National Synchrotron Light Source II

Project Progress Report

January 2010

Between significant snowfalls in January and February, progress continued unabated. This photo dates from January 29.

report due date:
February 20, 2009

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OVERALL ASSESSMENT

The National Synchrotron Light Source II project continued to make excellent progress with satisfactory cost (1.03) and schedule (0.99) performance. The Project team, working closely with Torcon, responded to the forty-six corrective actions that were developed to address the Judgments of Need from the independent construction safety investigation. Forty-three corrective actions were completed by the end of January and the three remaining actions are expected to be completed by the end of March 2010.

Despite abnormally cold weather that continued in January, construction of the ring building and central chilled water plant expansion made good progress. The roof for pentant 1 and walls through pentant 3 of the storage ring tunnel were completed, as were foundations for the cooling tower building. Footings and foundations were formed and poured for the compressor building, service buildings 1 and 2, and the injection building.

Accelerator Systems continued to make excellent progress on placing production orders, testing prototypes, and finalizing remaining designs. The Request for Proposals (RFP) for the booster was released, and a series of design validation reviews of designs submitted by the production magnet vendors continued. Substantial progress was made in the areas of vacuum, power supply, safety, RF systems, and insertion devices.

The baseline scope for six project beamlines was optimized and documented in January, and Beamline Advisory Team (BAT) meetings were held for five of the six beamlines. Excellent progress was made in a number of R&D areas, including commissioning of the Multilayer Laue Lens (MLL) deposition system.

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

SCHEDULED EVENTS 2010

Danfysik DVR	Feb 3-4
DOE Review of the NSLS-II Project	Feb 9–11
IXS Beamline Advisory Team (BAT)	Mar 23
DOE Review of the NSLS-II Project	Sept 2010

ACCELERATOR SYSTEMS DIVISION (ASD)

Design validation reviews for the magnets continued in January. The NSLS-II project team put significant effort into analyzing and checking the designs submitted by the contractors and developed a number of action items to be resolved before the production of the first articles.

The vacuum group assembled the first two S5 dipole chambers with NEG strips, for evaluation. More multipole extrusions have been made at both vendors. Six multipole extrusions for S2 have been machined. The first S2 multipole prototype chamber is being welded at APS. The production machining contracts for thirty S5 dipole chambers and thirty S4 multipole chambers have been placed. Drawings for the second prototype RF shielded bellows are being reviewed for fabrication. The design and prototyping of the first "stick" absorbers have begun. Other vacuum procurements are going well; contracts for 350 sputter ion pumps and NEG strips have been placed. Custom titanium sublimation pumps were ordered from three vendors for evaluation. The refurbishment of the clean assembly room in B905 passed its operational readiness review and is fully operational. The RFP for the ultrasonic cleaning facility is in final review before the order is placed.

The electrical engineering group made further progress. The prototype of the Main Dipole Power Supply controls rack is fully assembled and testing has begun. The prototype power amplifier for the corrector has been constructed and tested. The performance of the power amplifier has been measured and production of the 1,450 DCCTs is going well, with 350 modules already delivered (Fig. 1). After a successful external review, procurement documents for the equipment enclosures were completed and the procurement is ready to go.

Figure 1: 350 high-precision current measurement devices (DCCT) used for controlling the magnet power supplies have been received from a vendor.

Safety Systems successfully tested communications between prototype programmable logic controllers (PLCs); this constitutes an important milestone in system design. The final review of the Human Interface Box (serving for tunnel search, safety system status information, and the Emergency-Off button) was completed. Input/output signal listing of the Personal Protection System (PPS), including beamline signals, has been finalized. The requirements for the Experimental End Station Enclosure PPS have been reviewed with XFD. No gaps were identified in the design approach or the capabilities for interfacing with beamlines. The loss control monitor system (now LCM, formerly known as beam confinement system, BCS) was reviewed; many functions for beamline BCS as intended for SSRL are included in the NSLS-II design.

Prototype area radiation detectors have been mounted at NSLS for testing. The charge loss basis for the linac has been completed; this constitutes the final design basis for supplemental shielding.

The digital RF controller for the booster cavity has been successfully commissioned and the water system has been designed. On the storage ring cavities, the pressure vessel code "equivalence by design" analysis was completed and the report was submitted for review by the BNL cryogenic safety committee. Approval will qualify the niobium structure for ASME equivalence. A result of the analysis was that the wall thickness of the cavity is increased to 3 mm. A new mechanical design of the KEK cavity with 3mm cell thickness has been generated.

