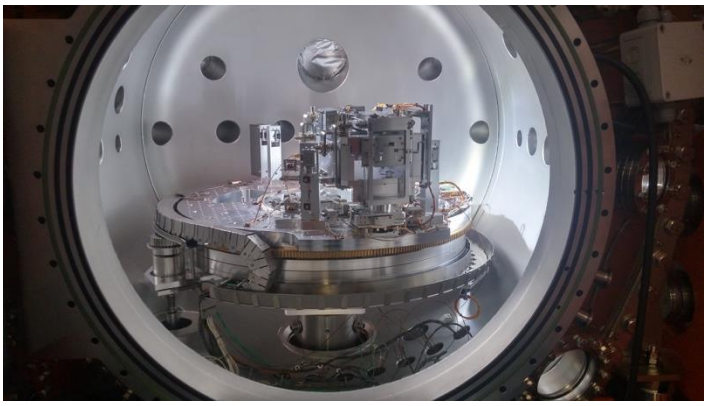
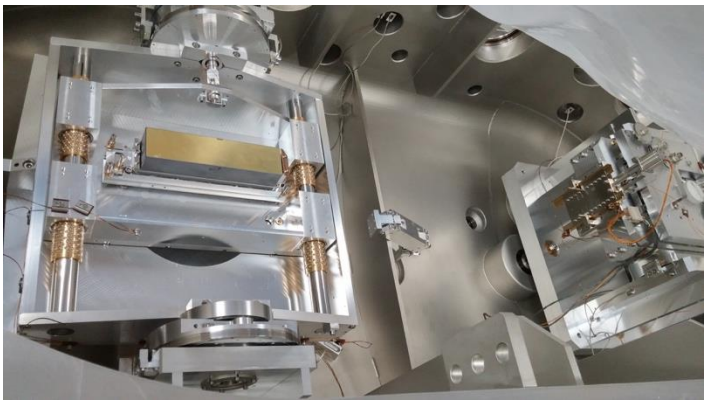
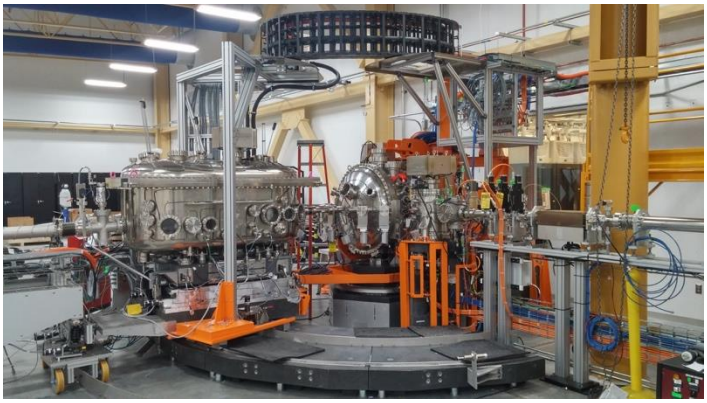
NSLS-II Experimental Tools (NEXT)

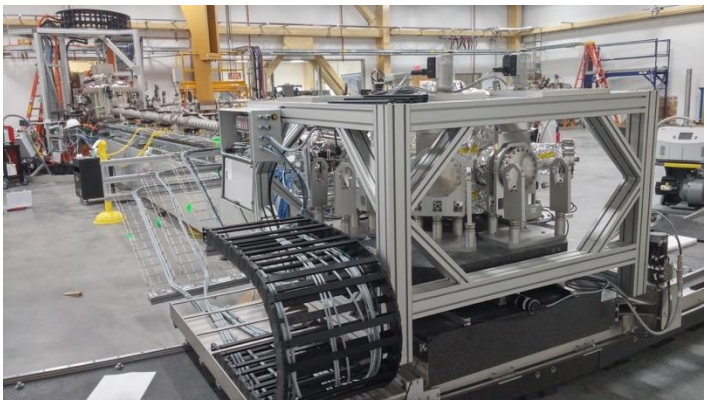
March 2017 Project Activity
Report due date: April 20, 2017

SIX Endstation









Top Left: Interior of the sample chamber with the M5 two-theta rotating wheel and the M5 hexapod.

