National Synchrotron Light Source II

Project Progress Report

February 2013 Activity

Workers arriving, early on a wet winter morning. February 28, 2013.

report due date:
March 20, 2013

Steve Dierker
NSLS-II Project Director

Brookhaven National Laboratory
Upton, New York 11973

OVERALL ASSESSMENT

The National Synchrotron Light Source II Project continued to maintain satisfactory cost and schedule performance with cumulative cost and schedule indices of 0.99 and 0.96, respectively. At the end of February, the project was 87% complete with 47% of contingency and management reserve for the remaining EAC (59% for the remaining BAC). A number of Project Change Requests are being implemented according to the contingency spend plan.

Conventional construction activities and conventional facilities project staff continue to wind down as the overall conventional facilities is about 99.7% complete. All five LOBs and the HXN satellite building are completed; work on minor punchlist items, furnishings, and commissioning continued. Contract closeout for the ring building and LOBs are slated to occur in July 2013. The ring building recently received LEED Gold certification and the NSLS-II Project has been designated winner of a Diamond Award, the highest category of award by the New York State chapter of the American Council of Engineering Companies. The LOBs are expected to receive LEED Gold certifications, and the contractor achieved no lost workdays in 300,000 hours worked.

Overall accelerator systems is 87% complete and schedule performance for accelerator systems continued to improve, with a monthly schedule performance index of 1.14, +$491K, in February. The installation and integrated testing for booster and storage ring are making excellent progress and enhanced radiation shielding analysis and implementation are being carried out. Various schedule delays in super conducting RF cavity and cryogenic system fabrications are being mitigated. Designs or productions of all types of insertion devices are making good progress.

Experimental facilities maintained its schedule performance in all beamlines. Excellent progress continued in hutch installation, and design and fabrication activities of beamline components at various vendor sites. Utility and infrastructure installation is ramping up.

With the addition of two insertion devices as an investment for the future beamlines, the early project completion date now extends out to August 2014. However, the project will continue to strive to complete all project scope by June 2014 except the two new insertion devices as added scope. The critical path of the project now runs through booster Accelerator Readiness Review and DOE approval to start booster commissioning, followed by the commissioning of the booster and storage ring and delivery of the two new insertion devices. The project now has 56% (10 months) of schedule contingency for the remaining duration of 18 months before early completion.

UPCOMING EVENTS

BNL Director's Review of the NSLS-II Beamline Projects	Apr 4–5
7th International Workshop on Radiation Safety at Synchrotrons	May 8–10
Accelerator Readiness Review (ARR)	June
DOE Review of NSLS-II Project	July 16–18
DOE CD-2 Review of NEXT Beamlines Project	Jul 30–Aug 1

ACCELERATOR SYSTEMS

Injector. Installation and testing of booster components is coming to an end. Booster kicker testing has been completed by BINP and NSLS-II experts. Kicker waveforms correspond to the specifications. BINP programmers completed the development and optimization of the operator panels.

Final survey of the booster components has been completed. The failed quadrupole power supplies were repaired, have been integrated into their racks, and integrated testing started in late February. The booster cavity is ready for commissioning. All components of the LtBTL have been installed and surveyed. Cable terminations were completed earlier this month. The installation of cooling systems is complete and the systems are fully tested. Diagnostic integrated testing will be completed in early March. All BtSTL-I components, including beam dump and faraday cup, have been installed and surveyed. The DIW system is installed and leak checked. BST Magnets are now ready to be terminated. Diagnostic component installation is complete.

The BST-II and SR-Injection Straight stands and table top raw material were received from the vendor. The table tops were machined by BNL Central Shops and are ready to be sent to the BNL Paint Shop. Installation of the stands will occur immediately after the table tops are received from the painter late in March.

Booster tunnel radiation shielding has made very good progress. The BST downstream wall penetration has been filled with the lead/concrete block and the pass-through chamber was installed. The booster dump lead shielding has also been installed. The extraction septum forward shield was installed, including the lead and tungsten poly. Prototype dipole shadow shield stands were installed in arcs 1 and 4.The lead will not be installed until after the support is fastened to the ground, which should be completed during the first week of March. Arrangements are being made to build the remaining stands. The Injection and Extraction Shield Cart parts have been fabricated and delivered to Central Shops for welding; after that they will be sent to the Paint Shop.

Check-out of the injector interlock system is ongoing in chains A and B and should be completed by mid-March. The details for securing SR pentants 1 and 2 during booster commissioning are being worked out. The BST safety shutter is installed and will be tied into the PPS network and tested.

SR injection. All kicker components are designed, and final fabrication is either underway or will begin when the drawings are released in a few weeks. Barring unexpected production delays, final assembly and testing will start in April.

A first article pulser was constructed according to the final design and was successfully tested to 10 kV, which is 10% greater than the expected operating voltage. Final printed circuit boards for all pulsers are being manufactured by a vendor, and all electronic components for the boards have been purchased. Major high voltage components—blocking diode modules, isolation transformers, pulsed capacitors, and protection relays—have either arrived or are expected to arrive in the next few weeks. Pulser chassis design was sent to a vendor; a quotation is expected by the first week of March.

