

# National Synchrotron Light Source II

## Project Progress Report

September 2011



New perspective from the water tower showing the ring building with Lab-Office Building 2 enclosure work in progress.

report due date:  
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## OVERALL ASSESSMENT

The National Synchrotron Light Source II project maintained satisfactory cost and schedule performance, completing 63% of the project by the end of September with over 30% of contingency and management reserve for the remaining Budget At Completion (BAC). The cumulative Schedule Performance Index (SPI) for the overall project is 0.96 and the cumulative Cost Performance Index (CPI) is 1.0.

The project is conducting a project-wide comprehensive Estimate At Completion (EAC) over the next couple of months. This exercise will be based on the current status of the conventional construction, updated magnet production and accelerator installation schedule, up-to-date procurement plans, and more detailed-out installation activities for the six project beamlines. Based on this comprehensive EAC, the cost and schedule contingencies and the projected early completion date for the overall project will be updated.

Construction of the ring building and lab-office buildings (LOBs) remains on schedule. The restoration of the interior courtyard and the foundations for LOB 4 were completed in September. The beneficial occupancy of pentant 3 is planned for early October, at which point more than 65% of the ring building space will be taken over by the project. The contractor is currently projecting that the entire ring building will be turned over to the project by the end of this year.

Although excellent progress continued in most areas as reported below, the monthly SPI in September for the Accelerator Systems was 0.80, largely due to delays in accelerator installation and the production of dipole and transport line magnets. All magnet suppliers except 35 mm dipoles have now ramped up production rates. Progress continued in accelerator installation in pentants 1 and 2, the RF building, the injector building, and the computer room.

The procurements of long-lead-time beamline components for the six Project beamlines are moving ahead at a good pace and the Preliminary Design Review (PDR) for the hutches was held.

The projected early completion date remains at March 2014 and the critical path continues to pass through the 35 mm dipole magnet deliveries, girder assembly and installation, and integrated tests and commissioning of the storage ring. Activities funded by the American Recovery and Reinvestment Act (ARRA) continue on schedule and on budget.

## UPCOMING EVENTS

## CY 2011

Installation Workshop for Accelerator Systems	Oct 4
Preliminary Design Review (PDR), Liquid Helium System	Oct 4-6
Science Advisory Cttee Beamline Development Proposal Panels:	
Materials Science and Engineering	Nov 17-18
Biological and Medical Sciences	Dec 1
Spectroscopy and Spectromicroscopy	Dec 6
ALD's Conceptual Design Review for NIH BL	Nov 29-30
DOE Review of NSLS-II	Apr 17-19, 2012

## ACCELERATOR SYSTEMS

**Magnets.** Magnet production passed the 50% production complete milestone in September. The production for all but one of the multipole magnets is on track, and a successful production readiness review (PRR) for the 35 mm aperture dipoles took place at the end of September. With only a few action items identified from the PRR, approval for partial production was granted, with full production release expected in early October. The 90 mm aperture dipole production was also fully released in September. The coil production for the Tesla quadrupole suddenly ran into a low yield problem, but a solution was quickly identified. The NSLS-II project team plans to visit Tesla Engineering in early October in order to observe its progress and review the revised delivery schedule. All other production lines are active and producing magnets at the expected rate.

**RF.** The storage ring RF transmitter was delivered in September, and installation of cable trays, AC power, water utilities, and the transmitter in the RF building is progressing. Fabrication of the booster RF transmitter is also on schedule at the factory. The preliminary design of the cryogenics system was completed on schedule by the supplier; the design review is scheduled for early October. The delivery of niobium for the superconducting cavity production became a problem when overdue delivery from the niobium supplier (different from the cavity manufacturer) eventually arrived in July and the niobium did not meet specifications. This raw material was rejected and new niobium from a different source was ordered by the cavity manufacturer in September. The project team has formulated a backup plan to use an existing cavity for the initial operation, eliminating any potential schedule risks. The project team is also working with the cavity manufacture to minimize any further delays.

**Injector.** After joint effort by the RF, injector, and controls groups, the linac front-end generated first beam in mid September. The electron gun was operated in the single-bunch mode; the total charge measured met the design specification. Software and hardware implementation of the controls system for the booster is progressing well and production of the injector beam position monitors is in full swing.

**Vacuum systems.** Installation of ion pump controllers, vacuum gauge controllers, and titanium sublimation pump controllers in pentant 1 was completed and the bake-out for the chambers installed in the magnet-girders is progressing. Awards for the damping wiggler chambers were made.

**Insertion devices.** Proposals for the 21 mm period in-vacuum undulator (IVU21) were received and evaluated; the request for proposal (RFP) for the IVU20 has been released. A successful PDR for the elliptically polarizing undulator (EPU) was conducted in late September.

**Electrical utilities.** The delivery of 575 equipment enclosures is now complete and a large amount of shelving and other auxiliary equipment is at hand, ready for installation. Electrical utilities and racks have been installed in pentants 1

and 2, the RF building, and the computer room. For the linac, all power supplies were delivered and cable trays are in place.

**Installation** crews progressed well with the third and fourth magnet-girders in the accelerator tunnel, and racks and cables are now being installed in pentant 2. The installation of power supply equipment, vacuum controls system, and programmable logic controllers for safety systems has begun in pentant 1. The accelerator installation crews also have begun working in the injector building. Cable trays and de-ionized (DI) water piping have been installed, and equipment enclosures have been placed and connected to utilities.