Middle Left: (from left to right) Spectrometer optics tank, cable management system, sample chamber, M4 chamber.

Bottom Left: Polarimeter chamber and its cable chain.

Top Right: Interior of the spectrometer optics tank with the 1250 l/mm grating and M6 mirror.

Middle Right: Spectrometer arm.

Steve Hulbert
NEXT Project Manager

BROOKHAVEN NATIONAL LABORATORY

OVERALL ASSESSMENT

All five NEXT beamlines continued technical and science commissioning during March. In addition, the ISS beamline continued general user operations.

At SMI, the final component for the SAXS beam chamber (cable chain) was received and assembly was nearly completed this month. Completion is expected in April.

The SIX M4 mirror was received this month, to be installed in April following optical metrology to confirm surface figure. The ESM M4 mirror is expected to be received, measured, and installed during April.

SIX endstation progress during March consisted of final cabling and vacuum work. Endstation testing activities are expected to be completed during the final Bestec visit, scheduled for April. At that point, the interface between the sample chamber and the emission spectrometer arm will be provided by any one of six selectable fixed-angle ports. NEXT scope includes receipt and acceptance of a Triple Rotation Flange (TRF) which will replace the fixed-angle-port interface and provide continuous adjustment of spectrometer angle. At the end of March, the expected delivery date for the TRF was mid-June. As of the delivery date for this report, TRF delivery is expected in July, based on delayed availability of a long-lead component (rotary gaskets).

Of the 63 major procurement contracts, 50 are closed, 10 others are complete for NEXT (with milestones committed to operations), and 3 have work remaining for NEXT: one requiring delivery and acceptance of the ESM and SIX M4 mirrors (to complete in April); one requiring completion of installation of the SIX emission spectrometer (expected in May); and one (SIX sample chamber) requiring delivery of the TRF.

As of March 31, 2017, the project is 99.7% complete on base scope performance earned to date. This month, the cumulative SPI increased by 0.01 to 1.00 while the cumulative CPI decreased by 0.01 to 0.93 as a result of accruals processed the month for SIX beamline systems value earned earlier. BAC remained at $83.09M. Cost contingency is $6.91M, compared to $0.29M BAC work remaining.

The EAC, reported as the sum of actual cost to date (ACWP) plus the estimated cost to complete (ETC), is $89.33M, $0.11M higher than the February value. As of the end of March, contingency on EAC is $0.67M, which represents 197.0% of $0.34M EAC work remaining, or 1115.8% of $0.06M unobligated work to go ($0.28M of the remaining work is obligated to fixed-price equipment contracts).

COMMON SYSTEMS

All Common Systems work on ISS, ESM, SMI, and ISR has been completed.

Completion of the remaining SIX Mechanical and Electrical utilities installation work continued in the SIX Satellite Building this month. Installation of compressed air service to the spectrometer arm was finished this month.

ESM – ELECTRON SPECTRO-MICROSCOPY

Receipt and acceptance of the M4 mirror are the only remaining ESM activities. This mirror, which will provide beam to the photoemission microscope in the XPEEM branch, is expected to ship from JTEC by the end of March.

ISR – IN-SITU AND RESONANT HARD X-RAY

Commissioning reports for the ISR Dual Phase Plate Assembly and Instrumented 6-Circle Diffractometer were received on March 23, and approved one day later. Key information in the Dual Phase Plate Assembly report included the angle vs. voltage calibration of the two piezo flippers (Figure 1).

With approval of the two commissioning reports, the ISR scope of the NEXT Project is now complete.