High-voltage DC power supplies for the kickers were ordered from Spellman, a Long Island company that has frequently provided similar supplies to BNL. The kicker magnet design was completed and a prototype was built. Building the prototype revealed the need for minor changes in mechanical design of the magnet conductors. These design changes have been incorporated and the final drawings were released for checking on February 28. All kicker core ferrite components are in house, and construction of the production magnets is expected to start as soon as the drawings are approved. The design of the kicker roll mechanism is finished. All purchased parts have either arrived or have been ordered.

Ceramic vacuum chambers are under construction by Friatec in Germany. Six ceramic tubes were built, four for production kickers, one spare, and one for a diagnostic pinger. Metal rings were brazed to the ends of the tubes by the vendor, who shipped them to a subcontractor for vacuum flanges to be welded on. The completed assemblies will be shipped to another subcontractor, GSI, who will apply a 2-micron layer of titanium inside the ceramic. GSI expects to complete these at a rate of one chamber per week. Friatec is to ship chambers to BNL as they are completed. The first four chambers should be shipped to BNL before the end of March.

PS staff attended the successful septum FATs at Danfysik, held February 13–14. Collection of technical data for the IRR/ARR review is nearly (~90%) complete.

Vacuum. Production of the last components of the vacuum system is ongoing. The brazing of aperture crotch absorbers went well once the design was slightly modified; production brazing is underway. Three damping wiggler absorbers were received and are being inspected. The wiring mistake of all 240 ion-pump controllers was corrected by the vendor.

P5 cell vacuum cables were pulled and termination has begun. The routing and termination of straight section cables is underway prior to straight-section bakeout.

Vacuum condition of sections installed in the SR tunnel has made very good progress. Cells C12, C13, C14, and C15 were successfully in-situ baked this month, bringing the total to 16 cells and 1 straight tested and in-situ baked. Seven straight sections were assembled with Day-1 vacuum chambers and are being aligned prior to in-situ bake. The installation of the BTS-I vacuum system is completed except for the connection to the booster vacuum system.

RF. Integrated testing of the booster RF was performed. The booster RF transmitter was operated into a shorting plate to characterize the circulator. The RF transmitter was operated using EPICS controls, and problems in the PLC code were revealed and fixed.

The BR3 water skid was run and the booster cavity was brought to operating temperature. Stability of the water system temperature and HOM frequency vs. temperature were measured and documented.

The $^{7}/_{8}$-in. coaxial cable for the master oscillator was pulled between the RF building and injector building. The tuner loop was closed and is operating with the cavity controller serial link that was developed last year and tested at CLS in December. The only outstanding installation task is the final cut-to-size of the last 6 $^{1}/_{8}$-in. coax line to the cavity.

There are delays in the production of SR RF components. The AES cryomodule fabrication has had a series of delays. The cryostat delivery from Meyer to AES is delayed pending successful copper plating of the waveguide E-bend. The first article was plated three times at the original plating company before being sent to EPNER plating in Brooklyn, where it was plated twice. This last plating was 99% successful, but rejected due to a blister in the copper plating. At the end of February the decision was made to ship the first cryostat with the rejected E-bend installed, to allow the cryostat delivery to AES while the second waveguide E-Bend went to plating. This second E-bend has been plated and baked at 400°C without blisters, as inspected at the vacuum furnace vendor. It will be shipped directly to AES for final inspection and, if accepted, it will be mated with the first cryomodule assembly while the rejected part gets re-plated.

The niobium cavity fabrication also had a series of issues requiring design and production of new tooling at every step of the fabrication process. Special fixtures and tooling were required to keep the fluted beam tube parts in correct placement for welding, for final machining of the assembly for weld prep, and for fixtures to align the fluted beam tube to its flange for welding. These steps had to be repeated for the waveguide assembly, coupler window, cavity cells, and for final assembly. There is significantly more effort going into design and fabrication of the tooling and fixtures than into the Niobium cavity itself. The cavity was scheduled to be done by March 8, but that date is likely to slip by a week or two.

The helium cryogenic system is on the critical path for the completion of Accelerator Systems and has a number of schedule risks. The cold box, helium compressors, oil removal system, and control panel were all delivered as scheduled in January-February. The valve box, manifold box, and LN2 phase separator are behind schedule by ~4 months now, with delivery expected in mid-March. This delay has significantly reduced the built-in schedule float but does not impact the project schedule. However, the main contractor for the cryogenic system, Linde, awarded their cold multichannel vacuum jacketed piping contract substantially behind schedule. Their subcontractor PHPK has not been able to complete the design and, as a result, production of the multi-channel lines is now scheduled to be completed at the end of June, pushing installation completion of the cryogenic system into late July. Linde has also been late in submitting the installation plan, which is holding up the work permit. Engineers from Linde have been working at the BNL site to finalize the warm piping documentation, installation plan, and schedule.

A very successful ODH review was held, and action items recommended by the BNL Laboratory Environment, Safety and Health Committee are being promptly addressed.

