National Synchrotron Light Source II

Project Progress Report

June 2012

Photo taken at the end of the workday on June 29 shows exterior finishes nearly all complete.

report due date:
July 20, 2012

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BROOKHAVEN NATIONAL LABORATORY

OVERALL ASSESSMENT

The National Synchrotron Light Source II Project continued to maintain satisfactory cost and schedule performance. The cumulative cost and schedule indices are 1.0 and 0.95, respectively. At the end of June, the Project was 79% complete with 45% of contingency and management reserve for the remaining Budget at Completion (BAC).

While an independent investigation for the linac beam miss-steering excursion is being conducted, linac commissioning activities with beam have been suspended and will not resume until all corrective actions are satisfactorily implemented and permissions to re-start are granted.

The conventional construction continued to be on budget and on schedule. Beneficial occupancy readiness evaluations (BOREs) have been completed for Lab–Office Buildings (LOBs) 1, 2, and 3. Construction activity continues to wind down, as the ring building is complete and these LOBs are essentially complete. LOBs 4 and 5 will be completed in the late-December time frame.

Good progress continued for the accelerator systems, resulting in a positive schedule variance of $551K (schedule performance index of 1.11) in the month of June. The production and installation of magnets, booster, vacuum, RF, power supplies, cryogenic systems, and insertion devices continued to make good progress. Installation of booster and storage ring continued to meet goals. In total, 65 magnet girders are now installed in the storage ring tunnel.

Hutch installation at the ring building experimental floor continued. The CSX and HXN optics hutches are completed with minor finishing tasks remaining. Procurement work for the Project beamline components continued.

The early completion date remains at June 2014, with 12 months of schedule float (33% schedule contingency) with respect to the Project's CD-4 milestone date. The schedule refinement for accelerator and beamline installation will continue over the next few months. The annual project-wide comprehensive Estimate At Completion (EAC) review is underway. Cost and schedule contingencies and the projected early completion date for the overall project will be updated based on the comprehensive EAC and schedule refinement.

Activities funded by ARRA (American Recovery and Reinvestment Act) are now more than 99% complete and continue to be on schedule and on budget.

UPCOMING EVENTS

XPD Preliminary Design Review (PDR)	July 17
Beamline EPS&PPS Design Review	July 20
CHX Diffractometer PDR	July 23
Diagnostics X-Ray Beamline Design Review	July 23
SRX Optical Components Package PDR	Jul 25–26
XPD and SRX Optical Components Package PDR	Jul 27
ALD's Preliminary Design Review of NEXT Project	Aug 7–9
RF Cryogenics, LN2 System, Final Design Review	Aug 29
DOE CD2 review of NEXT Project	Sep 11–12
DOE mini-Review of NSLS-II Project	Nov 19

ACCELERATOR SYSTEMS

Injector. The linac commissioning is nearly complete. The only remaining work is the final acceptance measurement to be conducted, after the linac supplementary shielding has been revised and improved (see ESH section, p. 8).

Kicker magnets and pulser hardware have been shipped to BNL. A second test cage has been built in Bldg. 832 for testing these magnets. Integration of controls for the pulsed magnets, corresponding EPICS database update, and high-level applications are in progress.

The work on the transfer lines (TL) progresses slowly. The support structure for magnets and other equipment has been completed and delivered. The production and delivery schedules for the TL magnets and booster power supplies were delayed and are being watched carefully.

The first unit of the NSLS-II injection kicker has been built and tested successfully. All design requirements were met.

Vacuum. Over two-thirds of the straight section chambers which allow closing the vacuum in the absence of insertion devices ("Day-1 Chambers") were received from APS, with the balance expected by August. These chambers are in the process of completion and being readied for installation. The production of crotch absorbers and RF bellows' internal fingers is ramping up. Most other vacuum components and chassis are either completed or near completion.

The design of the BTS vacuum is complete except for the injection DC septum chamber. The fabrication of BTS vacuum chambers and drift pipes has begun. The production of stick and flange absorbers is over 50% complete.

Testing and assembly of multipole and dipole chambers continues. The vacuum chamber assembly and installation in pentant 1 (P1) have been completed and a large fraction of P2 and P3 girders are completed (see below). Cell 25 was re-baked after the installation of the crotch absorbers. The installation of bellows and absorbers in P1 cells continues, with C27 completed and baked. Cables in P1 and P2 were terminated. Vacuum chassis in P1-3 were installed, and all chassis for the injector were installed and cables terminated at the rack end. Vacuum chambers for one booster arc were installed, assembled, and pumped down. The vacuum instrument for LTB is being relocated from a temporary rack to its final rack.