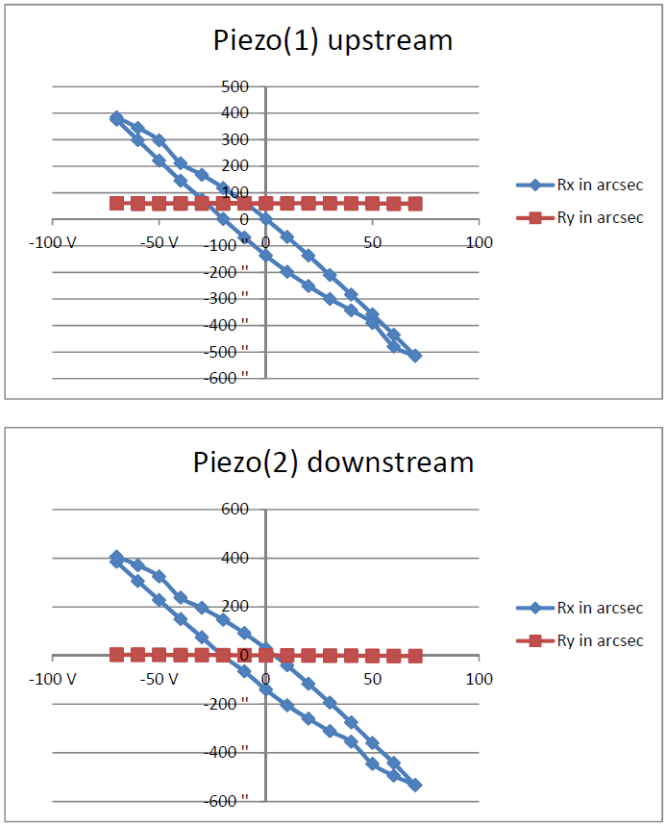


Figure 1. ISR: Dual Phase Plate Assembly piezo flipper angle vs. voltage calibration measurements carried out using an autocollimator during installation of the two stacks.

SIX – SOFT INELASTIC X-RAY

The X-ray commissioning of the PDS continued during March, and resulted in the successful measurement of absorption spectra at the *L* edge of transition metal wires (Figure 2). Measurements were performed at 300 mA ring current, with the front end slits set to 1.2 mm x 1.2 mm aperture. Energy calibration of the PGM (500 lines/mm grating) is underway using these XAS spectra. The next step is to measure the N *K* edge of N_2 using the gas cell located in the monochromatic beam section downstream of the exit slit.

The M4 mirror was received from JTEC on March 30. The slope error, measured using the NSLS-II nanoradian surface profiler, is estimated to be 0.3 µrad RMS, exceeding (lower than) the specified value of 0.5 µrad RMS. Measurement of the sagittal slope error, extremely challenging given the small curvature radius, is underway using the Shack-Hartmann sensor.

The upcoming visit by Bestec staff has been confirmed for April 19 – May 5. Work scheduled during this visit includes the installation of a larger motor for the rotation of the spectrometer optics tank and the cable chain system, test of the limit switches of the endstation optics motion systems, and the installation of the M4 mirror on the beamline.

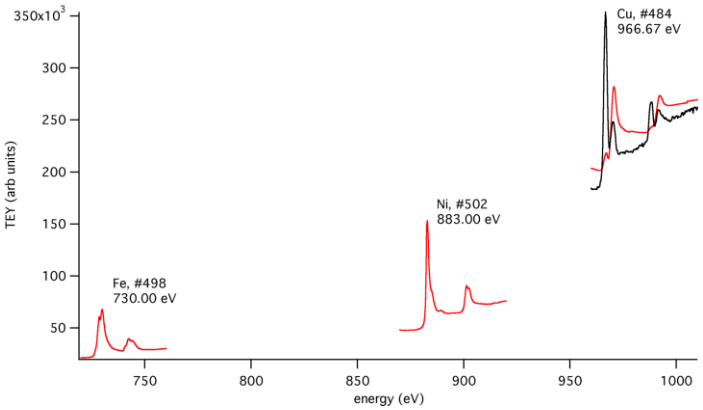


Figure 2. SIX: $L_{2,3}$ XAS spectra measured from an Fe wire, a Ni-Cu alloy wire (Ni and black Cu spectra), and a Cu wire (red Cu spectrum).