Electrical engineering. Main dipole power supply fabrication is complete and is in initial testing at the vendor's facility. The problem with the series pass sub-system has been corrected. Component testing and installation for the quadrupole and sextupole power supplies continues. PSC chassis have been installed in pentants 1, 2, and 3; P4 is in progress. Testing of regulators needed for P1 and P2 and their transport lines is complete. Resources have been added to test regula-

tors more quickly. The present rate of testing is 20 regulators per week. Testing and configuration of power supply interfaces continues in P4 and P5, while pentants 1 to 3 and the injector have been completed. The DC dipole corrector power amplifiers have all been delivered, and 280 of 400 units have been tested. Bits have been received for the production of power supplies for the fast correctors, which remained within the planned budget. P3 power supply installation is completed; that work is underway in P4. Cable pulling is done through P4 and cable pulling in P5 is underway.

Cable pulling has started for the BtS TL-II. Electrical power is being connected to the He compressors. AC connection work is completed in P5. Cable tray above the straight section in the SR tunnel and for beamline front end devices is in progress. The conduits for PPS cables in P4 and P5 are completed. All production low-precision temperature control chassis units have been delivered and tested. The high-precision temperature controller chassis (used for BPM racks) have all been received and tested for P1 through P4.

Insertion devices The first article Damping Wiggler is undergoing magnet measurement and onsite troubleshooting by the manufacturer. The most prominent problem is considered a "motor stall" issue that is not consistently repeatable. Full production is expected to be released on March 13.

The FAT for the EPUs is pending because of measurement metrology issues that are being resolved. Preparations are being made for the Critical Lift associated with the delivery of these two EPUs. Minor changes of the IVU21 and IVU20 undulator base plates have been added to the design, to ease installation in the tunnel. Permanent magnet orders for the IVU22 were recently placed.

Instrumentation. Good progress was made on a number of instrumentation devices. The design of the stripline monitors for Transverse feedback was completed, and the Tune Monitor was improved and built. The improved design met the vacuum requirements. The multi-BPM chamber with integral absorber is nearly complete. The end flanges have been received and the Glidcop chamber is due soon. All five high-stability BPM stands have been assembled. The machined components for the first storage ring FLAG (fluorescence monitor) chamber have been received, cleaned, and delivered to the vacuum group for final brazing. All other components have been received except for the two YAG screens. The two custom bellows assemblies arrived but did not pass inspection and were sent back to VAT in Switzerland for re-work.

The horizontal scraper actuator 10K test procedure was completed and approved. The 10K cycle test was completed and a post-mortem performed; Glidcop particles were found, resulting from the blade rubbing against the stainless flange. It is believed this occurred due to deformation of the sliding assembly when subjected to vacuum loading, as the pre-alignment was performed at ambient pressure. The bellows assembly survived 10,000 cycles without issue. Bellows assemblies for the vertical scrapers were returned to Central Shops to correct an issue due a welding error during assembly. The corrected assemblies have been received and the plan is to re-assemble one vertical scraper for testing.

The BPM system installation is progressing. The Injection System BPM installation is 100% complete. The storage ring BPM installation is 60% complete, with the first three pentants installed. We anticipate to complete P4 by March 10, and P5 by April 10; that will complete the NSLS-II machine production.

Installation. The critical path for the Accelerator Systems runs through booster commissioning, with the SR power supplies, SR area monitors, injection straight, cable pulling, PPS, cryo system, and RF cavity on or near the critical path (<60 days float). The booster shielding and preparations for the Injector system ARR are driving booster completion. The remaining SR installation schedule is being evaluated, including an option of installing ID before the SR commissioning with beam.

In the injector complex, all LtBTL magnets have been hipotted, and low-current testing can start. The last two BtS TL-I stands have been installed (Fig. 1). Installation of TL power supply components in the racks is underway. Programming of the B chain for booster PPS interlock checking is in process. Termination of the booster BPM cables is complete. Pulling of the BTSTL-II cables has begun. All grounding in the booster tunnel is now complete. A booster quadrupole power supply that failed last month has been redesigned, installed, and tested.

Injection and extraction kicker testing is ongoing. The installation of shadow shield stands is in process (Fig. 2); the shielding carts are in the weld shop and most shielding blocks have been received. The lead bricks have been installed in the booster/SR penetration. The BR-3 DIW skid is now running to provide cooling water to the booster RF cavity.

Figure 1. SR tunnel, Pentant 5.

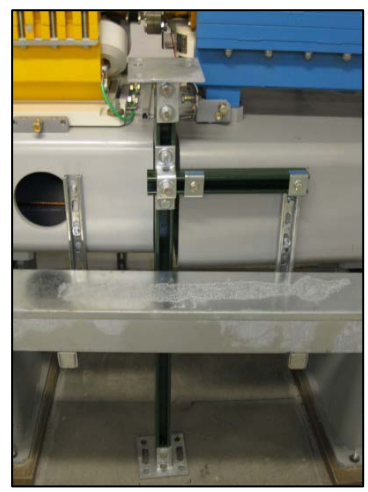


Figure 2. Booster Dipole Shadow Shield stand.