NSLS-II staff measured and analyzed the transmitter-cavity-beam system at the Canadian Light Source, obtaining critical information on the Cathode HV DC power supply. These tests also provided an opportunity for testing the NSLS-II cavity controller electronics. The second clock generator has been completed and the third is nearly finished. A draft drawing for the cryogenic plant has been released. Draft specifications are being discussed with possible vendors.

The insertion device (ID) group made progress in procuring the inventory for the ID laboratory. Procurement drawings for the integrated field measurement system, a multipurpose flip/stretch/moving wire concept, are in release and ready for RFP. These have been referenced and integrated into the specification. Fabrication drawings for a full 30-period fixed-gap array and structure have been released to Central Shops, which is machining the longer-lead and high-precision components. All materials (raw metal, PMs, poles, fasteners, etc.) have been received. Quality control for the recently purchased permanent magnets is underway using purchased nonmagnetic calipers. The clean room design procurement nears conclusion, with the specifications updated and clarified.

A preliminary model for a test chamber of the 4m vacuum vessel for the in-vacuum undulators (IVU) has been produced. A bench test rig using a circular chamber has been designed to support testing of the seal design specification. A solid model is being developed for the IVU U22 x 1.5m insertion device to serve as a quasi-universal design for in-vacuum undulators. Correction Current sheet maps for various EPU polarization states are being generated to improve the field quality.

EXPERIMENTAL FACILITIES DIVISION (XFD)

In January, the Experimental Facilities Division (XFD) completed the beamline baseline scope and costing analyses for all six project beamlines. The overall objective was to optimize scope across the six beamlines within the current beamline budget of ~$66M. To achieve this objective, XFD consolidated efforts and resources to ensure that the baseline beamline scopes are designed to deliver cutting-edge initial scientific capabilities for each of the six project beamlines, enable new user science in the initial phase of NSLS-II operations, and minimize risks within the baseline scope given the current understanding of beamline optics and technology. A summary of the baseline scope for each project beamline is shown in Table 1. The full conceptual designs of individual beamlines are retained, including both baseline scope and additions required for upgraded capabilities. Scope items not in the baseline are identified as upgrade options to be implemented when future funds become available.

Table 1: Experimental Facilities Beamline Baseline Scope and Initial Science Capabilities

Beamline	$M	Initial Scientific Capabilities
1.4.5.1 IXS	11.1	▪ Inelastic scattering at ~ 9.1 keV with CDDW scheme or alt. ▪ Single experiment hutch designed for ~1 meV & ~0.1 meV ▪ Initial ~1 meV spectrometer with improved resolution tail
1.4.5.2 HXN	14.4	▪ Nano-XRF/XRD at 6-25 keV with MLL/FZP or alt. ▪ Long beamline, design capable of ~1 nm spatial resolution ▪ Satellite building for env. isolation and stability ▪ Initial science microscope with ~10 nm resolution
1.4.5.3 CHX	10.1	▪ XPCS at 6-15 keV with monochromatic or pink beam ▪ Consolidated small-/wide-angle endstation instrument ▪ Fast dynamics studies down to sub-millisecond range
1.4.5.4 CSX	10.7	▪ Two branches for polarization-dependent coherent scattering and XMCD spectroscopy in 0.2-2 keV ▪ High coherent flux and fast polarization switching
1.4.5.5 SRX	11.1	▪ Micro-XRF/XANES in 4.7-23 keV with 100 nm resolution ▪ Upgrade path to add zone-plate branch
1.4.5.6 XPD	9.4	▪ High flux/resolution/time-resolved PD in 40-70 keV ▪ Upgrade path to add dedicated PDF branch

Beamline Advisory Team (BAT) meetings were held for five of the six project beamlines. Discussions included proposed changes since the CDR submission, particularly in clarification of initial and mature scope and the consequent impact on scientific programs. Following these discussions, small amendments were made to scope and/or individual beamline budgets.

Preliminary design activity continues for the beamlines, focusing on the satellite building for the HXN beamline, refining beamline mirror and monochromator optical specifications, and drafting RFPs for the lead radiation enclosures and the monochromatic beamline shutters.

In optics metrology, systems for vibration suppression of the AFM were evaluated and selected, and a small acoustic damping enclosure was designed. Optical polishing techniques and companies are being evaluated with mirrors received from In Sync (conventional polishing) and Zeiss (ion polishing). Mirror measurements on the AFM and NuView interferometer are completed; data analysis is underway.