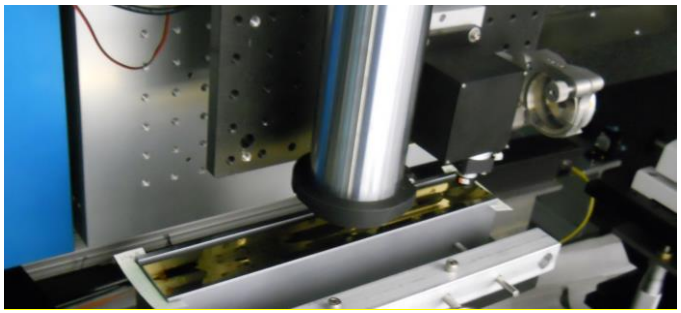


Figure 3. SIX: M4 mirror during the measurement of its sagittal slope error using the NSLS-II nanoradian surface profiler.

SMI – SOFT MATTER INTERFACES

During March, SMI completed simulations and measurements of the IVU23 performance, concluding that the girder elevation needed to be lowered by 0.375mm and that a slight adjustment to the taper was required. This work depended critically upon availability of the SRW simulation code, which predicted a 40% improvement of flux after correction. The necessary adjustments to the IVU have now been made, and the SMI team was able to continue with a much improved beam shape to complete DCM orientation and energy calibrations. The only task remaining is to finalize the data acquisition code related to energy changes.

X-ray Beam Position Monitors (XBPMs) have been calibrated. These devices have proved crucial for characterizing the performance of the Photon Delivery System with respect to vibrations. The largest beam excursions derive from the Vertical Focusing and Deflection Mirrors. Vendor-supplied isolation pads were installed in early April and have partly corrected the problem. Now, active feedback solutions will be implemented to achieve the beam stability that will be required for micro-beam measurements.

At the end of the month, SMI completed all major assembly tasks involving the SAXS system. Figure 4 shows the assembly from the side, in the "service" position at the downstream end of its track. Note that the rail cantilever is supported by manually positioned brace. A limit switch ends travel on the outboard side rail at this position. When the detector is moved into the chamber, an additional limit switch block on the inboard rail will prevent the detector from driving onto the cantilever, and will limit downstream travel to the design value which places the detector sensors 8m from the sample.

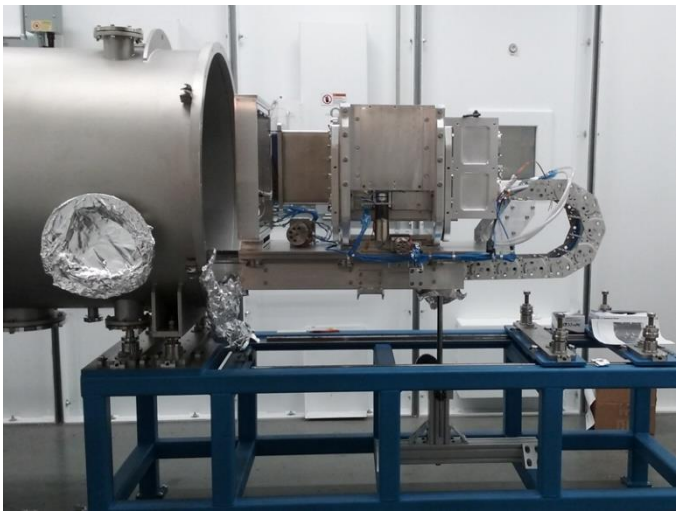


Figure 4. SMI: View of the SMI SAXS Detector and Beam Stop Assemblies in the "service" position at the downstream end of the rails.