The monthly SPI for the Accelerator Systems in September was 0.80, largely due to the installation activities in the storage ring being behind schedule, and to delays in the production of dipole magnets and transport line magnets. A dedicated installation workshop for the Accelerator Systems is scheduled to be held in early October to review the current status and update the installation plan and schedule based on latest magnet production schedules and experience gained from the initial infrastructure and magnet-girder installation activities. This workshop will be one of the main inputs in formulating the comprehensive Estimate At Completion (EAC) for the Accelerator Systems.

## EXPERIMENTAL FACILITIES

Experimental Facilities work concentrated on various procurement packages for the long-lead-time beamline optical components. The preliminary design review meeting was held at BNL for the lead and steel hutch contractor.

**IXS.** The specification document for the KB Mirror System is ready for final review and good progress was made on the specification document for the first optical enclosure package.

A formal agreement has been signed between DESY/PETRA III and NSLS-II to enable collaboration between the two facilities on high-resolution crystal optics R&D. The 1 meV prototype test endstation has been commissioned and the system will be shipped to PETRA III in early October. The 4B crystal monochromator mechanism has also been completed and a set of 4B crystals has been procured, ready for testing together with the mechanism in the coming beamtime at PETRA III. Another set of 4B crystals is being fabricated in-house by the crystal fabrication group.

The IXS Beamline Advisory Team (BAT) held its sixth meeting in September to discuss the choice of high resolution optics for the baseline scope in light of the recent test results obtained on the CDW optics. Design of the spectrometer and the sample environments for initial experiments were also discussed at the meeting.

**CHX.** The RFP for the optics package was released in early September and several suppliers have indicated interest in submitting proposals. In response to requests, the deadline for proposals was extended from Oct 17 to Nov 21.

The procurement of a first (small format – 512x512 pixels) XPCS detector was started with a request for information (RFI) being released in late September. The Specifications and Statement of Work (SOW) for the multi-circle diffractometer were completed and the evaluation criteria were also finalized. A new capillary holder and beamstop holder were designed and built for an experiment that will take place at ESRF.

**CSX.** The SOWs and specs are being finalized for each of the mechanical components, and the tender for the gratings is expected to be ready for release soon. The procurements of toroidal mirrors, monochromators, and the M3A mirror are soon to follow. Investigations are underway to improve the coating for the optics.

**HXN.** The proposals for the optics package were received and are being reviewed; the selection process is expected to be completed in early November. A contract for a set of advanced piezo stages and controllers for manipulating MLL optics was awarded and delivery of components is expected in three to four months. A major breakthrough was accomplished in the MLL optics, which can now be mechanically polished to below 10 microns. Measurements with x-ray beam will be taken on the newly sectioned optics in the last week of October at the Advanced Photon Source.

**XPD.** The RFP for Double Laue Monochromator, released in July, is expected to receive five proposals in October. The RFPs for the remaining beamline components are being prepared for release in mid October.

**SRX.** All RFPs for optics packages were completed and released in September. Tests for precision positioning using the Delta Tau controller showed that the interaction of a coarse stage, a fine stage, and an interferometer enables very precise positioning. Discussions with several potential suppliers are under way in order to identify the optimal stages.

**Optical metrology.** The final design review of the gantry for the Nano Radian Surface Profiler was held successfully and the delivery of the profiler is expected to be on schedule at the end of January 2012.

**Optics fabrication.** 4-bounce crystal optics fabrication for the IXS group's planned experiments at PETRA-III was completed, with metrology results indicating that the crystals are all of high quality.

## CONVENTIONAL FACILITIES

Construction of conventional facilities continued to make excellent progress during September. Site restoration by the ring building contractor is transforming the "jobsite" look of the facility to that of one nearing completion (Fig. 1). The ring building and LOB construction contracts continue ahead of schedule. Major accomplishments for September include completion of interior courtyard site restoration, completion of foundations for LOB 4, and the start of foundations for LOB 5.



Figure 1. Courtyard restoration is complete near the tunnel and service bldg. 4.

The ring building contractor continues work toward phased turnover of the ring building for beneficial occupancy. The cooling tower building and pentant 3 are expected to be turned over in early October. Pentant 4 is slated for turnover in November and pentant 5 in December, more than two months earlier than scheduled. With turnover of the cooling tower building, the cooling water systems that are needed to support equipment installation in the injection, RF, and storage ring buildings will undergo pre-operational checks and be made ready to support installation and the start-up of accelerator systems. This and turnover of pentant 3 in early October will bring more than 65% of the ring building space under beneficial occupancy and available for Accelerator Systems installation activities (Fig. 2). Punchlist work in the occupied areas continues to be steadily completed and is being coordinated under a work permit system.



Figure 2. Service bldg. 3 mechanical room is nearly ready for turnover.

Work in pentants 4 and 5 continues to proceed ahead of schedule. Interior painting of pentant 4 is complete, and mechanical and electrical work in service building 4 is nearing completion. Pentant 5 will be the last major work area for the ring building contractor, so demobilization of some of the subcontractors will be taking place in the next month or two as their work in pentant 5 is completed and punchlist work is closed out.

Substantial progress was made on site restoration during September. Final paving of all roads and parking lots is nearly completed. Distribution of topsoil, final grading, and seeding is complete in the interior courtyard except for some touch-up

work. Finish grading and seeding of the exterior areas are now well underway and should be completed by the end of October. Some areas along the exterior of the ring building will be left for completion by the LOB contractor due to ongoing construction of the LOBs. These areas will be completed by the autumn of 2012, due to the added scope of LOBs 4 and 5.