Electrical engineering. Production for the last power supply components has started. The first 24 units of the DC corrector power amplifiers needed for polarity switching have been tested and full production has begun. Electrical engineering has been busy with fixing assembly errors and testing incoming production units.

Insertion devices. All pole modules for the first article damping wiggler (DW) have been assembled with side magnets; the sorting of main magnets is well underway. assembly is done using the fabricated tooling. Tests of the control systems for all DW have been completed. Assembly of the balance of production DW units is well advanced and they are expected to be shipped from the subcontractor Nortemecanica to the manufacturer Danfysik in July.

The mechanical system of the EPU is ready for Factory Acceptance Testing. The EPU control system was reviewed in June and a follow up of the review is scheduled for July. The manufacturer's Final Design Report for the IVMMS (in-vacuum measurement system) has been approved and fabrication has begun. Most problems associated with integrated field measurement of the flip coil system have been addressed.

Work with the 4 m vacuum vessel seal test continues with baking tests. The PDR for the IVU21 and IVU20 was held on June 6. A CDR on IVU22 was held with Danfysik. BNL formally commented regarding the lack of remote roll adjustment, "redundant" contact micro-switches, optical gap encoder, VST-type vacuum seal configuration, means of positively locating and retaining poles, and information on the planned cooling circuit. Comments also addressed a high-permeability zone violation, unacceptable hanging of ion pumps from the large rectangular cover flange, the removability of the stainless "box" of flexible transition to allow for measurement of the fringe field by the planned full-length (3+ meter) IVMM system, if and when that is developed. A revised model for the 3PW based in permanent magnet blocks from the DW production has been produced.

RF. The booster cavity was installed in the "blockhouse" and is ready for high power testing. The installation of the RF transmitter is complete and final water hookups are in progress. Fabrication of the niobium cavity is progressing after delays in the deep drawing of the fluted beamtube aluminum prototype blanks. This has been successfully demonstrated, and production of the niobium parts is now in progress. Production of the tuner is 71% complete and production of the HOM damper ferrite tiles and the corresponding cooling system is in progress. The HE refrigerator cold box passed the factory acceptance test (Fig. 1).

The LN2 System underwent the preliminary design review successfully in June. The focus was on the phase separator, which is the most technically challenging piece, as well as general layout and interface issues.

First article production boards of the final version of the digital controller are complete and in test on the bench. Additional functionality has been added to this version of the controller, which turns it into a universal low-level RF control system. All cables of the master oscillator distribution system are now in house, and the cable tray is nearly complete. The RF clean room procurement has been advanced; in particular, the specification and SOW have been completed.

Instrumentation. Production of BPM electronics is advancing well, with sufficient units available to satisfy the installation schedule. Preliminary design for the x-ray BPM is in progress. A mechanical test assembly consisting of a prototype invar stand, XY precision stage, and an 8-inch "T"-shaped vacuum chamber was completed and mounted onto a grouted pad. In addition, a ray tracing was prepared to study the effect of reflected light coming from the absorbers and how it will impact the X-BPM blades. Triggering issues and controls interfaces for the bunch-by-bunch BPM have been resolved. Orders have been placed for most of the production of components for the transverse feedback and tune monitor.

Central Shops will fabricate the remaining stripline electrodes, tapered chamber components, and BPM chamber components. Fabrication of vacuum components of the chambers for the tune monitor strip lines is in progress. In addition, an order was placed with Central Shops to fabricate the flexible supports for the strip line chambers. Orders have been placed for invar rods for the high-stability BPM stand/chamber needed to make five complete stands. This is a long lead item and delivery is expected in September. In the meantime, Central Shops will fabricate ancillary components needed for the stands as well as the vacuum chambers.