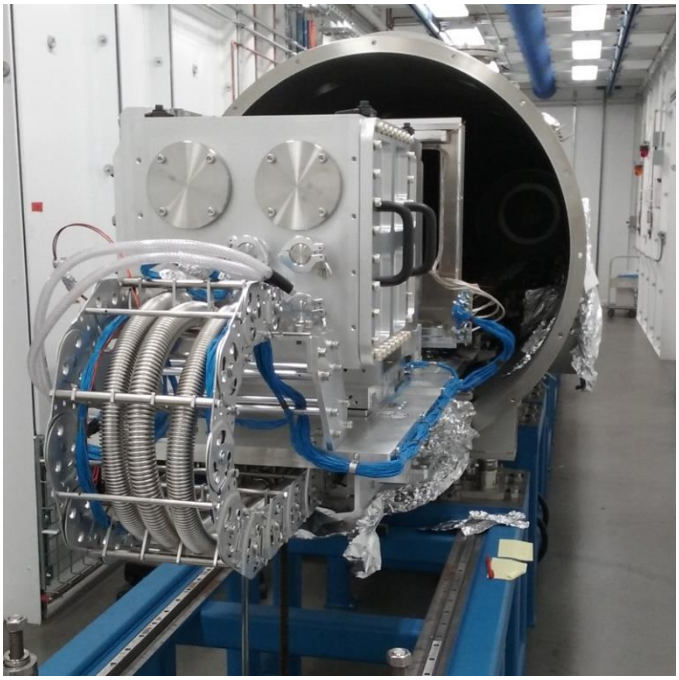


Figure 5. SMI: Seen from the back, the loading of the cable chain on the SAXS detector/beam stop assembly is evident.

Figure 5 shows the assembly from the back, where the loading of the cable chain can be seen. The unit moves well on its XYZ axes. The speed of motion on the long axis is of order 1m/min. Therefore, it will be a 6.4 minute operation to drive the detector between its maximum and minimum sample-detector distances of 8.0m and 1.6m, respectively. Shown in Figure 6, the Beam Stop Assembly is assembled and under test. A tungsten rod has been installed, providing a flat machined face that can be oriented to block 2 or 3 of the Pilatus detector pixels, for low divergence mode at the maximum detector distance. A wide "beam paddle" is also installed, not shown in this view. The beam paddle has a photodiode and can be used to safely block the beam while moving the detector carriage along the Z rails. In addition, by passing the tungsten rod beamstop in front of the photodiode, the X position of the rod can be refined quickly and safely during alignment. Two extra carriages are installed to enable implementation of additional beamstops. As of April 10, the group is finishing Controls tests for these axes. A few sensor wires need to be terminated and tested. After this, vacuum prep and test will be done and construction will be complete.

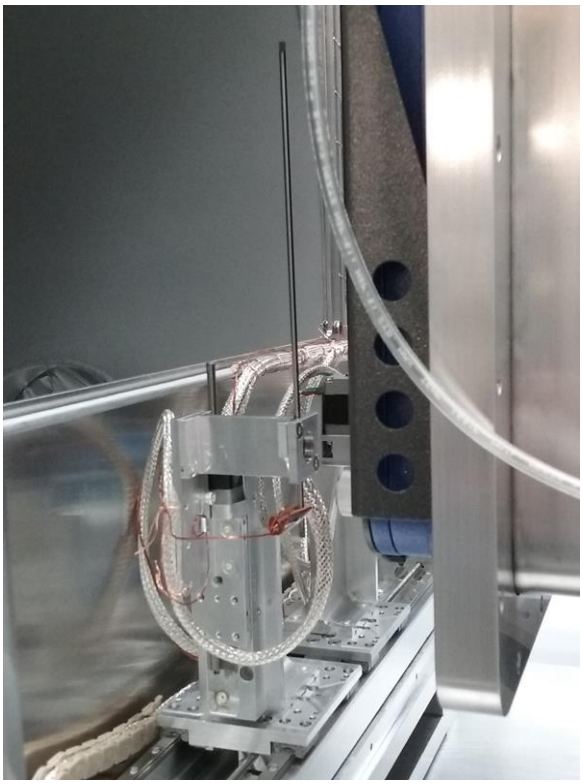


Figure 6. SMI: Tungsten rod Beam Stop with a flat machined face, mounted on its XY carriages upstream of the detector.