The new Multilayer Laue lens (MLL) deposition system for production of 1nm optics is undergoing commissioning with careful alignment of the rails within the system. Significant progress was made in January on the test of ~1meV optics performed at the R&D beamline, X16-A, at NSLS. Preliminary results indicated a ~3.7meV monochromator resolution, as shown in Fig. 2. The optical efficiency was assessed at ~15% for the CDW configuration. More detailed analysis is needed to confirm these results.

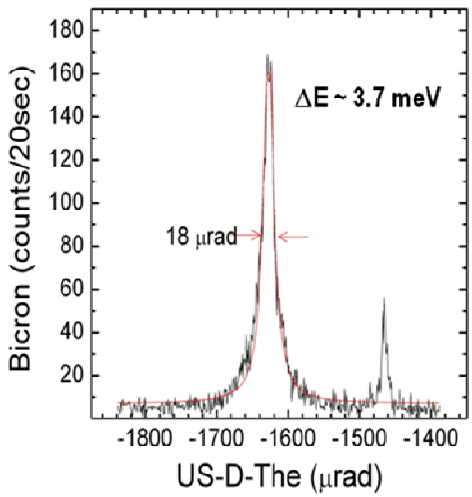


Figure 2. Experimentally measured monochromator energy resolution ~3.7 meV, based on preliminary results of the ~1 meV CDW optics test conducted at X16-A beamline at NSLS.

CONVENTIONAL FACILITIES DIVISION (CFD)

Construction of conventional facilities continued to make substantial progress in January despite colder than average winter temperatures. Overall progress remains on schedule, as the contractor has been able to maintain productivity despite a frost depth of nearly 15 inches.

Major January accomplishments included completion of the final vehicle tunnel retaining wall and the tunnel roof slabs (Fig. 3). Backfill and compacting of the earth around the vehicle tunnel can begin once warmer weather returns.

Figure 3: Pouring concrete roof of vehicle tunnel

Additional concrete progress included the placement of the remaining storage ring tunnel roof sections to complete the tunnel in pentant 1. The storage ring tunnel floor slab has now been extended into pentant 4, and storage ring walls have been completed through most of pentant 3 (Fig. 4). The cooling tower building foundations were completed and progress was made on foundations for the compressor building, service buildings 1 and 2, and the injection building.

Figure 4: Storage ring view of high-density concrete wall

There was one setback during the month, as a planned placement of the final two high-density concrete tunnel wall sections had to be deferred to February due to a shortage of the aggregate. An order for additional high-density aggregate was placed and rail car delivery is expected in early February. Concrete work is expected to quickly catch up to planned production rates, if the weather returns to seasonable status.

Cold conditions did slow some of the concrete progress and backfilling operations in the area of the RF building and service building 1, the first buildings slated for steel erection. The ground in this area had not been backfilled and compacted sufficiently to allow crane operations for rigging the steel. The contractor also felt the steel erection operations might overtake the concrete work and interfere with work sequencing, so the planned start of steel erection was deferred 10 days, to February 16. The contractor is confident that steel erection will keep pace with concrete work to achieve the required completion dates despite the 10-day deferment. All steel for the first three phases of construction is fabricated and ready for delivery to the site.

An additional major accomplishment during January was the delivery of all remaining components of the owner-furnished unit substations, 2 months earlier than planned. All eight unit substations have been delivered, received, and inspected and are ready for pick-up and installation by the ring building electrical utilities contractor. The other electrical pre-purchased equipment items for the 20 MVA substation expansion have also been delivered early, with the exception of the 20MVA transformer, which is still scheduled for delivery by July as originally planned.

Utility installation continued with progress on the underground steam piping outside the ring building and in the utility tunnel, and progress on the electrical ductbank in the interior courtyard. Preparation of the structural earthwork for the future Lab Office Buildings (LOBs) will resume when warmer weather arrives and there is less frost in the ground.

Construction continued at the electrical substation and chilled water plant sites. The 15kV switchgear has been moved into the substation building and interior modifications

for all equipment and cabling are underway. The chilled water plant expansion continues to move ahead quickly, as structural steel erection is now completed and decking is being readied for concrete placement. The chillers have been fabricated and are ready for testing and delivery later in the spring. The cooling tower foundations are now in place and being readied for steel supports for the cooling tower cells. The decision to defer the installation of the chilled water piping until March when better weather is expected appears to be a sound one. The harsh winter conditions would have increased risks to utilities, vehicles, pedestrians, and snow removal equipment if this work were underway in December and January.