In the storage ring, pulling of timing fibers throughout the SR is 60% complete. Installation of the FE and straight section cable tray is completed. The survey team is currently working on the front ends, injector survey/EPOCH 6, vacuum straights, and the profiling test in P1. The main dipole power supply is expected to arrive in mid to late March. The SR tunnel PPS interlock gates will be moved further downstream so they are not in the middle of the IDs. The new location is 8.5 inches off the face of the girder. Checkout of PPS is

complete in P1 and P2. The power supply installation in P3 is complete. In P4, pressure testing of multipole girders is in process. Pressure testing of the copper DI header by FWS has been completed. Power supply installation is in process. Pulling of PPS cables will be completed in early March. In P5, pulling of vacuum cables is complete and pulling of PPS cables is in process. Pulling of multipole magnet cables has begun.

The installation of the cryogenic plant started. The Dewar has been delivered (Fig. 3).

Figure 3. Cryo Dewar.

The DI wet taps for the RF compressors are complete and the piping is in process. The installation of the UPS for the cryogenic plant is complete. The cryo-compressors are in place (Fig. 4). The HVAC ductwork obstructing the pipe bridge penetration in the RF building has been temporarily removed to route the cryo lines and reroute the DI lines.

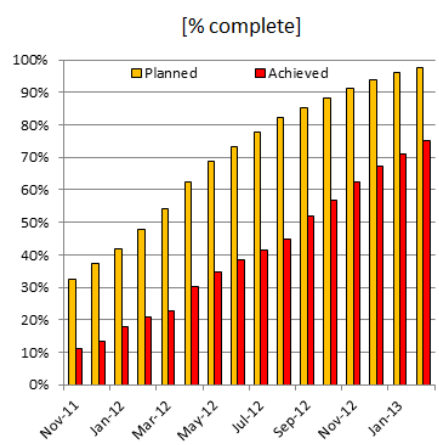
Moving electrical disconnects in the compressor building is complete (cables need to be pulled). The installation of the ductwork in the compressor building is complete, excluding the access doors. The heliax pull for the master oscillator is complete.

Figure 4. Cryo System Compressors.

Integrated testing. Two issues found while testing P1 power supplies were resolved: A status line from the power converters for the quad and sextupoles was corrected and successfully retested. The second issue was an air flow problem that caused insufficient cooling of the rack component. This was resolved by additional air diverters. Integrated testing started in P2. High-pot tests in the multipole girders are completed. Integrated testing of BPMs was completed for the linac, LtBTL, BtSTL, and the booster. The system test is very comprehensive in that all system aspects (except beam) are tested. Data are generated by placing the pilot-tone on the central beam frequency, creating an artificial beam signal. The Control System Studio panels are fully developed and ready for beam.

Table 1. NSLS-II Accelerator installation progress at the end of February 2013.

	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Feb-13
Mechanical Utilities	37%	38%	38%	38%	39%	60%	61%	62%	68%	74%
Electrical Utilities	55%	61%	65%	69%	72%	75%	80%	85%	91%	96%
Magnets	43%	50%	62%	65%	68%	73%	78%	87%	93%	100%
Vacuum	8%	10%	13%	14%	15%	21%	30%	38%	39%	57%
Power Supplies	12%	15%	18%	22%	27%	30%	36%	43%	48%	65%
Instrumentation	23%	27%	31%	38%	36%	37%	46%	53%	58%	66%
Frontends	0%	0%	0%	0%	0%	0%	1%	2%	6%	11%
RF	21%	27%	32%	33%	35%	38%	40%	45%	47%	52%
Inje Straight	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
LINAC+Booster	15%	27%	33%	42%	55%	74%	82%	92%	95%	97%
Total	**30%**	**35%**	**38%**	**41%**	**45%**	**52%**	**57%**	**63%**	**67%**	**75%**



EXPERIMENTAL FACILITIES

Excellent progress in fabrication of beamline components is now visibly apparent. Visits to several vendor sites have documented the status of the manufacturing of beamline components for HXN and XPD beamlines. A large fraction of the HXN optical component package has been fabricated by FMB-Oxford, and many of these components have been integrated and tested with BNL motion controls. The Factory Acceptance Test (FAT) for the XPD double Laue mono-chromator (DLM) was initiated in February with the NSLS-II project controls engineer in attendance, and the DLM was subsequently shipped to the Diamond Light Source for testing in high heat-load beamline environment to assure the design performance of the DLM is achieved. The status of other beamline components is clearly described during weekly (or bi-weekly) teleconferences with vendors, and their progress is closely monitored. Most component fabrication and manufacturing is following the planned schedule, with only a couple of unanticipated delays that will be evaluated for impact on the beamline installation schedules. At this time the schedules indicate all project beamlines will be ready to accept beam at the early completion date. Installation activities continue for both the hutches and for utility distribution. The hutch vendor has increased the installation workforce and added work shifts to increase the completion rate for the hutches. This additional effort has resulted in improved performance in hutch installation and assembly.

CHX. The CHX team moved to LOB4, next to the experimental floor where a temporary cage has been created for equipment storage and testing. The procurement of an ultra-fast pixelated x-ray detector for coherent scattering and x-ray photon correlation spectroscopy advanced to its very final stages; a contract award is imminent. The CHX team has also finalized the procurement documents for a CRL Trans-focator, and worked to finalize the procurement materials for a SAXS table.