LOB construction continues to make excellent progress. LOB 1 mechanical and electrical work, roof installation, and building enclosure are underway. Partition wall installation and roofing of LOBs 2 and 3 are in progress (Fig. 3).



Figure 3. LOB 3 partition walls in open plan office area.

LOB 4 foundations have been completed and steel erection is scheduled for mid-October (Fig. 4); foundation work for LOB 5 is now underway. The coordination of work between the ring contractor, LOB contractor, and ongoing accelerator installation continues to progress well with minimal interference or disruption.



Figure 4. Steel being staged for erection at LOB 4.

## RECENTLY HIRED

Christopher Amundsen – Mechanical Engineer – ASD  
 Stephen Antonelli – Mech. Engineer – Beamline Eng., Photon Division  
 Mark Breittfeller – Mechanical Engineer – ASD  
 Joseph Dadhal – Student Assistant – Elec. Engineering, ASD  
 William Licciardi – Mech. Tech. – Insertion Devices, ASD  
 Jüri Tagger – Controls Engineer – Controls, ASD  
 John VanHouten – Computer Support Technician, Business Division  
 Paul Zschack – Deputy Division Director, Photon Division

## COST/SCHEDULE BASELINE STATUS

The cumulative Cost Performance Index (CPI) for the overall project is 1.0 and the cumulative Schedule Performance Index (SPI) remains at 0.96, both well within the acceptable range. The project is 63% complete, with 28% of contingency and management reserve remaining, based on EAC work remaining.

The project current-period SPI of 0.83 is due to Conventional Facilities (0.86 SPI) and Accelerator Systems (0.80) in September. The Conventional Construction schedule variance (SV) for the current month results from completion of mechanical work in August that was scheduled for September; this will self-correct next month. Accelerator Systems' monthly SPI of 0.80 is based on delays in storage ring installation activities and production numbers for dipole and transport line magnets.

Experimental Facilities continues to perform close to plan on a cumulative basis for both cost and schedule.

The critical path for the project has not changed since last month; the systems on the critical path include 35 mm dipole magnet deliveries; pentant 5 girder assembly, installation, survey, and alignment; subsystem test diagnostics; EPU installation; integrated tests; and commissioning of the storage ring. The projected early completion date for the project remains at March 2014. There are 15 months of float between the project early completion milestone and CD-4, with approximately 33% schedule contingency.

## PROCUREMENT ACTIVITIES

Four significant solicitations (>\$100K, estimated) were released to industry through FedBizOps in September. Awards under this group of solicitations will be made in October and are estimated at greater than \$1M. An RFP for the CHX Beamline Optical Components Package was posted on FedBizOps on September 2. Awards for the Damping Wiggler Vacuum Chambers (\$790K) and the SR Injection Pulsed Magnet System – Septum System (\$336.6K) were made in September.

## ENVIRONMENT, SAFETY, AND HEALTH

The beneficial occupancy readiness evaluations (BOREs) continued on schedule. BOREs have been completed for pentants 1, 2, and 3; the RF, compressor, and injection buildings; and the cooling tower. Occupancy of pentant 3 and the cooling tower is pending finalization of pre-start items and should be complete by 10/20/11, enabling occupancy.

Significant efficiencies have been gained from experience with the BORE process: with the recent evaluations there have been fewer pre-start items and less time from the BORE inspection to approved changes leading to occupancy.

The Booster Safety Assessment Document and Accelerator Safety Envelope have been developed and will go through an internal PSD review in October. This development process is approximately one month ahead of schedule and is attributed to lessons learned during linac documentation development.

The Accelerator Readiness Review (ARR) committee has been selected and all committee members are now engaged. An initial meeting of the committee took place at the Accelerator Safety Workshop during the week of Sept. 19. The intent of the meeting was to update the committee on the progress of the injection facility, injector hardware, and the necessary documentation being developed. Several groups continue to work on documentation necessary for a successful commissioning ARR, including operational procedures, emergency procedures, and training and qualifications criteria; these tasks are on schedule to be completed in late October. The linac ARR is now scheduled for mid January 2012.