The LOB design package was finalized in December. The bid issue design package was available for release to bidders in January, pending DOE review and approval of the RFP. Proposals will be due in late March.

COST/SCHEDULE BASELINE STATUS

The cumulative Cost Performance Index (CPI) improved from 1.05 to 1.03, and the cumulative Schedule Performance Index (SPI) remained the same as last month at 0.99. Both cumulative indices have green status and are well within the DOE acceptable range.

CPI for the month is 0.77 (red status), due to the accrual for the electrical substation delivery being processed in January instead of December when the delivery was planned and occurred. The monthly SPI is 0.87 (yellow status) due to delayed Design Validation Reviews for the storage ring magnets as well as the initial vendor receipt of raw materials, which was planned for January.

PROCUREMENT ACTIVITIES

The booster solicitation was released to industry on January 19, 2010. The solicitation package was sent to five potential suppliers and was also posted on FedBizOps to maximize competition. Design Validation Reviews were conducted for four of the five magnet suppliers, and the fifth DVR is scheduled for early February. The Laboratory Office Buildings solicitation was forwarded to DOE for review.

ENVIRONMENT, SAFETY, AND HEALTH (ESH)

The NSLS-II project worked closely with Torcon to develop corrective actions to address the Judgments of Need and associated contributing causes for the serious injury occurred at the ring building construction site on September 30. A total of forty-six corrective actions were identified, of which three remain open. All corrective actions will be completed by the end of March 2010.

In other ESH work in January, two of the three prototype area radiation monitors from separate vendors have been received and installed at NSLS for evaluation. The third is due at the end of February. These monitors will be used to take data at NSLS and help determine the reliability and operating characteristics of the units, prior to finalizing the procurement specifications and ordering the units required for operations.

RECENT HIRES

Corey Churnside – Applications Engineer, Bus. Systems Dev., PSD
Yongjian Gu – Mechanical Engineer, Mech. Engineering, ASD
Donald Davis – Survey & Alignment Tech., Mech. Engineering, ASD
William Fielitz – Electrical Technician, Electrical Engineering, ASD