CSX. The differential pump delivered by Gamma Vacuum was tested and verified that it satisfied delivering 2 orders of magnitude of differential vacuum. Design of the Toroidal mirror package, the most complicated for the CSX polarization control branch, is advancing. The vendor is making final touches and running simulations to check the component's performance. Delivery and installation of the monochromator package will occur September of this year. Reports from the vendors of the gratings and mirrors indicate that beamline optics work is currently on schedule. The final vacuum design for CSX is nearly complete; some vacuum components are being purchased.

HXN. Installation of mechanical utilities (cooling water, gaseous nitrogen, compressed air, and cable trays) is about 90% complete (Fig. 5). Electrical utility installation work began. Approximately 90% of the HXN optical component package has been fabricated by FMB-Oxford. The HXN team visited FMB in late February, monitored the progress, and participated in a number of performance tests. About half of the optical component equipment has been tested and vacuum tested. Also, approximately half of all the HXN equipment has been tested using the BNL motion controller.

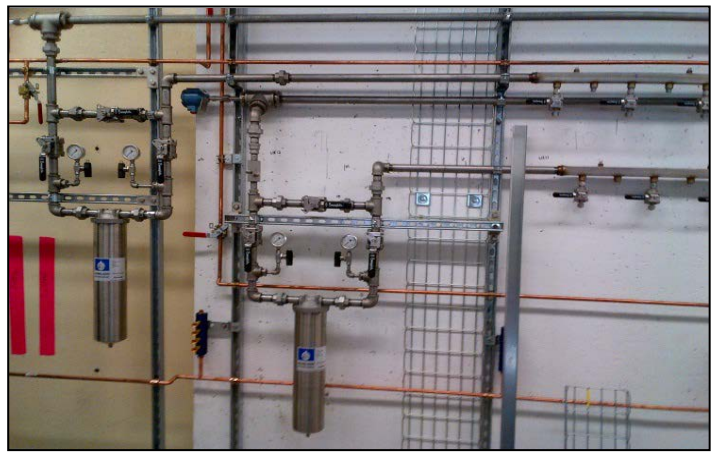


Figure 5. Mechanical utilities at HXN beamline

IXS. The FDR review for the IXS FOE optics components proceeded as scheduled on February 14-15 at BNL. Key personnel from BNL, together with the IXS team reviewed all aspects of the design including radiation safety, ESH, control and interfaces. The contract award for the HRM vacuum chambers was in the final stage and was expected to be made in early March. In parallel, the IXS team began in-house fabrication of the HRM components and the strip detector. All mechanical components for the strip detector were completed. Assembly of the strip detector was planned for March pending the final processing of the sensor elements (see Fig. 6).

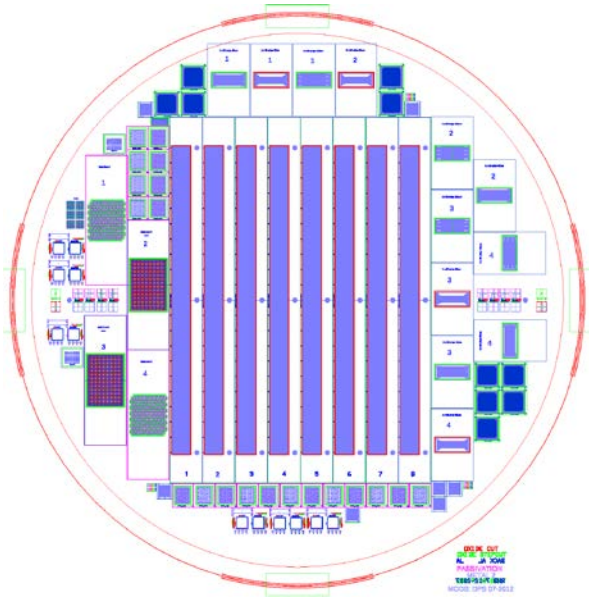


Figure 6. I mage of the HEXID wafer mask where batches of sensors for the IXS strip detectors were included. The wafer has been fabricated and post processing is currently underway.

The IXS team held the 8th BAT meeting on February 20, providing a comprehensive update to BAT members of the current status of the project, including a tour of NSLS-II (Fig. 7). Detailed discussions were held on the technical and science commissioning, as well as on plans for early science.

Figure 7. Members of the IXS project personnel and Beamline Advisory Team (BAT) prior to their tour of NSLS-II during the BAT meeting on February 20, 2013.

SRX. After having finished the Final Design Reviews for both large optical packages, the Beamline Optics and the KB Mirror System, the SRX team continues to closely monitor the efforts of the vendors in fabricating the components. A major activity has been the design of sample environment and sample stages in context with the correct positioning of the interferometer control of stage movement and of the fluorescence detectors. Figure 8 shows the sample environment for the high-resolution setup, with the rotary stage for tomography in place, the visible light microscope on top to continuously monitor the sample, and two fluorescence detectors for simultaneously collecting tomographic data.

