	107,581	106,541	0	1,041	2,062,904	2,062,904	2,389,934	0	-327,030	4,828,335	5,367,673	-539,337
1.04.02 Standard Local Controls & Data Acquisition Systems													
WBS[3]Totals:	0	0	0	0	0	21,887	28,876	0	6,989	28,876	69,585	69,585	-0
1.04.05 User Instruments													
WBS[3]Totals:	252,686	185,593	263,129	-67,093	-77,536	4,229,199	4,203,077	3,040,819	-26,122	1,162,258	63,573,084	65,836,278	-2,263,194
1.04.06 Front End User Requirements Development													
WBS[3]Totals:	0	0	0	0	0	456	456	1,205	-0	-749	456	1,205	-749
1.04.07 Optics Labs													
WBS[3]Totals:	0	0	10,889	0	-10,889	843,917	645,243	565,512	-198,674	79,731	2,072,162	1,076,012	996,150
WBS[2]Totals:	**360,268**	**293,174**	**380,560**	**-67,093**	**-87,385**	**7,158,363**	**6,940,556**	**5,997,470**	**-217,807**	**943,085**	**70,543,623**	**72,350,753**	**-1,807,130**
1.05 Conventional Facilities													
1.05.01 Conventional Facilities Management													
WBS[3]Totals:	219,815	219,815	298,562	0	-78,747	5,332,341	5,332,341	5,307,791	0	24,550	14,187,003	14,868,590	-681,588
1.05.02 Conventional Facilities Engineering and Design													
WBS[3]Totals:	102,619	90,453	121,949	-12,166	-31,496	18,780,711	18,717,069	15,614,368	-63,642	3,102,702	22,563,410	22,563,410	0
1.05.03 Conventional Facilities Construction													
WBS[3]Totals:	3,837,053	4,017,734	2,826,978	180,681	1,190,756	47,259,704	54,379,691	53,432,564	7,119,986	947,127	217,468,209	237,888,846	-20,420,637
1.05.04 Integrated Controls & Communications													
WBS[3]Totals:	0	0	0	0	0	139,236	13,539	13,594	-125,697	-55	561,273	961,273	-400,000
1.05.05 Standard Equipment													
WBS[3]Totals:	0	0	0	0	0	0	0	0	0	0	1,025,586	1,025,586	0
1.05.06 Conventional Facilities Commissioning													
WBS[3]Totals:	5,000	0	2,163	-5,000	-2,163	45,000	67,819	38,681	22,819	29,138	578,000	578,000	0
WBS[2]Totals:	**4,164,487**	**4,328,002**	**3,249,652**	**163,515**	**1,078,350**	**71,556,993**	**78,510,459**	**74,406,998**	**6,953,467**	**4,103,462**	**256,383,482**	**277,885,706**	**-21,502,224**
1.06 Pre-Operations													
1.06.01 Management - Pre Ops													
WBS[3]Totals:	0	0	0	0	0	0	0	0	0	0	20,170,700	20,170,700	0
1.06.02 Accelerator Systems - Pre Ops													
WBS[3]Totals:	0	0	0	0	0	0	0	0	0	0	17,071,591	17,071,591	0
1.06.03 Experimental Facilities - Pre Ops													
WBS[3]Totals:	0	0	0	0	0	0	0	0	0	0	3,823,660	3,823,660	0
1.06.04 Spares													
WBS[3]Totals:	0	0	0	0	0	0	0	0	0	0	9,134,454	9,134,454	-0
WBS[2]Totals:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**50,200,405**	**50,200,405**	**0**
Performance Measurement Baseline - PMB	8,038,425	9,254,450	7,688,224	1,216,025	1,566,226	201,336,533	199,953,123	192,381,654	-1,383,410	7,571,469	758,170,386	787,388,741	-29,218,355
Undistributed Budget											3,861,138	0	3,861,138
Sub Total	8,038,425	9,254,450	7,688,224	1,216,025	1,566,226	201,336,533	199,953,123	192,381,654	-1,383,410	7,571,469	762,031,524	787,388,741	-25,357,217
Contingency/Mangement Reserve											149,968,476		
Total Project Cost -TPC	8,038,425	9,254,450	7,688,224	1,216,025	1,566,226	201,336,533	199,953,123	192,381,654	-1,383,410	7,571,469	912,000,000		

CLASSIFICATION (When Filled In)

CONTRACT PERFORMANCE REPORT
FORMAT 1 - WORK BREAKDOWN STRUCTURE

FORM APPROVED
OMB No. 0704-0188

1. CONTRACTOR	2. CONTRACT	3. PROGRAM	4. REPORT PERIOD
a. NAME Brookhaven Science Associates	a. NAME	a. NAME NSLS_EV8 - NSLS II Project	a. FROM (YYYYMMDD) 2010 / 02 / 01
b. LOCATION (Address and ZIP Code) Brookhaven National Laboratory, Upton,NY	b. NUMBER	b. PHASE	b. TO (YYYYMMDD) 2010 / 02 / 28
	c. TYPE / d. SHARE RATIO	c. EVMS ACCEPTANCE NO YES X (YYYYMMDD)	