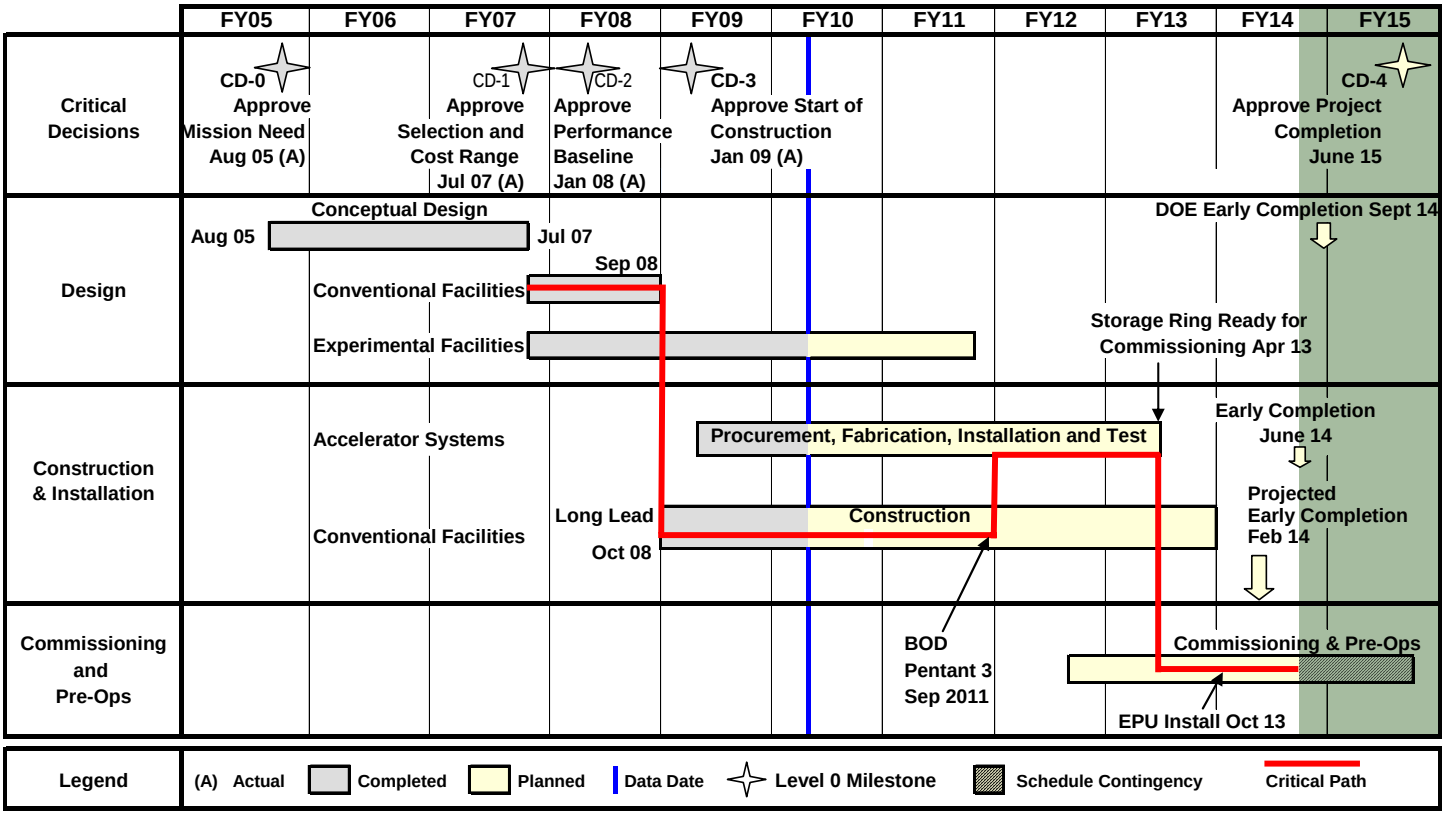
RECENT PROJECT ACCOMPLISHMENTS

- Six multipole extrusions for S2 have been machined. The first S2 multipole prototype chamber is being welded at APS. The production machining contracts for thirty S5 dipole chambers and thirty S4 multipole chambers have been placed. The pressure vessel code "equivalence by design" analysis for the storage ring cavities was completed. A new mechanical design of the KEK cavity with 3mm cell thickness has been generated.
- The digital RF controller for the booster cavity has been successfully commissioned. Procurement drawings for the integrated field measurement system, a multipurpose flip/stretch/moving wire concept, are in release and ready for RFP.
- Two prototype area radiation monitors from separate vendors have been received and installed at NSLS for evaluation. Design Validation Reviews were conducted for four of the five magnet suppliers; the fifth DVR is scheduled for February.
- The baseline scope for the six beamlines was optimized.
- The conventional contractor completed the final vehicle tunnel retaining wall and vehicle tunnel roof slabs, as well as storage ring tunnel roof slabs for pentant 1. The storage ring tunnel floor slab has now been extended into pentant 4, and storage ring walls have been completed through most of pentant 3.
- All remaining components of the owner-furnished unit substations were delivered, 2 months earlier than planned. The 15kV switchgear has been moved into the substation building and interior modifications for all equipment and cabling are underway. Structural steel erection for the chilled water plant expansion project is completed. The chillers have been fabricated and are ready for testing and delivery in the spring. The cooling tower foundations are in place.
- The booster solicitation was sent to five potential suppliers and also posted on FedBizOps.

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



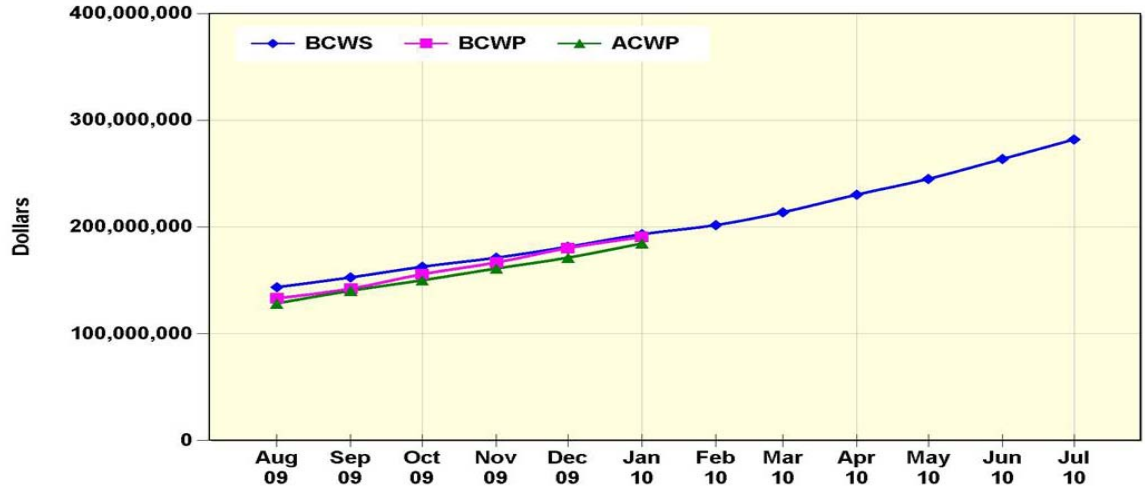
Funding Profile

	NSLS-II Funding Profile ($M)											
Fiscal Year	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 January 31, 2010