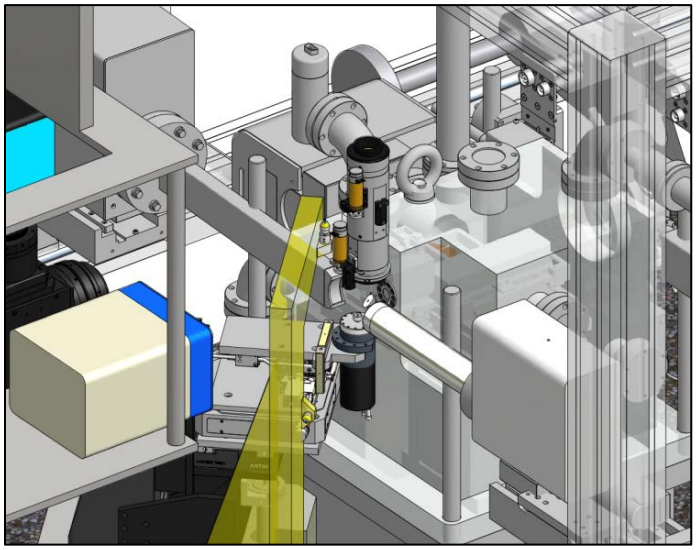


Figure 8: Sample stage and detector setup for the collection of fluorescence tomographic data, using two fluorescence detectors simultaneously.

XPD. Beamline components. Materials and subcontracted components have been placed on order. By month's end, 26% of material had been received; 39% was scheduled to have arrived. Thus FMB has a number of shortages on kits, so these have not been released to manufacture. Progress is being made on the high resolution monochromator (HRM), where kits are complete. The FMB operations director and production team leader have reviewed the strategy for keeping manufacture of the beamline components on track. The FMB purchasing department has a priority list for expediting parts to be delivered, to complete kits that can then be started. Subcomponents such as slits and filters are being given priority, as is the End Optical Bench.

Laue-Laue monochromator. The FAT (Figs. 9–12) began on Feb. 26, with Controls Engineer Wayne Lewis from NSLS-II project attending. DLM Part 1 has been taken to Diamond Light Source twice, for a practical review of the interfaces and installation of the DLM on the I12 experimental table. Crystal Scientific have had considerable trouble making the thin dumbbell crystals.

Figure 9. XPD monochromator Part 1 crystal assembly in the Factory Acceptance Test (FAT).

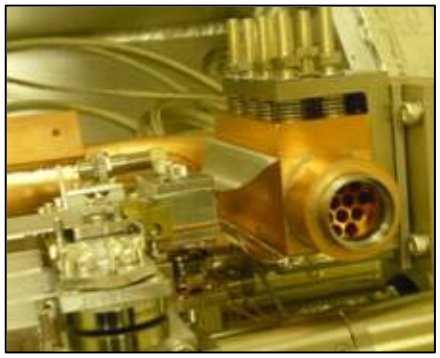


Figure 10. One side of the dumbbell-shape crystal is shown next to the bender rollers. The silver foil is attached to the heat exchanger fitted with the cryo-line.

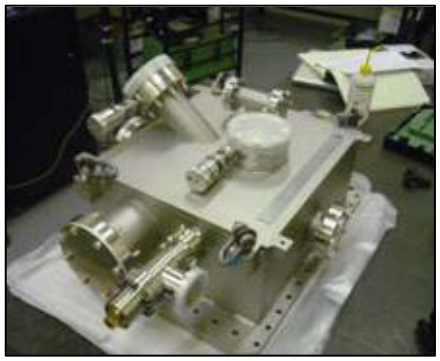


Figure 11. Top lid of the XPD monochromator Part 1 vacuum vessel.

Figure 12. The XPD monochromator Part 1 control crate before shipping to Diamond Light Source on 2/20. It contains: the VME crate and CPU, the scaler, the pump and gauge controllers, the PLC, the network switch, two motor controllers, the resolver interfaces and the EPICS IOC server.

Vertical focusing mirror. The bender is mounted (Fig. 13b). The granite is delivered and integration has begun (Fig. 13a). The ion pump has been received. The vacuum vessel (Fig. 13c) is being manufactured and should leave the supplier on March 11, scheduled February 15. Software development is on schedule. The FAT is still slated for the end of April.

(a) (b) (c)

Figure 13. Details of the XPD long mirror at the factory: a) granite support; b) bender for the mirror; c) vacuum vessel for the mirror.

Diffractometer. A model of the diffractometer assembly has been submitted to Amtek Engineering Solutions for the FEA. Design changes accommodate the horizontal linear translation (60 mm of travel) have been completed. Some component drawings have been released by RPI's design office and put into the production schedule for manufacture. The design of the sample table is 50% complete. The castings for the linear stage and the motors have been ordered.

Lead/steel enclosures. Enclosures 28-IDA-A and -B were released, and acceptance testing has started.

MAD x-ray detector: The Specs and SOW are being routed for approvals. Evaluation criteria were finalized Feb. 22. A Record Of Invention was submitted and the option of a patent application was explored.

Robotic sample manipulator. Write-up of the Specs and SOW is in progress.

The XPD Beamline Advisory Team met on Feb. 20.

CONVENTIONAL FACILITIES

Conventional construction continued its excellent progress through February. All base scope construction is now substantially complete. LOBs 3 and 4 are now occupied and LOB 5 is being readied for occupancy in March. LOB 1 is ready for occupancy with move-in planned for later this year. The HXN end station building adjacent LOB 3 is completed, and beamline installation activity is now underway.