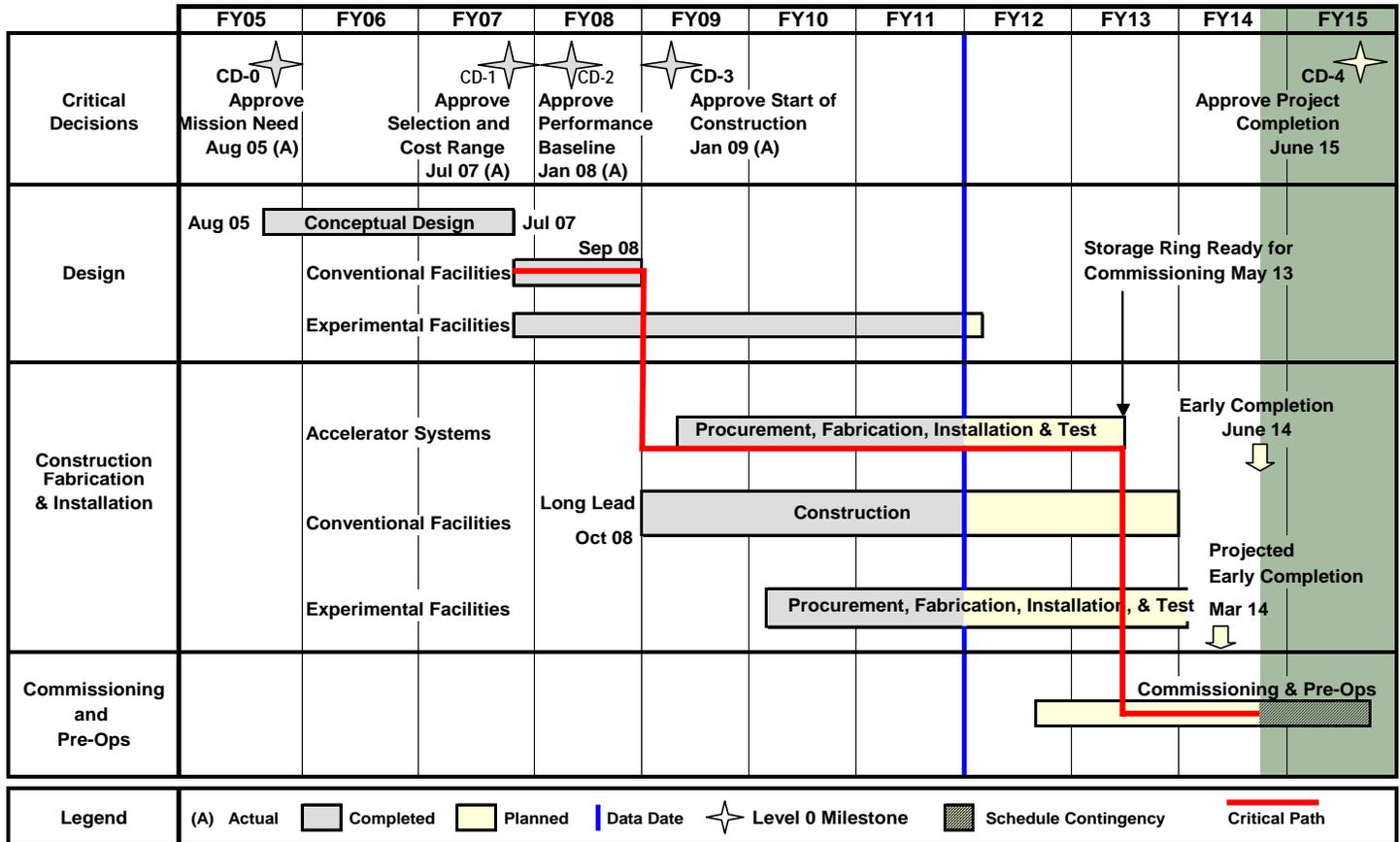
On September 22, a painter working in the ring building was injured while moving a box containing the cover for an electrical cabinet. Although he was wearing appropriate personal protective equipment, when the box slipped out of his hands and landed on the instep of his foot, it unfortunately caused a fracture and subsequent lost time.



Figure 5. The new sign is above the main door of the ring building, and the "loop" paving is in place.

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**



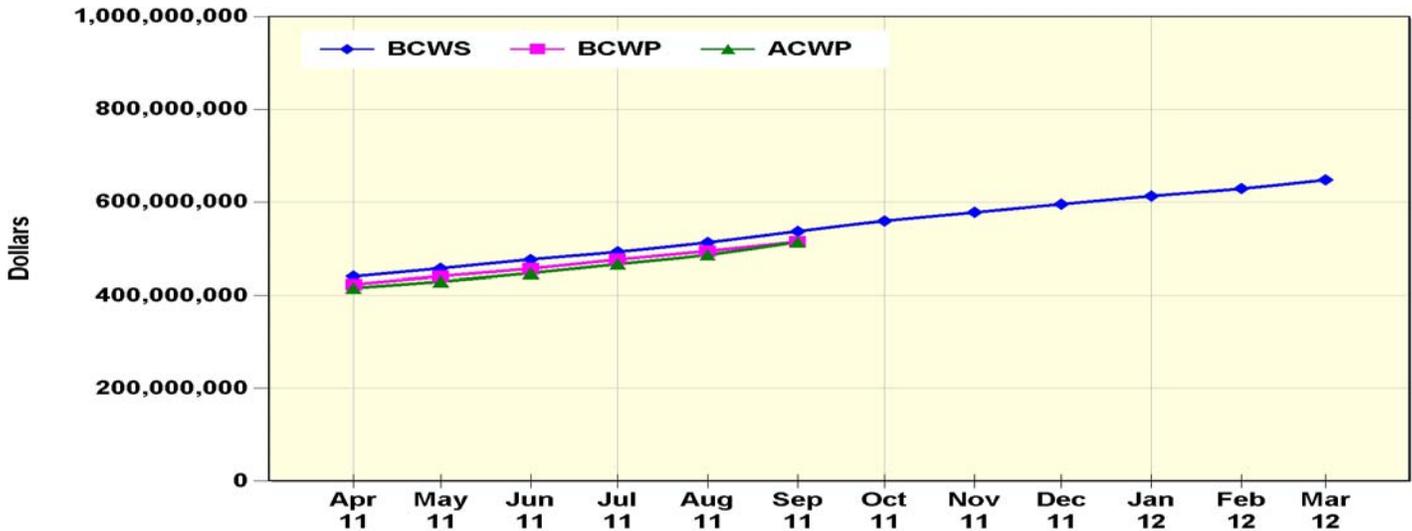
**Funding Profile**

Funding Type	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	151.3	151.4	47.2	26.3		731.2
Pre-Ops							0.7	7.7	24.4	22.4	5.0	60.2
<b>Total NSLS-II Project</b>	<b>1.0</b>	<b>4.8</b>	<b>25.0</b>	<b>49.7</b>	<b>253.3</b>	<b>141.0</b>	<b>152.8</b>	<b>159.1</b>	<b>71.6</b>	<b>48.7</b>	<b>5.0</b>	<b>912.0</b>