Cumulative to Date (K$)	Aug 09	Sep 09	Oct 09	Nov 09	Dec 09	Jan 10	Feb 10	Mar 109	Apr 10	May 10	Jun 10	Jul 10
BCWS	143,605	152,869	162,854	171,323	181,553	193,298	201,874	213,851	230,406	245,183	263,781	282,125
BCWP	133,133	142,268	155,908	166,818	180,426	190,699						
ACWP	128,528	140,413	150,173	161,209	171,370	184,693						

Project as of 1/31/10	Current Period	Cum-to-date
Plan (BCWS) $K	11,745	193,298
Earned (BCWP) $K	10,273	190,699
Actual (ACWP) $K	13,323	184,693
SV $K	-1,472	- 2,599
CV $K	-3,050	6,005
SPI	0.87	0.99
CPI	0.77	1.03
Budget at Completion $K (PMB (UB))		761,643
Planned % Complete		25.4%
Earned % Complete		25.0%
Mgmt Reserve/Cont as % of BAC remaining		26.3%
Mgmt Reserve/Cont as % of EAC remaining		25.3%

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 **1.03**

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

Three PCRs were approved in January 2010:

PCR #	Area	Δcost	Title or Description
10_119	ASD	$0	Injection Pulsed Magnets Detail Plan
10_123	PM	$508K	Construction Safety Staff Increase
10_126	EXD	$0	1nm Optics, Nano-Positioning and Metrology R&D Cost and Schedule Revisions

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 1/31/10	Current Period	Cum-to-date
Plan (BCWS) $K	3,065	31,724
Earned (BCWP) $K	4,216	36,187
Actual (ACWP) $K	7,440	35,008
SV $K	1,151	4,464
CV $K	-3,224	1,179