There is some minor change order and punchlist work underway, so there is still a contractor presence on the site. However, both the ring building and LOB contractors have demobilized most of their field team. Typical daily contractor workforce is less than 25 workers and will continue to diminish over the next few months, as punchlist and warranty work is completed. Remaining work includes final dress-up of site grading and landscaping in localized areas, painting and carpentry punchlist work, and final adjustments of controls as part of commissioning.

Following completion of all physical work at the site, final demobilization and contract closeout will commence. It is anticipated that both the Ring and LOB contractors' site presence will end by June 2013, although they will continue to be available for any warranty work. The Facilities Division staffing level is also being reduced in accordance with the ramp-down plan. However, the core of the Facilities Division team remains to oversee the closeout of contractor activities.

ENVIRONMENT, SAFETY, AND HEALTH

Work is ongoing for the corrective action plan (CAP) associated with the beam mis-steering excursion that occurred at the linac on May 29, 2012. This CAP was approved by BHSO; the Project is providing routine status of the progress. Commissioning activities have been suspended and will not resume until all necessary corrective actions have been satisfactorily implemented and a successful Accelerator Readiness Review is conducted.

All BOREs (Beneficial Occupancy Readiness Evaluations) for the NSLS-II facility have been completed. The BORE process ensures 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. Operational Readiness Evaluations (OREs) were conducted for the first three of ten laboratories in LOB 3. These labs will be used for beamline component assembly and component testing. The ORE process, similar to the BORE, will ensure that all life safety, code compliance, and work planning/ controls are in place prior to commencing with laboratory work. These labs will start up pending resolution of ORE pre start findings.

Conventional construction activity is complete except for punchlist work. A roof deck painting job in P1 is ongoing to correct a paint delamination issue. This job is progressing well but will take an extensive coordination effort between the contractors and ongoing accelerator installation/testing work in the area. The contractor is working with the Accelerator Division to expand the work areas to accelerate completion of the work early. 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.

COST/SCHEDULE BASELINE STATUS

The current-period schedule variance (SV) for the overall project is +$330K with the associated schedule performance index (SPI) of 1.04, indicating strong schedule performance for the month due to positive performance in most areas of the project, including Accelerator Systems, +$491K, and Experimental Facilities, +$14K. The cumulative SV for the project has green status with an SPI of 0.96 (-$32.9M).

The current-month cost performance index (CPI) for the NSLS-II project is green, 1.12, +$897K, and the cumulative CPI is 0.99 with a cost variance (CV) of -$5.4M, green status.

The Experimental Facilities cumulative SPI (0.88, -$5.7M) has continued to improve from previous months, as a result of improved schedule performance for the month by all beamlines, contributing to an overall positive SV for the month of +$14K and SPI of 1.01.

Conventional Facilities' schedule performance for February is positive, with a SPI of 1.22, +$99K, yellow status. The cumulative Conventional Construction SPI is 1.0 (-$781K), green status.

Accelerator Systems (WBS 1.3) had positive schedule performance in February of +$491K and SPI of 1.14, due to continued positive schedule performance in many areas with the exception of a large negative schedule variance in Beam Position Monitors. This was due to early delivery of components that were planned for delivery in February. The cumulative Accelerator Systems schedule performance continued to improve, with an SPI of 0.92 (-$22.3M), resulting in green status.

Accelerator Pre-Ops (WBS 1.6.2), Integrated Test, is again behind schedule in the current month. There is a negative SV of (-$274K), contributing to a continued negative cumulative SPI for all of Pre-ops WBS 1.6: (-$4.2M, 0.76), red status. This schedule variance is due to delayed integrated testing planned in WBS 1.6.2.

The Project was approximately 87% complete as of February 28 with approximately 59% remaining contingency/MR on BAC work remaining.

At the end of February there was approximately $66.7M remaining of Contingency and MR on the Project, based on the approved PCRs processed and approved through February 15. (Remaining MR is $4,272K.)

The Project EAC is $873,942K, and MR/Contingency is approximately 47% of EAC work remaining. Project percent complete based on EAC work remaining is 84%.

With the incorporation of PCR_12_410, additional insertion devices as an investment for the future beamlines were added to the project (IVU-23L Units 1 and 2), with an expected delivery date of August 2014. This changed the project critical path and the early completion of the project to August 2014. There are now 10 months of float between the Project's early completion milestone and CD-4, with approximately 36% schedule contingency.