**Key Personnel**

Title	Name	Email	Phone
Federal Project Director	Frank Crescenzo	<a href="mailto:crescenzo@bnl.gov">crescenzo@bnl.gov</a>	631-344-3433
NSLS-II Project Director	Steve Dierker	<a href="mailto:dierker@bnl.gov">dierker@bnl.gov</a>	631-344-4966

EVMS for WBS 1 (NSLS-II Project) as of September 30, 2011



Cumulative to Date:	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12
BCWS	440,566	457,942	476,911	493,071	513,275	537,171	559,612	577,917	595,786	613,394	629,293	648,036
BCWP	423,737	440,842	457,437	476,392	494,904	514,839						
ACWP	416,068	429,933	447,653	466,719	486,560	514,161						

Project as of 9/30/11	Current Period	Cum-to-date
Plan (BCWS) \$K	\$ 23,897	\$ 537,171
Earned (BCWP) \$K	\$ 19,935	\$ 514,839
Actual (ACWP) \$K	\$ 27,600	\$ 514,161
SV \$K	\$ - 3,962	\$ - 22,333
CV \$K	\$ - 7,665	\$ 678
SPI	0.83	0.96
CPI	0.72	1.00
Budget at Completion \$K (PMB [UB])		\$ 820,082
Planned % Complete		65.5%
Earned % Complete		62.8%
Mgmt Reserve/Cont as % of BAC remaining		30.1%
Mgmt Reserve/Cont as % of EAC remaining		28.2%

Milestones – Near Term	Baseline	Done
L3-SR RF Cavities – Contract Award	10/2010	✓
L3-Accelerator SR Controls – Design Complete	10/2010	
L2-Ring Building Pentant 1 BOD	2/2011	✓
L3-Lobby BOD	2/2011	
L3-Accelerator Injector System Design Complete	2/2011	✓
L3-Accelerator SR Insertion Devices – Design Complete	5/2011	✓
L3-Accelerator SR Safety Systems – Design Complete	5/2011	
L2-RF Building BOD	5/2011	✓
L3-Ring Building Pentant #2 BOD	6/2011	✓
L3-Accelerator SR Beamline Front Ends – Design Complete	8/2011	
L3-Ring Building Pentant #3 BOD	9/2011	
L3-Accelerator SR Design Complete	11/2011	
L2-Ring Building Pentant #4 BOD	2/2012	
L3-Ring Building Pentant #5 BOD	2/2012	

L3 = Level 3 milestone, L2 = Level 2 milestone

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

**Schedule Performance Index, Project to Date:**

SPI 0.96

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

**Cost Performance Index, Project to Date:**

CPI 1.00

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

Two PCRs were approved in September.

PCR #	Area	Δ cost	Title or Description
011-322	AS	\$0K	Injection Straight Pulsed Magnets Contract Award Implementation
011-291	PM	\$29.5K	Procurement of AEDs (defibrillators) for Ring Building

**ARRA DETAILS**

The Recovery Act has provided advanced funding for NSLS-II construction, created jobs, and substantially reduced the cost and schedule risks for the project. The overall schedule for the ring building completion has not been accelerated; however, Recovery Act funds have allowed 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 the critical path. This addition of schedule float significantly reduces the schedule risk for the accelerator. In addition, Recovery Act funds have allowed for accelerated completion of the Laboratory–Office Buildings by approximately 15 months, which has enabled the project to maximize the cost advantage of the depressed construction market.

ARRA\$ as of 9/30/11	Current Period	Cum-to-date
Plan (BCWS) \$K	\$ 3,041	\$ 122,471
Earned (BCWP) \$K	\$ 3,157	\$ 125,314
Actual (ACWP) \$K	\$ 3,784	\$ 124,498
SV \$K	\$ 116	\$ 2,843
CV \$K	\$ - 627	\$ 817

ARRA Milestones		
Description	Baseline Date	Status
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.
Pentant 2 tunnel walls complete.	3/16/10	Completed 3/11/10.
Begin steel erection pentant 1.	4/14/10	Completed 3/16/10.
Start metal decking for pentant 1 Service Building.	5/12/10	Completed 4/14/10.
Pentant 5 tunnel slab complete.	5/25/10	Completed 12/9/10.
Begin experimental floor concrete, pentant 1.	6/2010	Completed 6/7/10.
Begin experimental floor concrete, pentant 2.	7/2010	Completed 6/21/10.
Complete structural for steel pentant 3.	9/2010	Completed 8/13/10.
Complete chilled Water Plant enclosure.	9/2010	Completed 8/2010.
Pentant 1 building enclosure complete.	10/2010	Completed 10/2010.
RF building enclosure complete.	11/2010	Completed 11/2010.
Injection building enclosure complete	12/2010	Completed 8/2011.
Permanent power available, pentant 1	1/2011	Completed 1/2011.
Pentant 1 ready for beneficial occupancy	2/2011	Completed 3/2011.
RF Building ready for beneficial occupancy	3/2011	Completed 6/2011.
Chilled Water expansion complete	4/2011	Completed 3/2011.
Injection building ready for beneficial occupancy	5/2011	Completed 8/2011.
Pentant 2 ready for beneficial occupancy	6/2011	Completed 7/2011.
Permanent power available, pentant 3	8/2011	Completed 7/2011.
Pentant 3 ready for beneficial occupancy	9/2011	Anticipate completion <a href="#">mid October.</a>

Blue text is new.