5. CONTRACT DATA

a. QUANTITY	b. NEGOTIATED COST	c. ESTIMATED COST OF AUTHORIZED UNPRICED WORK	d. TARGET PROFIT/ FEE	e. TARGET PRICE	f. ESTIMATED PRICE	g. CONTRACT CEILING	I. DATE OF OTB/OTS (YYYYMMDD)
1	912,000,000	0	0	912,000,000	#REF!	0	

8. PERFORMANCE DATA

ARRA vs. REGUL Cost Account ITEM (1)	CURRENT PERIOD BUDGETED COST WORK SCHEDULED (2)	BUDGETED COST WORK PERFORMED (3)	ACTUAL COST WORK PERFORMED (4)	VARIANCE SCHEDULE (5)	VARIANCE COST (6)	CUMULATIVE TO DATE BUDGETED COST WORK SCHEDULED (7)	BUDGETED COST WORK PERFORMED (8)	ACTUAL COST WORK PERFORMED (9)	VARIANCE SCHEDULE (10)	VARIANCE COST (11)	AT COMPLETION BUDGETED (14)	ESTIMATED (15)	VARIANCE (16)
A ARRA													
1.05.03.02.01 General Requirements	124,762	76,564	76,572	(48,197)	(8)	4,707,995	4,576,780	3,562,209	(131,215)	1,014,570	4,851,187		
1.05.03.02.02 Site Work	0	14,558	439,009	14,558	(424,451)	3,089,062	2,649,462	2,680,925	(439,600)	(31,463)	3,533,893		
1.05.03.02.03 Pentant 1 and Service Building	(68,916)	133,120	170,133	202,036	(37,013)	5,656,913	5,527,706	5,352,174	(129,207)	175,533	18,563,024		
1.05.03.02.04 Pentant 2 and Service Building	457,525	723,279	715,035	265,754	8,244	5,220,210	5,289,313	5,287,915	69,103	1,398	15,132,461		
1.05.03.02.05 Pentant 3 and Service Building	61,800	451,189	445,547	389,389	5,642	1,471,637	2,459,901	2,536,475	988,264	(76,574)	9,823,908		
1.05.03.02.06 Pentant 4 and Service Building	0	105,449	105,447	105,449	2	772,680	878,129	969,538	105,449	(91,408)	2,170,707		
1.05.03.02.07 Pentant 5 and Service Building	109,268	1,183	1,183	(108,085)	0	2,952,113	2,786,628	2,703,012	(165,485)	83,616	6,812,987		
1.05.03.02.08 Injection Building	220,175	740	740	(219,435)	0	667,139	533,338	716,038	(133,801)	(182,700)	5,337,009		
1.05.03.02.09 RF and Compressor Building	152,939	198,633	179,851	45,694	18,782	1,406,092	1,408,746	1,180,539	2,654	228,207	4,750,060		
1.05.03.02.10 Lobby	0	3,300	2,640	3,300	660	105,589	163,199	160,159	57,610	3,040	2,987,094		
1.05.03.02.11 Cooling Tower and Process Water	32,911	16,770	16,769	(16,141)	1	110,583	139,615	132,855	29,032	6,760	4,075,953		
1.05.03.02.12 Underground Mechanical Utilities	0	136,083	136,084	136,083	(1)	722,916	3,024,305	2,935,842	2,301,389	88,463	8,478,155		
1.05.03.02.13 Site Electrical Utilities	890,409	99,200	102,840	(791,209)	(3,640)	4,310,510	5,652,104	5,347,223	1,341,594	304,881	9,356,456		
1.05.03.03 Electrical Substation and Feeder (Contract)	288,422	88,749	109,933	(199,673)	(21,185)	1,354,094	1,281,978	972,805	(72,116)	309,173	2,943,143		
1.05.03.04 Chilled Water Plant (Conract)	342,283	890,082	(756,769)	547,799	1,646,851	1,787,863	2,755,016	2,215,176	967,154	539,840	9,200,000		
1.05.03.06.01 LOB 1	0	0	0	0	0	0	0	0	0	0	9,817,013		
1.05.03.06.02 LOB 5	0	0	0	0	0	0	0	0	0	0	9,817,018		
1.05.03.06.03 LOB 4	0	0	0	0	0	0	0	0	0	0	5,273,022		
ARRA Sub Total:	2,611,577	2,938,900	1,745,015	327,323	1,193,886	34,335,395	39,126,221	36,752,885	4,790,826	2,373,336	132,923,090		
Undistributed Budget											3,861,138		
ARRA Total Cost	2,611,577	2,938,900	1,745,015	327,323	1,193,886	34,335,395	39,126,221	36,752,885	4,790,826	2,373,336	136,784,228		