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. Vehicle tunnel concrete work expected to complete early Feb so backfill can begin.
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	a. NAME NSLS_EV8 - NSLS II Project	a. FROM (YYYYMMDD) 2010 / 01 / 01
b. LOCATION (Address and ZIP Code) Brookhaven National Laboratory, Upton,NY	b. NUMBER	b. PHASE	b. TO (YYYYMMDD) 2010 / 01 / 31
	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:	145,886	145,886	66,125	0	79,761	3,021,226	3,021,226	2,867,453	0	153,773	7,445,412	7,445,412	0
1.01.02 Environmental, Safety & Health													
WBS[3]Totals:	69,702	69,702	85,221	0	-15,518	2,009,236	2,009,236	2,345,898	0	-336,662	6,662,820	6,662,820	0
1.01.03 Project Support													
WBS[3]Totals:	694,427	694,427	736,151	0	-41,724	16,537,239	16,537,239	16,950,686	-0	-413,447	37,878,194	39,305,194	-1,427,000
1.01.04 Quality Assurance													
WBS[3]Totals:	51,705	51,705	37,500	0	14,205	1,225,903	1,225,903	869,781	0	356,122	3,073,212	3,073,212	-0
1.01.05 Configuration Management & Document Control													
WBS[3]Totals:	26,941	26,941	21,199	0	5,742	750,495	750,495	586,924	0	163,571	1,972,567	1,972,567	0
WBS[2]Totals:	**988,662**	**988,662**	**946,196**	**0**	**42,465**	**23,544,099**	**23,544,099**	**23,620,741**	**-0**	**-76,642**	**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:	136,741	85,750	94,758	-50,991	-9,007	9,591,921	9,231,942	9,281,498	-359,979	-49,556	11,460,076	11,460,078	-2
1.02.02 Experimental Systems R&D													
WBS[3]Totals:	178,382	260,971	211,305	82,589	49,667	12,363,172	11,907,800	11,208,433	-455,372	699,367	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 & Support													
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:	33,745	33,745	13,664	0	20,081	4,810,887	4,810,887	4,795,684	0	15,203	5,305,339	5,066,213	239,126
WBS[2]Totals:	**348,868**	**380,466**	**319,726**	**31,598**	**60,741**	**51,446,779**	**50,631,428**	**50,149,773**	**-815,351**	**481,654**	**60,612,763**	**60,612,765**	**-2**
1.03 Accelerator Systems													
1.03.01 Accelerator Systems Management													
WBS[3]Totals:	81,543	81,543	95,204	0	-13,661	2,534,688	2,534,688	2,449,107	0	85,581	6,019,099	6,298,099	-279,000
1.03.02 Accelerator Physics													
WBS[3]Totals:	198,643	198,643	255,855	0	-57,212	3,606,950	3,606,950	3,144,082	0	462,868	10,071,767	10,071,767	-0
1.03.03 Injection System													
WBS[3]Totals:	271,294	269,892	134,872	-1,402	135,020	2,867,729	2,308,296	1,694,532	-559,433	613,764	42,691,324	42,121,324	570,000
1.03.04 Storage Ring													
WBS[3]Totals:	4,314,626	1,554,447	1,307,904	-2,760,179	246,543	22,334,564	17,506,523	17,591,042	-4,828,041	-84,519	148,362,313	152,715,313	-4,353,000
1.03.05 Controls Systems													
WBS[3]Totals:	216,966	188,871	214,888	-28,095	-26,016	4,600,768	3,745,049	3,853,141	-855,718	-108,092	20,207,065	20,207,065	0
1.03.06 Accelerator Safety Systems													
WBS[3]Totals:	113,743	3,350	31,811	-110,393	-28,461	917,530	656,238	675,145	-261,291	-18,907	4,471,232	4,471,232	-0
1.03.07 Insertion Devices													
WBS[3]Totals:	107,483	29,507	26,189	-77,976	3,318	1,491,000	1,013,176	543,140	-477,824	470,036	24,225,288	24,225,288	-0
1.03.08 Accelerator Fabrication Facilities													
WBS[3]Totals:	155,146	57,635	61,406	-97,511	-3,771	5,763,400	4,322,386	4,198,470	-1,441,014	123,916	6,961,411	7,381,411	-420,000
WBS[2]Totals:	**5,459,444**	**2,383,888**	**2,128,129**	**-3,075,556**	**255,759**	**44,116,629**	**35,693,307**	**34,148,660**	**-8,423,321**	**1,544,648**	**263,009,500**	**267,491,500**	**-4,482,000**
1.04 Experimental Facilities													
1.04.01 Experimental Facilities Management													
WBS[3]Totals:	138,205	138,205	105,647	0	32,558	1,955,322	1,955,322	2,283,393	0	-328,071	4,828,335	5,367,673	-539,337
1.04.02 Standard Local Controls & Data Acquisition Systems													
WBS[3]Totals:	0	14,630	0	14,630	14,630	21,887	28,876	0	6,989	28,876	69,585	69,585	-0
1.04.05 User Instruments													
WBS[3]Totals:	236,556	331,591	186,127	95,035	145,465	3,976,513	4,017,484	2,777,689	40,971	1,239,794	63,573,084	63,573,084	0
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	74	0	-74	843,917	645,243	554,623	-198,674	90,620	2,072,162	2,072,162	-0
WBS[2]Totals:	**374,761**	**484,426**	**291,848**	**109,665**	**192,578**	**6,798,095**	**6,647,381**	**5,616,911**	**-150,714**	**1,030,471**	**70,543,623**	**71,083,710**	**-540,086**
1.05 Conventional Facilities													
1.05.01 Conventional Facilities Management													
WBS[3]Totals:	230,516	230,516	397,447	0	-166,932	5,112,526	5,112,526	5,009,229	0	103,297	14,187,003	14,868,590	-681,588
1.05.02 Conventional Facilities Engineering and Design													
WBS[3]Totals:	107,334	80,403	8,702	-26,932	71,701	18,678,092	18,626,616	15,492,419	-51,476	3,134,198	22,563,410	22,563,410	0
1.05.03 Conventional Facilities Construction													
WBS[3]Totals:	4,230,901	5,724,648	9,231,240	1,493,747	-3,506,592	43,422,651	50,361,957	50,605,586	6,939,305	-243,629	217,540,505	237,238,846	-19,698,341
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	0	-5,000	0	40,000	67,819	36,518	27,819	31,301	578,000	578,000	0
WBS[2]Totals:	**4,573,750**	**6,035,566**	**9,637,389**	**1,461,816**	**-3,601,823**	**67,392,506**	**74,182,457**	**71,157,346**	**6,789,952**	**3,025,112**	**256,455,778**	**277,235,706**	**-20,779,928**
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	11,745,485	10,273,008	13,323,288	-1,472,477	-3,050,280	193,298,108	190,698,673	184,693,430	-2,599,435	6,005,243	757,854,273	785,083,289	-27,229,016
Undistributed Budget											3,788,842	554,501	3,234,341
Sub Total	11,745,485	10,273,008	13,323,288	-1,472,477	-3,050,280	193,298,108	190,698,673	184,693,430	-2,599,435	6,005,243	761,643,115	785,637,790	-23,994,675
Contingency/Mangement Reserve											150,356,885		
Total Project Cost -TPC	11,745,485	10,273,008	13,323,288	-1,472,477	-3,050,280	193,298,108	190,698,673	184,693,430	-2,599,435	6,005,243	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 / 01 / 01
b. LOCATION (Address and ZIP Code) Brookhaven National Laboratory, Upton,NY	b. NUMBER	b. PHASE	b. TO (YYYYMMDD) 2010 / 01 / 31
	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