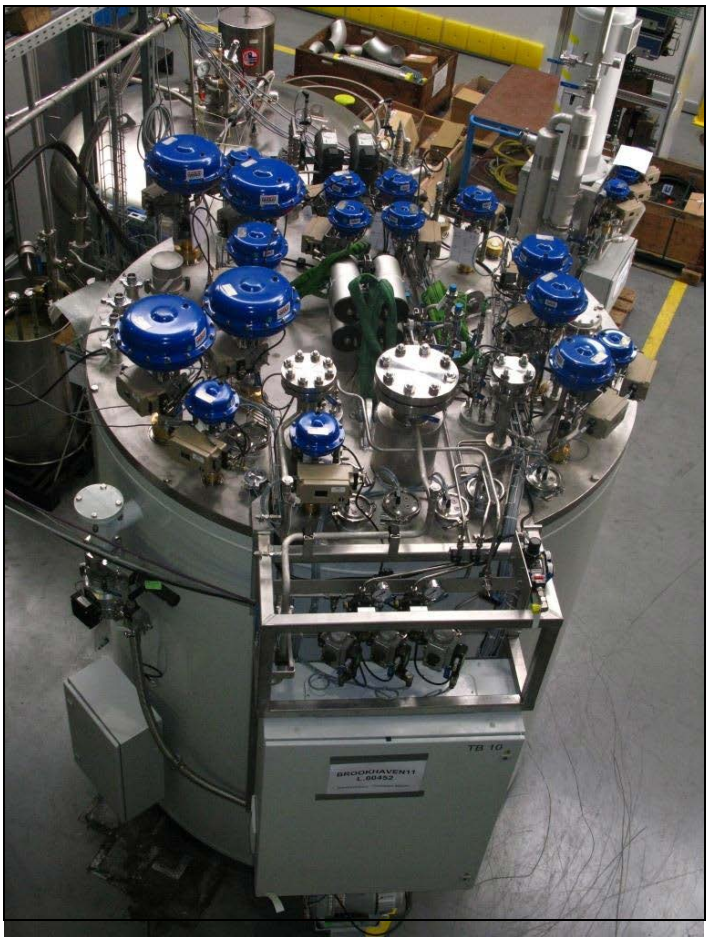


Figure 1. Cold box at the manufacturer's facility.

Six complete BHS assemblies should be ready by the end of October. The primary extraction mirror of the synchrotron light monitor has been brazed and welded and assemblies were completed and vacuum tested. A purchase order was issued to provide nickel coating, optical polishing, and a final aluminum coating. The drawings for stands, vacuum components, shielding, and optical transports are in review pending release.

Procurement of long lead items has already started. The building contract for the SLM hutch was awarded to American Clean Rooms. A preliminary design for the storage ring flag located just downstream of the septum has been generated. This is a novel design (Fig. 2), which will allow the flag screen to be positioned at any point horizontally from the parked or fully retracted position out to 78 mm. It will be able to view the injected beam and a single turn beam. At this

point most of the major details have been addressed and the chamber has been analyzed for impedance losses. A design review was held on June 29.

The capabilities to make vibrational and thermal measurements in-situ are being developed within the instrumentation group. Performance studies and signal acquisition issues for the beam loss monitor were studied and improvements were added to the existing design. If the bandwidth limitations of operating the amplifier in the "saturation region" are acceptable, then this device is very linear over at least 5 decades and possibly 6 decades. The amplifier's performance at low light levels is limited by the 2 mV RMS noise in its output. The amplifier performed well with pulse widths from as small as 1 μsec to as large as 1 second, provided the photodiode does not become saturated.

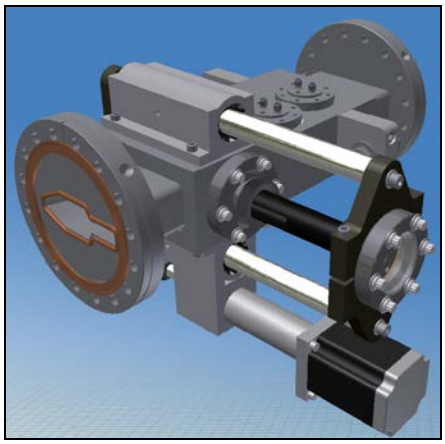


Figure 2. Conceptual view of the injection straight SR flag with three positions.

Booster installation. In the booster, 25 girders (Fig. 3) had been installed in the tunnel by the end of June. The BR-1 pump skid for the linac can now be run unmanned, as all ORE pre-start items have been completed. The BR-2 pump skid (for the booster RF transmitter) is being run manned and is available for the start booster RF transmitter testing. The BR-3 pump skid (for booster cavity) acceptance testing is complete. The booster shielding blocks were dry-fitted and not accepted due to large gaps between the blocks.