ARRA Cost Account	CURRENT PERIOD					CUMULATIVE TO DATE					AT COMPLETION			
	BUDGETED COST		ACTUAL COST	VARIANCE		BUDGETED COST		ACTUAL COST	VARIANCE		BUDGETED	ESTIMATED	VARIANCE	
	WORK SCHEDULED	WORK PERFORMED	WORK PERFORMED	SCHEDULE	COST	WORK SCHEDULED	WORK PERFORMED	WORK PERFORMED	SCHEDULE	COST				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(14)	(15)	(16)
<b>A ARRA</b>														
1.05.01.02.01 CF Project Office Construction Management	0	0	0	0	0	0	0	0	0	0	168,151			
1.05.02.02.01 CF Title II A/E Design	0	0	0	0	0	300,000	300,000	311,719	0	-11,719	300,000			
1.05.03.02.01 General Requirements	0	5,151	5,150	5,151	1	5,182,343	5,295,535	3,334,164	113,192	1,961,371	5,295,535			
1.05.03.02.02 Site Work	0	7,744	7,745	7,744	-1	3,456,532	3,584,294	3,411,263	127,762	173,032	3,611,419			
1.05.03.02.03 Pentant 1 and Service Building	0	15,000	15,000	15,000	0	19,501,848	19,381,165	19,111,446	-120,683	269,719	19,446,336			
1.05.03.02.04 Pentant 2 and Service Building	0	26,345	33,089	26,345	-6,744	15,414,127	15,419,957	15,523,582	5,830	-103,626	15,453,256			
1.05.03.02.05 Pentant 3 and Service Building	144,921	24,776	57,439	-120,145	-32,663	10,324,112	10,339,808	10,464,956	15,696	-125,148	10,363,240			
1.05.03.02.06 Pentant 4 and Service Building	72,224	19,612	19,612	-52,612	0	2,465,852	2,616,207	2,791,902	150,355	-175,695	2,749,735			
1.05.03.02.07 Pentant 5 and Service Building	24,048	19,706	25,705	-4,343	-6,000	7,009,056	6,949,423	7,061,964	-59,633	-112,541	7,145,854			
1.05.03.02.08 Injection Building	0	16,151	128,649	16,151	-112,499	5,584,306	5,558,499	5,507,243	-25,808	51,256	5,937,308			
1.05.03.02.09 RF and Compressor Building	0	6,842	6,842	6,842	-1	4,952,780	4,929,689	4,957,622	-23,092	-27,934	4,950,780			
1.05.03.02.10 Lobby	0	15,000	56,280	15,000	-41,280	3,005,358	2,946,779	2,934,079	-58,579	12,700	2,986,150			
1.05.03.02.11 Cooling Tower and Process Water	0	38,795	51,863	38,795	-13,068	4,466,519	4,407,193	4,381,883	-59,326	25,309	4,471,519			
1.05.03.02.12 Underground Mechanical Utilities	0	851	851	851	0	8,573,121	8,573,121	8,573,972	0	-851	8,573,121			
1.05.03.02.13 Site Electrical Utilities	14,917	2,100	900	-12,817	1,200	8,377,948	8,408,420	8,575,701	30,472	-167,281	8,411,720			
1.05.03.02.14 LN2 and GN2 Systems	0	0	0	0	0	0	0	0	0	0	0			
1.05.03.03 Electrical Substation and Feeder (Contract)	0	0	5,940	0	-5,940	2,943,143	2,943,143	2,857,771	0	85,372	2,943,143			
1.05.03.04 Chilled Water Plant (Contract)	0	0	15,347	0	-15,347	9,200,000	9,184,400	9,049,197	-15,600	135,203	9,200,000			
1.05.03.06.01 LOB 1	1,785,295	830,100	1,160,225	-955,195	-330,125	7,824,294	7,701,886	8,013,702	-122,408	-311,817	16,603,830			
1.05.03.06.02 LOB 2	568,828	661,759	521,259	92,931	140,500	1,587,276	3,020,075	3,331,555	1,432,799	-311,480	6,873,152			
1.05.03.06.03 LOB 3	430,487	1,466,869	1,672,043	1,036,382	-205,174	2,302,632	3,754,672	4,303,802	1,452,040	-549,130	13,188,199			
<b>ARRA Totals:</b>	<b>3,040,720</b>	<b>3,156,799</b>	<b>3,783,938</b>	<b>116,079</b>	<b>-627,140</b>	<b>122,471,248</b>	<b>125,314,265</b>	<b>124,497,525</b>	<b>2,843,018</b>	<b>816,740</b>	<b>148,672,448</b>			
<b>ARRA Undist Budget</b>														
<b>ARRA Totals:</b>	<b>3,040,720</b>	<b>3,156,799</b>	<b>3,783,938</b>	<b>116,079</b>	<b>-627,140</b>	<b>122,471,248</b>	<b>125,314,265</b>	<b>124,497,525</b>	<b>2,843,018</b>	<b>816,740</b>	<b>148,672,448</b>			