ARRA vs. REGUL Cost Account	CURRENT PERIOD					CUMULATIVE TO DATE					AT COMPLETION		
	BUDGETED COST		ACTUAL COST	VARIANCE		BUDGETED COST		ACTUAL COST	VARIANCE				
ITEM (1)	WORK SCHEDULED (2)	WORK PERFORMED (3)	WORK PERFORMED (4)	SCHEDULE (5)	COST (6)	WORK SCHEDULED (7)	WORK PERFORMED (8)	WORK PERFORMED (9)	SCHEDULE (10)	COST (11)	BUDGETED (14)	ESTIMATED (15)	VARIANCE (16)
A ARRA													
1.05.03.02.01 General Requirements	170,312	86,117	17,000	84,195	69,117	4,583,233	4,500,215	3,485,637	83,018	1,014,578	4,851,187		
1.05.03.02.02 Site Work	163,088	47,958	0	115,130	47,958	3,089,062	2,634,904	2,241,916	454,158	392,988	3,533,893		
1.05.03.02.03 Pentant 1 and Service Building	138,800	321,479	312,146	182,679	9,333	5,725,829	5,394,586	5,182,041	331,243	212,545	18,743,961		
1.05.03.02.04 Pentant 2 and Service Building	922,010	923,208	893,981	1,198	29,227	4,762,685	4,566,034	4,572,880	196,651	6,846	15,117,599		
1.05.03.02.05 Pentant 3 and Service Building	3,134	320,078	311,977	316,944	8,101	1,409,837	2,008,712	2,090,928	598,875	82,216	9,802,717		
1.05.03.02.06 Pentant 4 and Service Building	0	295,190	297,131	295,190	1,941	772,680	772,680	864,091	0	91,411	2,147,312		
1.05.03.02.07 Pentant 5 and Service Building	30,334	185,892	159,118	155,558	26,774	2,842,845	2,785,444	2,701,829	57,401	83,616	6,789,592		
1.05.03.02.08 Injection Building	115,780	109,031	56,127	6,749	52,904	446,963	532,598	715,298	85,635	182,700	5,324,111		
1.05.03.02.09 RF and Compressor Building	48,098	129,231	168,949	81,133	39,718	1,253,153	1,210,113	1,000,688	43,040	209,425	4,737,160		
1.05.03.02.10 Lobby	0	2,380	2,380	2,380	0	105,589	159,899	157,519	54,310	2,380	2,987,094		
1.05.03.02.11 Cooling Tower and Process Water	14,105	5,409	5,409	8,696	0	77,673	122,846	116,086	45,173	6,760	4,075,953		
1.05.03.02.12 Underground Mechanical Utilities	0	465,770	434,144	465,770	31,626	722,916	2,888,222	2,799,758	2,165,306	88,464	8,478,155		
1.05.03.02.13 Site Electrical Utilities	880,301	790,132	2,739,500	90,169	1,949,368	3,420,101	5,552,904	5,244,383	2,132,803	308,521	9,356,456		
1.05.03.03 Electrical Substation and Feeder (Contract)	138,386	67,819	111,395	70,566	43,575	1,065,672	1,193,230	862,872	127,558	330,358	2,943,143		
1.05.03.04 Chilled Water Plant (Conract)	440,808	466,168	1,930,481	25,360	1,464,313	1,445,580	1,864,934	2,971,945	419,355	1,107,011	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 vs. REGULTotals:	3,065,155	4,215,863	7,439,738	1,150,708	3,223,876	31,723,817	36,187,320	35,007,870	4,463,503	1,179,450	132,995,386		