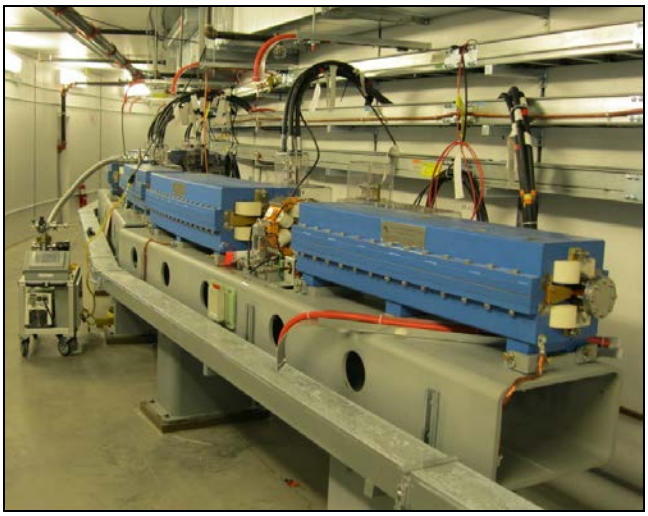


Figure 3. Booster girders.

Cable pulling in the injector made good progress: booster low voltage vacuum cables and booster diagnostic cables are complete. Booster klixon and PPS cable pulling is in process. The LtB TL P2 racks are being populated. Termination of the booster magnet cables is underway; arc 1 is 90% complete. The installation of the booster RF transmitter is complete, with acceptance testing starting on June 9. The lexan covers for the booster magnets are being modified to enhance protection. Cable tray installation along the booster girders for BPM cables is in process; arc 1 is 90% complete. Installation of the interlock conduit for the booster is complete. AC power to the racks and UPSs in the injector service area has been tested.

Storage ring installation. By the end of June, 65 magnet/girders (49 multipoles, 16 dipoles) had been installed in the SR tunnel (Fig. 4). The last magnet/girder needed to complete P1 will be installed on July 6. EPOCH 4 (fourth check of the survey control throughout the facility) is in process. The girders are being set into their finalize locations in the SR tunnel and hardware installation is in process.

Figure 4. SR tunnel, P2: The installation of interlock conduit and cable pulling are complete. Cell 29 is fully populated with magnets and the bellows have been installed. Rack shelving installation as well as PPS Interlock work are in process.

Parts needed to prepare the P1 DI copper header for priming are in-house and installation is in process. The goal is to prime the header in July. Power supply installation is in process in P1, focusing on cells 23, 24, and 27. Cells 25 and 26 are complete and powered, as well as the vacuum racks in cell 27. The vacuum bellows have been installed in cells 25, 26, and 27. Installation of absorbers throughout P1 is in process. Bakeout of cells 25 and 27 is complete. Cell 26 is next, to be followed by cell 24. The installation and cable termination of the diagnostic equipment is ongoing.

In the RF Building, terminating of the PPS cables in the blockhouse is complete. Testing of the interlocks is in process. DI piping work and AC power work in the blockhouse have been completed.

RF infrastructure installation. Pulling security cables from RF to the computer room is complete. Installation of AC power for the RF in the blockhouse is complete; running cable tray into the computer room is in process. PPS interface to the SR RF KSU is in process; testing of the blockhouse PPS will follow. Running cable tray to the mezzanine is in process.

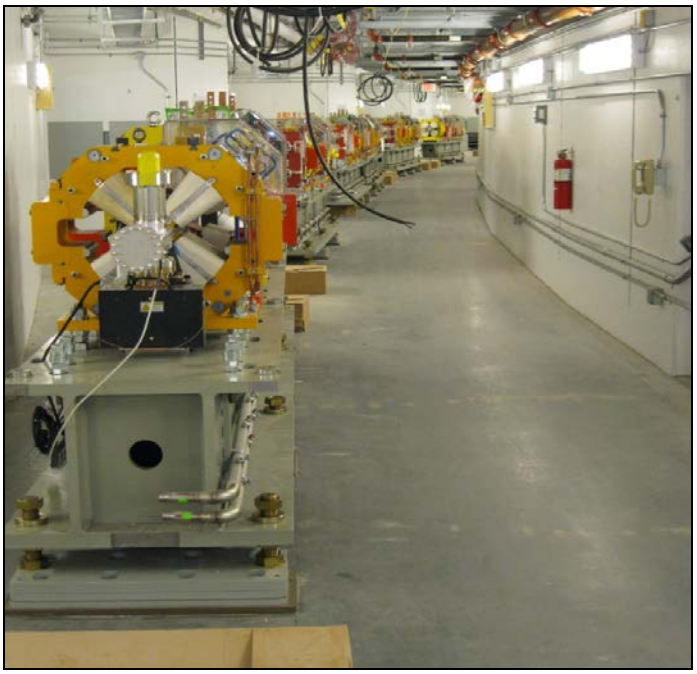


Figure 5. SR tunnel, P3: The PCW tie-in at the P3 racks is in process (headers 95% complete, tie-in is 75% complete). The AC power is complete and has been tested. Interlock conduit in the tunnel and on the mezzanine is complete. Pulling of vacuum cables is in process. The vacuum group has begun terminating cables.