CONTRACT PERFORMANCE REPORT FORMAT 1 - WORK BREAKDOWN STRUCTURE													CLASSIFICATION (When Filled In)					
1. CONTRACTOR a. NAME Brookhaven Science Associates b. LOCATION (Address and ZIP Code) Brookhaven National Laboratory, Upton, NY										2. CONTRACT a. NAME National Synchrotron Light Source II (NSLS-II) b. NUMBER  c. TYPE  d. SHARE RATIO			3. PROGRAM a. NAME September 2011 EV8 b. PHASE  c. EVMS ACCEPTANCE NO YES X (YYYYMMDD)			FORM APPROVED OMB No. 0704-0168 4. REPORT PERIOD a. FROM (YYYYMMDD) 2011 / 09 / 01 b. TO (YYYYMMDD) 2011 / 09 / 30		
5. CONTRACT DATA																		
a. QUANTITY 1		b. NEGOTIATED COST 912,000,000		c. ESTIMATED COST OF AUTHORIZED UNPRICED WORK 0		d. TARGET PROFIT/ FEE 0		e. TARGET PRICE 912,000,000		f. ESTIMATED PRICE 0		g. CONTRACT CEILING 0		I. DATE OF DTBOYS (YYYYMMDD)				
6. ESTIMATED COST AT COMPLETION																		
MANAGEMENT ESTIMATE AT COMPLETION (1)			CONTRACT BUDGET BASE (2)			VARIANCE (3)			7. AUTHORIZED CONTRACTOR REPRESENTATIVE a. NAME (Last, First, Middle Initial)  c. SIGNATURE			d. DATE SIGNED (YYYYMMDD)						
a. BEST CASE 0			0			0												
b. WORST CASE 0			912,000,000			912,000,000												
c. MOST LIKELY 0			912,000,000			912,000,000												
8. PERFORMANCE DATA																		
WBS[2] WBS[3] Control Acct	BUDGETED COST		ACTUAL COST		VARIANCE		BUDGETED COST		ACTUAL COST		VARIANCE		AT COMPLETION					
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)					
1.01 Project Management																		
1.01.01 Project Management																		
WBS[3] Totals: 204,562 204,562 81,105 0 123,457 6,230,602 6,230,602 6,219,770 0 10,832 7,962,806 8,446,608 -483,802																		
1.01.02 Environmental, Safety & Health																		
WBS[3] Totals: 143,998 143,998 151,985 0 -7,987 4,109,332 4,109,332 4,560,385 0 -451,053 6,507,532 6,944,032 -436,500																		
1.01.03 Project Support																		
WBS[3] Totals: 1,113,927 1,113,927 1,061,454 0 52,474 35,131,257 35,131,257 35,600,734 -469,477 43,353,294 44,209,809 -856,515																		
1.01.04 Quality Assurance																		
WBS[3] Totals: 64,514 64,514 102,549 0 -38,035 2,459,043 2,459,043 2,231,313 0 227,730 3,397,133 3,397,133 0																		
1.01.05 Configuration Management & Document Control																		
WBS[3] Totals: 29,127 29,127 38,363 0 -9,236 1,319,275 1,319,275 1,094,369 0 224,906 1,972,567 1,972,567 0																		
<b>WBS[2] Totals: 1,556,128 1,556,128 1,435,455 0 120,673 49,249,510 49,249,510 49,706,571 -457,061 63,193,331 64,970,148 -1,776,817</b>																		
1.02 R&D and Conceptual Design																		
1.02.01 Accelerator Systems R&D																		
WBS[3] Totals: 257,227 27,625 55,066 -229,602 -27,441 11,372,494 11,236,454 11,007,217 -136,039 229,237 11,460,076 11,890,274 -430,198																		
1.02.02 Experimental Systems R&D																		
WBS[3] Totals: 347,294 340,173 325,728 -7,121 14,445 17,795,932 17,564,397 17,139,132 -231,535 425,265 19,166,550 18,771,057 395,493																		
1.02.03 Conceptual Design - Accelerator Systems																		
WBS[3] Totals: 0 0 0 0 0 12,998,214 12,998,214 12,960,504 0 37,709 12,998,214 12,960,504 37,709																		
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 7,326,180 0 -239,992 7,086,188 7,325,314 -239,126																		
1.02.07 Project Management - R&D																		
WBS[3] Totals: 18,110 18,110 58 0 18,052 5,305,339 5,305,339 5,034,284 0 271,055 5,305,339 5,066,213 239,126																		
<b>WBS[2] Totals: 622,631 385,908 380,852 -236,723 5,056 69,154,563 68,786,969 68,052,645 -367,574 734,344 60,612,763 60,612,763 -0</b>																		
1.03 Accelerator Systems																		
1.03.01 Accelerator Systems Management																		
WBS[3] Totals: 194,279 194,279 52,884 0 141,396 4,399,410 4,399,410 4,692,742 0 -293,332 6,127,100 6,127,100 0																		
1.03.02 Accelerator Physics																		
WBS[3] Totals: 200,265 200,265 297,671 0 -97,406 7,768,386 7,768,386 7,977,999 0 -209,613 10,071,767 10,071,767 0																		
1.03.03 Injection System																		
WBS[3] Totals: 2,071,729 1,109,032 8,118,027 -962,697 -7,008,995 30,943,678 28,907,293 27,268,005 -2,036,385 1,639,288 43,877,439 44,581,159 -703,720																		
1.03.04 Storage Ring																		
WBS[3] Totals: 7,317,896 6,047,143 6,133,873 -1,270,753 -86,730 99,531,755 78,386,971 80,486,360 -21,144,784 -2,099,390 157,422,839 162,461,140 -5,038,301																		