NEWLY HIRED

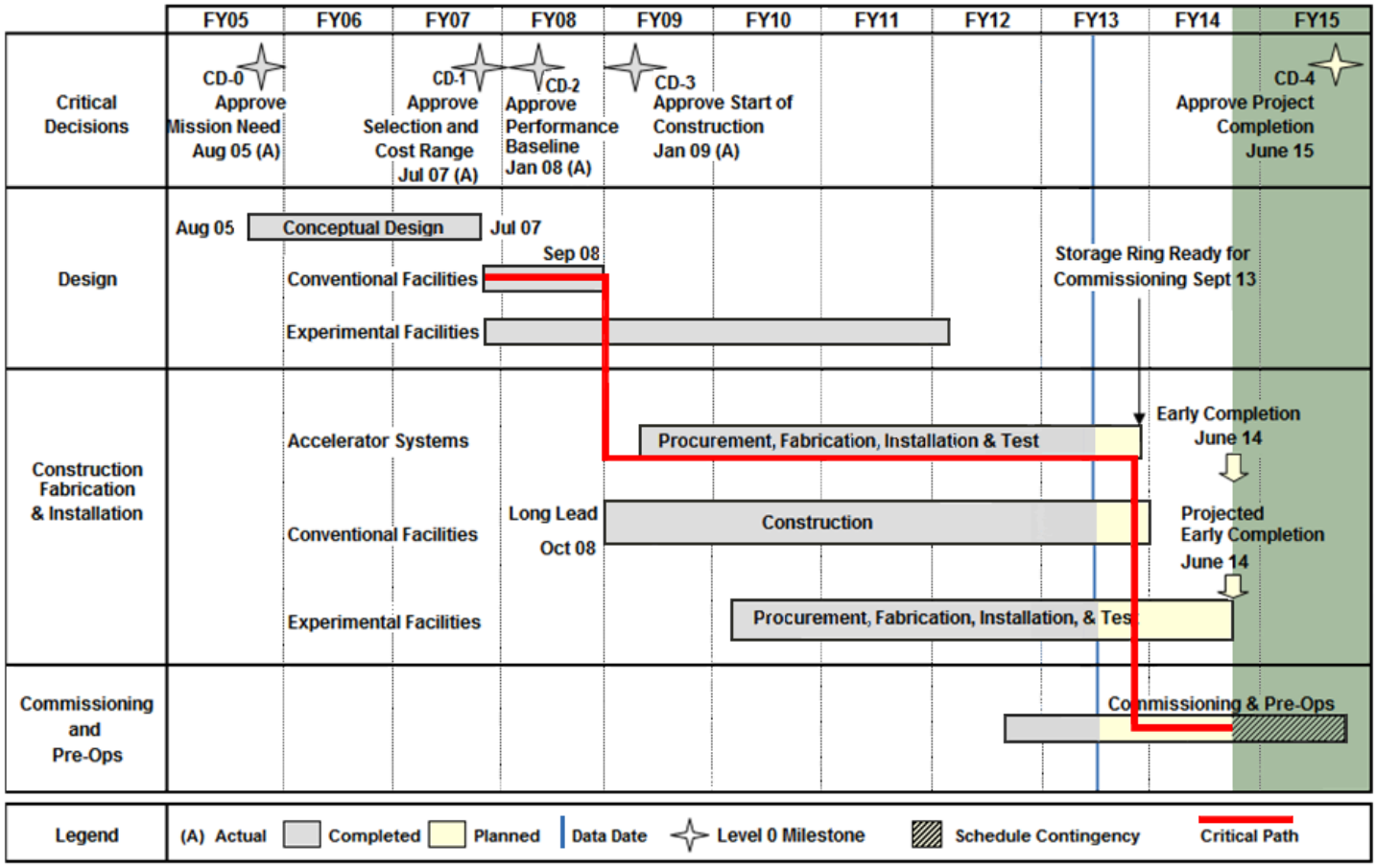
There were no new hires in February for the NSLS-II Project.

ACRONYMS

ARR	Accelerator Readiness Review
ARRA	American Recovery and Reinvestment Act
BAC	Budget At Completion
BHSO	Brookhaven Site Office (of DOE)
BORE	Beneficial Occupancy Readiness Evaluation
BPM	Beam Position Monitor
BST	Booster-to-Storage Ring
CAP	Corrective Action Plan
CHX	Coherent Hard X-ray beamline
CPI	Cost Performance Index
CSX	Coherent Soft X-ray beamline
CV	Cost Variance
DIW	Deionized Water
DLM	Double Laue Monochromator
EAC	Estimate at Completion
EPU	Elliptically Polarizing Wiggler (beamline)
EVMS	Earned Value Management System
FAT	Factory Acceptance Test
FE	Front End
FEA	Finite Element Analysis
FLAG	Fluorescence monitor
HVAC	Heating, Ventilation and Air Conditioning
HXN	Hard X-ray Nanoprobe beamline
IRR	Instrumentation Readiness Review
ISR	In-Situ Resonant X-ray Studies beamline
IVU	In-Vacuum Undulator
IXS	Inelastic X-ray Scattering beamline
LOB	Lab–Office Building
LtB	Linac-to-Booster
NEXT	NSLS-II Experimental Tools (beamlines)
ODH	Oxygen Deprivation Hazard
ORE	Occupancy Readiness Evaluation
P1, P2…	Pentant 1, Pentant 2, etc.
PDR	Preliminary Design Review
PLC	Programmable Logic Controller
PPS	Personnel Protection System
PS	Power Supply
PSC	Power Supply Controller
RF	Radio Frequency
RFQ	Request For Quotations
SIX	Soft Inelastic X-ray Scattering beamline
SLM	Synchrotron Light Monitor
SPI	Schedule Performance Index
SR	Storage Ring
SRX	Submicron Resolution X-ray Spectroscopy
SV	Schedule Variance
TL	Transport Line
WBS	Work Breakdown Structure
XPD	X-ray Powder Diffraction beamline

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
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.