Figure 6. SR tunnel, P4: Beamline box installation is complete, cable pulling is in process. Racks have been placed and secured. Installation interlock conduit is in process (tunnel is complete).

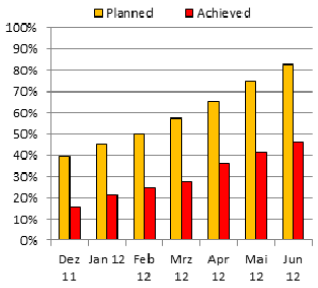
Figure 7: SR tunnel, P5: Installation of the beamline boxes is in process. The racks have been placed. DI piping installation is in process and is scheduled to be complete by July 13. Installation of girder floor plates will start once the DI piping is complete.

Figure 8: Booster cavity in blockhouse.

The charts below show an overview of installation progress.

NSLS-II Accelerator Installation Progress

Achieved	Apr 12	Mai 12	Jun 12
Mechanical Utilities	58%	59%	59%
Electrical Utilities	73%	81%	86%
Magnets	43%	50%	62%
Vacuum	13%	15%	19%
Power Supplies	12%	15%	18%
Instrumentation	23%	27%	31%
Frontends	0%	0%	0%
RF	21%	27%	32%
Inje Straight	0%	0%	0%
LINAC+Booster	16%	30%	36%
Total	**36%**	**42%**	**46%**



Experimental Facilities

During the month of June, work continued with many procurements, active project management of contracts placed, and the preliminary design review for the XPD beamline optics. The CSX and HXN optics hutches are now basically completed with minor finishing tasks needed. The schedule for remaining hutches was carefully reviewed and the contactor, GPS, is trying to complete all work by the end of this calendar year. The utilities designs and work planning is progressing and work will start as soon as the CSX hutch is handed over and we have the necessary parts in house. The shutters bid is close to being released; however, we plan an internal design review prior to this being released for bidding. The shielded transport pipe RFP documentation will follow.

CHX. The CHX team worked with the contractors on the two major procurements already awarded, the optics package and diffractometer. In early June the CHX beamline scientists traveled to Germany and visited Bruker ASC (contractor of the optics package) and Huber Gmbh (contractor of the diffractometer). Both meetings focused on particular details of the preliminary design. From Germany, they traveled to Zurich, where they visited Dectris, Inc. and the Swiss Light Source. In both places the discussions focused on the specifications and development schedule of the Eiger detector series, which will likely become the default detectors for time-resolved and coherent scattering applications.

The CHX hutches project proceeded forward. The contractor, GPS Inc., is very slow in implementing changes requested by the CHX team at the Final Design Review. Some additional difficulties, e.g., obtaining drawings in suitable formats, make this project advance more slowly than ideal. While the hutches are not on the project critical path, the CHX team is following up this procurement closely to minimize the risk of facing significant schedule or technical problems.

CSX. In June the CSX beamline team received proposals from three suppliers for the M1A and M3B mechanics package. Careful evaluation of the proposals will occur in the coming month. Simultaneously, we have made steady progress with evaluation of the toroidal mirror package and finalized the contract for the M3A bendable mirror package. We continue to work on the CCD detector package SOW and Specifications, to be ready in July, as well as other packages such as the M3B mirror, chopper, and pin-hole holder. The end of the month was dedicated to preparing the contribution to SRI and information for the following reviews. Finally, the beamline team was also busy compiling information needed to start procurement for the beamline vacuum components.

HXN. After the final design review of the HXN Beamline Component Package, the HXN team gathered the recommendations from four technical BSA panels. In parallel, the HXN team and the Contractor documented the number of post-FDR items. Some critical components are already captured in the revised HXN FDR report, which spans more than 1,200 pages in volume, including the detailed technical drawings. The HXN Final Design was formally approved on June 29. Construction of the HXN A-hutch started in June and is progressing well. The enclosure with its side walls is erected, and work on the interior and ceiling is taking place.

IXS. Request for proposals (RFP) for the IXS beamline optics component package received four responses. The evaluation of these proposals was completed and the best-value proposal was identified. Contract negotiation with the identified supplier has begun. Contract negotiation for the IXS KB Mirror Package has been concluded. The contract award is being prepared and is expected in July. As part of the preparation for early science experiments for the IXS beamline, members of the IXS team conducted high-resolution IXS experiments at SPring-8 in Japan.