1.03.05 Controls Systems																		
WBS[3] Totals: 475,407 701,210 650,118 225,802 51,092 12,552,801 12,132,624 11,831,416 -420,177 301,208 20,317,707 20,317,707 0																		
1.03.06 Accelerator Safety Systems																		
WBS[3] Totals: 202,669 96,292 195,300 -106,377 -99,007 3,404,198 2,053,986 3,288,224 -1,350,212 -1,234,237 6,070,137 7,674,127 -1,603,990																		
1.03.07 Insertion Devices																		
WBS[3] Totals: 819,440 613,990 367,987 -205,449 246,004 7,925,290 6,359,905 6,108,363 -1,565,385 251,542 24,227,823 26,337,726 -2,109,903																		
1.03.08 Accelerator Fabrication Facilities																		
WBS[3] Totals: 14,425 44,000 248,853 29,575 -204,853 7,347,435 6,945,186 7,018,862 -402,249 -73,676 7,358,739 7,589,500 -230,761																		
<b>WBS[2] Totals: 11,296,111 9,006,212 10,064,712 -2,289,899 -7,058,500 173,872,953 146,953,762 148,671,971 -26,919,191 -1,718,210 275,473,552 285,160,228 -9,686,675</b>																		
1.04 Experimental Facilities																		
1.04.01 Experimental Facilities Management																		
WBS[3] Totals: 92,632 92,632 143,722 0 -51,090 3,972,669 3,923,656 4,829,659 -49,013 -906,003 4,877,349 5,780,777 -903,428																		
1.04.02 Standard Local Controls & Data Acquisition Systems																		
WBS[3] Totals: 0 0 0 0 0 69,585 52,582 3,457 -17,003 49,125 69,585 319,585 -250,000																		
1.04.05 User Instruments																		
WBS[3] Totals: 585,073 530,727 699,310 -54,345 -168,583 11,464,176 11,105,990 10,582,757 -358,186 523,233 64,445,109 65,908,537 -1,463,427																		
1.04.06 Front End User Requirements Development																		
WBS[3] Totals: 0 0 0 0 0 456 2,111 0 -1,655 456 2,111 -1,655																		
1.04.07 Optics Labs																		
WBS[3] Totals: 59,577 54,677 86,747 -4,899 -32,070 1,153,686 913,154 834,857 -240,533 78,297 1,509,737 1,824,972 -315,235																		
<b>WBS[2] Totals: 737,282 678,037 929,780 -59,245 -251,743 16,660,573 15,995,838 16,252,841 -684,735 -257,003 70,902,236 73,835,983 -2,933,746</b>																		
1.05 Conventional Facilities																		
1.05.01 Conventional Facilities Management																		
WBS[3] Totals: 328,742 328,742 397,555 0 -68,813 11,371,695 11,371,695 11,116,934 0 254,761 15,887,326 15,923,913 -36,587																		
1.05.02 Conventional Facilities Engineering and Design																		
WBS[3] Totals: 116,742 122,481 124,209 5,740 -1,728 21,569,172 21,569,172 20,629,022 0 940,150 23,181,410 23,101,377 80,033																		
1.05.03 Conventional Facilities Construction																		
WBS[3] Totals: 9,074,025 7,595,126 8,105,674 -1,478,899 -510,548 203,201,659 209,012,303 208,552,458 5,810,643 459,845 256,999,385 259,440,187 -2,440,802																		
1.05.04 Integrated Controls & Communications																		
WBS[3] Totals: 26,404 119,600 67,327 93,197 52,273 924,790 898,000 590,695 -26,790 307,305 1,256,000 1,256,000 0																		
1.05.05 Standard Equipment																		
WBS[3] Totals: 0 0 533 0 -533 57,263 0 12,463 -57,263 -12,463 1,025,586 1,425,586 -400,000																		
1.05.06 Conventional Facilities Commissioning																		
WBS[3] Totals: 21,758 26,019 7,424 4,261 18,596 407,697 299,927 175,624 -107,770 124,303 578,000 578,000 -0																		
<b>WBS[2] Totals: 9,567,671 8,191,969 8,702,722 -1,375,702 -510,753 237,532,276 243,151,097 241,077,196 5,618,821 2,073,901 298,927,708 301,725,064 -2,797,356</b>																		
1.06 Pre-Operations																		
1.06.01 Management - Pre Ops																		
WBS[3] Totals: 0 0 0 0 0 0 0 0 0 0 0 0 0 0																		
1.06.02 Accelerator Systems - Pre Ops																		
WBS[3] Totals: 116,923 116,923 86,947 0 29,976 701,539 701,539 399,452 0 302,087 17,071,591 20,816,426 -3,744,835																		
1.06.03 Experimental Facilities - Pre Ops																		
WBS[3] Totals: 0 0 0 0 0 0 0 0 0 0 0 0 0 0																		
1.06.04 Spares																		
WBS[3] Totals: 0 0 0 0 0 0 0 0 0 0 0 0 0 0																		
<b>WBS[2] Totals: 116,923 116,923 86,947 0 29,976 701,539 701,539 399,452 0 302,087 50,200,405 54,773,682 -4,573,277</b>																		
Performance Measurement Baseline - PMB																		
Undistributed Budget																		
Sub Total																		
Contingency/Management Reserve																		
Total Project Cost -TPC																		