SRX. Teleconference discussions with Bruker-ASC and WinlightX continued, to monitor design progress for the optics package and the KB mirror system, respectively. Especially for the optics package, several discussions have been carried out in preparation for the upcoming Preliminary Design Review. Early science studies at ALS and ESRF that were reported last month continue, with very good results. Discussions about the schedule and agenda of the upcoming SRX workshop “Rock&Cell” continue.

XPD and the prime Contractor (FMB-Oxford) coordinated the Preliminary Design Review (PDR) of the XPD Beamline Components, held on June 13 and June 21.

Testing of the XPD monochromator thermal prototype is in progress: initial tests with the cap sensors and flexure are now complete and the bender section (Fig. 9) has been connected to the liquid nitrogen heat exchanger. The thermal test data are now being reviewed in conjunction with the finite element model, which needs to hold up for all the different power loads and cooling foil thicknesses. This work is performed by the monochromator Contractor (FMB-Oxford) and will guide the ultimate thermal and bending design of the XPD monochromator first Laue crystal.

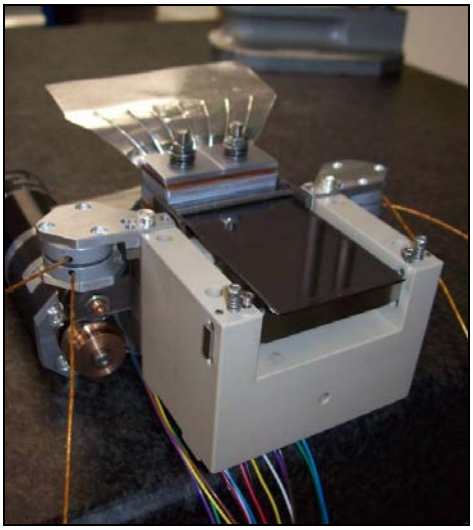


Figure 9. Bender section of the XPD monochromator thermal prototype.

Planning of XPD beamline installation and commissioning tasks is underway. Technical options, budget, and schedule are being examined for the XPD side branch.

CONVENTIONAL FACILITIES

Conventional construction continued its excellent progress during June as the first Lab–Office Buildings are nearing substantial completion and readiness for occupancy, while the ring building punchlist work is drawing down. LOBs 1 through 3 underwent beneficial occupancy reviews in late June. The ring building contractor has completed basic contract work and is working down remaining punchlist items, moving toward contract closeout.

With all areas of the ring building now occupied, the ring building contractor has completed the major work scope. All areas slated for the installation of accelerator equipment have been accepted from the contractor and are now being utilized for installation activities or staging and storing equipment and materials as they are readied for installation. The remaining ring building contractor work includes resolution of all punch-list items, completion of system commissioning and operator training, delivery of remaining operations and as-built documents, and final sitework. Following the completion of all physical work at the site, demobilization and contract closeout will commence. It is anticipated that the ring building contractor's site presence will end by August 2012, although they will be continue to be available for any warranty work.

Construction of the five LOBs continues to make excellent progress. LOB 1 activity is focused on the commissioning of mechanical and electrical systems, training O&M staff on equipment operation, and completion of pre-occupancy items identified during the beneficial occupancy review in late June. Office area finishes and flooring work are completed, laboratory furniture has been installed, and building plumbing and HVAC are ready for operation.

LOB 3 (Fig. 10) is slated for full fit-out next, and is progressing right on the heels of LOB 1. The building exterior envelope is nearly complete except for the HXN area, where sheathing is in place and siding installation is nearly complete. Interior finish work of the office areas and laboratories is nearing completion (Fig. 11). Mechanical/ electrical and plumbing (MEP) are being commissioned and made ready for use, and open items identified during the beneficial occupancy review of late June are being closed out.

Figure 10 LOB 3 exterior, nearly finished in late June.

LOB 2 follows, with roofing, sheathing, glazing and exterior siding complete. Finish work on interior partitions and MEP are well advanced and nearly completed. In LOB 4, steel and concrete are complete; interior partition and MEP work are in progress. In LOB 5, steel and concrete are complete, with roofing and sheathing in progress and interior partition work just getting underway.

Sitework for the LOBs continues to make rapid progress. Application of the final paving course for the parking lots was completed in late June. Finish grading of areas disturbed by LOB construction is underway and the application of top soil and seeding began in June. Much of the sidewalk and curbing work has been completed. Final grading, spreading of top soil, and seeding of areas around the LOBs are now in progress. Areas of finish grading and seeding for the ring building that were impacted by LOB construction will be finished by the LOB contractor this summer, bringing all site work to completion under the LOB contract by early fall.

With most work done in LOBs 1, 2, and 3 and the majority of structural work for LOBs 4 and 5 completed, the LOB workforce will begin to ramp down from peak activity levels. With beneficial occupancy of LOBs 1, 2, and 3 imminent, the workforce on the site will begin to diminish after June, until LOBs 4 and 5 are completed by the end of December 2012.

Figure 11. LOB 3 casework lighting casts a warm glow.

The coordination of work between the ring building and LOB contractors, with accelerator installation also underway, continues to progress well with minimal interference or disruption. Any work performed by the contractors in occupied areas is managed by a work permit system, to ensure safety of the workers and minimize potential disruption of the ongoing accelerator installation work.

COST/SCHEDULE BASELINE STATUS

The cumulative Cost Performance Index (CPI) for the overall Project is 1.0 and the cumulative Schedule Performance Index (SPI) is 0.95, both well within the acceptable range. The Project is 79% complete, with 40% of contingency and management reserve, based on EAC (estimate at completion) work remaining.

The project current period schedule variance is green, with a current-month SPI of 1.04, +$518K, due to continued positive performance in Accelerator Systems (AS) and Conventional Facilities.

The continued deliveries of storage ring (SR) magnets, and positive performance this month for other SR components such as vacuum valves and controls, have contributed to the positive AS schedule performance; the SPI of 1.11 represents a schedule variance of +$551K. The cumulative AS schedule performance also has continued to improve, with an SPI of 0.88, resulting in a schedule variance of (-$28M); this is a continuation of the improvement in April and May.

Although the SPI of 1.07 for the month of June is an improvement, the cumulative Experimental Facilities (EF) beamlines' schedule performance continues to be of concern, with cumulative EF SPI at 0.91 (-$2.4M).

Conventional Construction schedule performance for June 2012 is positive, with a SPI 1.03, +$118K, due to work completed ahead of schedule in the ring building and to the cumulative Conventional Construction schedule, which has been performing ahead of plan with a SPI of 1.00, +$1.1M.

The current-month CPI for the NSLS-II project is a negative variance of (-$1.4M), which is still green with a CPI of 0.90, due primarily to invoices paid for the SR magnet and RF System deliveries lagging receipt of the deliveries. The project-level cumulative cost performance is slightly positive, with a CPI of 1.00, +$343K, which is green status.

The critical path for the Project remains the same as last month and goes through the installation of power supplies and instrumentation in the racks. The critical path continues through EPU installation, integrated testing, final survey, and commissioning of the Accelerator Systems. The early Project completion date remains at June 2014, which is consistent with the baseline schedule. There are 12 months of float between the Project's early completion milestone and CD-4, with approximately 33% schedule contingency.

ENVIRONMENT, SAFETY, AND HEALTH

Beneficial occupancy readiness evaluations have been completed for Lab–Office Buildings, 1, 2, and 3. Pre-start items are being closed out and occupancy is expected in early August. LOBs 4 and 5 will be completed in the late-December time frame. The BORE process will ensure that all life safety and code compliance requirements are in place prior to staff occupying the LOBs. Work to close out the remaining post-occupancy items from the ring building continues and is nearly complete.

A beam miss-steering excursion occurred at the linac on May 29. During commissioning activities, the combination of linac electron beam energy and the power supply setting for the dipole bending magnet were such that the resulting beam path extended beyond the downstream shadow shield width and struck the linac shield wall. This resulted in elevated radiation in a radiation-monitored, controlled area within the booster enclosure. No personnel exposure or machine damage occurred. This excursion is under investigation by an independent team. A draft report is expected on July 20, 2012. Linac commissioning activities have been suspended and will not resume until all corrective actions are satisfactorily implemented and permissions to re-start are granted.

Construction activity continues to wind down, as the ring building is complete and LOBs 1, 2, and 3 are essentially complete. The focus of construction is now at LOBs 4 and 5 and on finished site work. Increased emphasis is being given to safety as the contractor demobilizes. Historically, this phase of a construction project results in increased injuries and claims. Enhanced communications and job planning are being implemented to minimize this risk.

NEWLY HIRED

There were no new hires in June.

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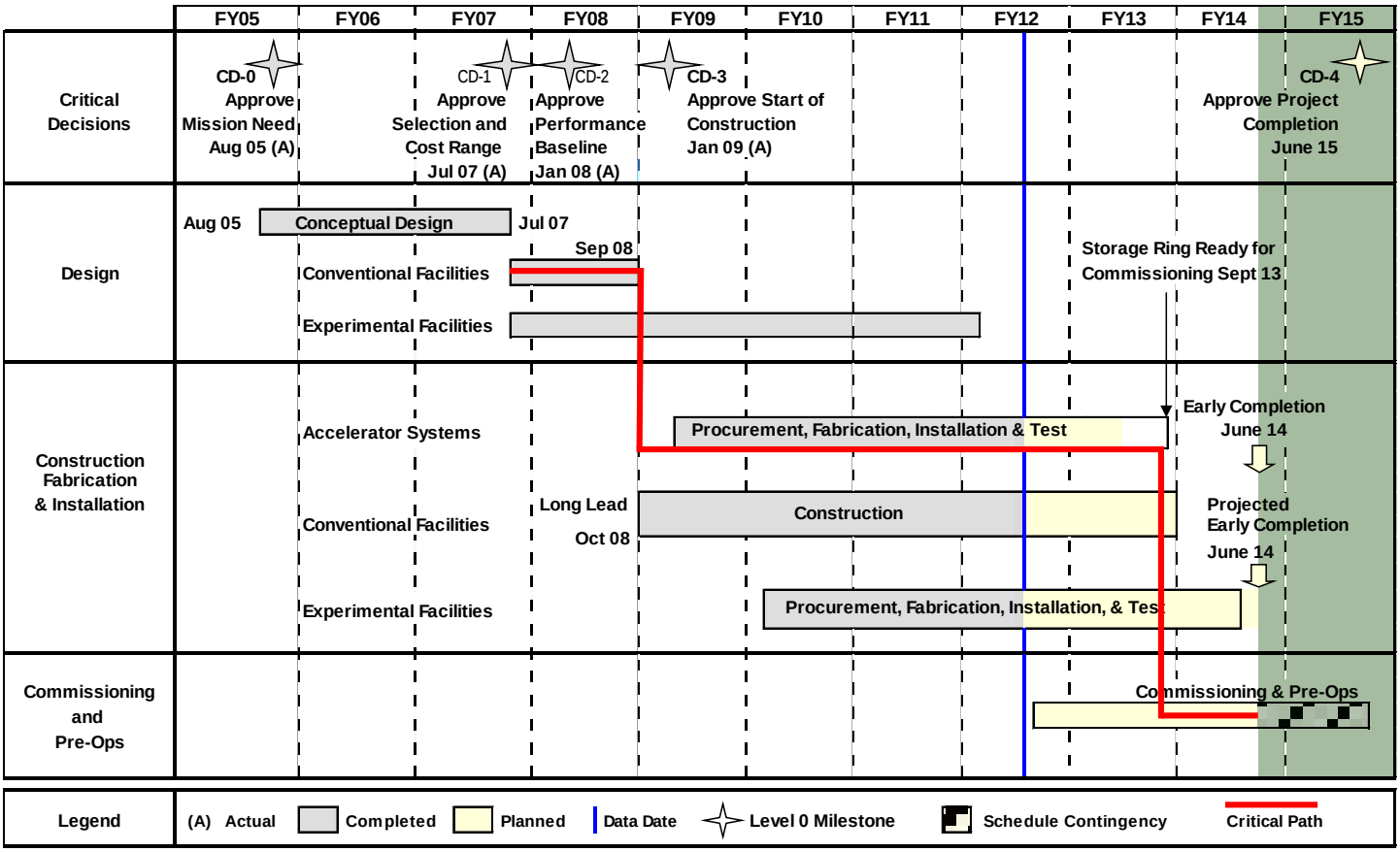
The NSLS-II Project is being carried out to design and build a world-class user facility for scientific research using synchrotron radiation. The project scope includes the design, construction, and installation of the accelerator hardware, civil construction, and experimental facilities required to 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



	NSLS-II Funding Profile ($M)											
Funding Type	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
Total NSLS-II Project	1.0	4.8	25.0	49.7	253.3	141.0	152.8	159.1	71.6	48.7	5.0	912.0

The NSLS-II Project Progress Report is prepared monthly for submission to the Department of Energy.
This condensed version is available to the public at the NSLS-II website in PDF format. For questions or comments contact the editor, Kathleen Robinson, at krobinson@bnl.gov,
or via mail at: Room 37, Bldg 830M, Brookhaven National Laboratory, Upton NY 119873.