PROJECT MILESTONES

Milestone	Planned	Actual
CD-0 (Mission Need):	May 27, 2010	May 27, 2010
CD-1 (Alternative Selection):	Sept. 30, 2011	Dec. 19, 2011
CD-2 (Performance Baseline):	Dec. 31, 2013	Oct. 9, 2013
CD-3A (Long Lead Procurement):	Dec. 31, 2013	Oct. 9, 2013
CD-3 (Start Construction):	Mar. 31, 2014	Jul. 7, 2014
Early Project Completion:	Jun 15, 2017	
CD-4 (Project Completion):	Sept. 29, 2017	

RECENT AND UPCOMING EVENTS

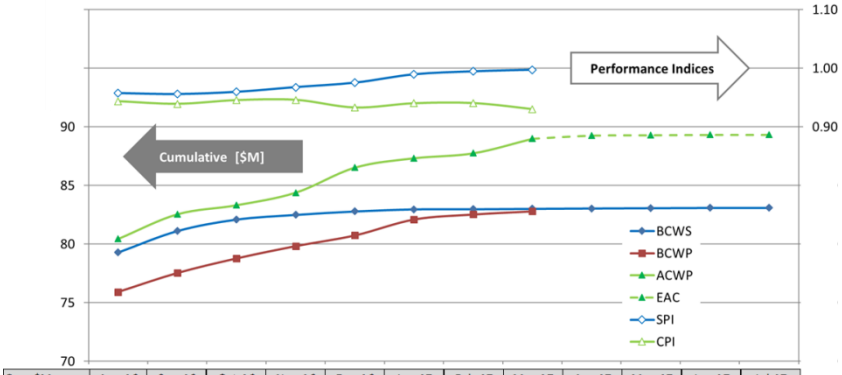
DOE/SC OPA CD-4 Review of NEXT	May 31-June 1, 2017

Acronyms and Abbreviations

AC	Actual Cost
ACWP	Actual Cost of Work Performed
BAC	Budget at Completion
BCWP	Budgeted Cost of Work Performed
BCWS	Budgeted Cost of Work Scheduled
CD	Critical Decision
CPI	Cost Performance Index
CV	Cost Variance
DCM	Double Crystal Monochromator
DOE	Department of Energy
EAC	Estimate At Completion
ESM	Electron Spectro-Microscopy beamline
ETC	Estimated Cost to Complete
EV	Earned Value
EVMS	Earned Value Management System
FE	Front End
FTE	Full Time Equivalent
FXI	Full-field X-ray Imaging beamline
FY	Fiscal Year
ID	Insertion Device
IRR	Instrument Readiness Review
ISR	Integrated In-Situ and Resonant X-ray Studies
ISS	Inner Shell Spectroscopy beamline
IVU	In-Vacuum Undulator
M&S	Material & Supplies
NEXT	NSLS-II Experimental Tools project
NSLS	National Synchrotron Light Source
NSLS-II	National Synchrotron Light Source ll
OPA	Office of Project Assessment
OPC	Other Project Costs
PCR	Project Change Request
PDS	Photon Delivery System
PGM	Plane Grating Monochromator
PMB	Performance Management Baseline
PV	Planned Value
RMS	Root Mean Square
SAXS	Small Angle X-ray Scattering
SC	Office of Science
SIX	Soft Inelastic X-ray Scattering beamline
SMI	Soft Matter Interfaces beamline
SPI	Schedule Performance Index
SRW	Synchrotron Radiation Workshop
SV	Schedule Variance
TEC	Total Estimated Cost
TPC	Total Project Cost
TRF	Triple Rotation Flange
UB	Undistributed Budget
VAC	Variance At Completion
WBS	Work Breakdown Structure
XAS	X-ray Absorption Spectroscopy
XBPM	X-ray Beam Position Monitor
XPEEM	X-ray PhotoEmission Electron Microscopy

COST AND SCHEDULE STATUS

Cost and schedule progress is being tracked using an Earned Value Management System (EVMS) against the cost and schedule baseline established on October 1, 2013. All baseline changes are being controlled through the NEXT Change Control Board. Cost and schedule revisions are being managed using Project Change Control procedures. From June 2015 forward, EAC is reported as the sum of actual cost to date (ACWP) plus the estimated cost to complete (ETC), at the individual activity and resource level, with account-level cost corrections applied as needed to account for the difference between the Earned Value and accrual schedules. ETC values are shown in the final row of the EVMS table below, and all EAC changes are captured in the monthly EAC log.



Cum $M	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17
BCWS	79.3	81.1	82.1	82.5	82.8	83.0	83.0	83.0	83.0	83.1	83.1	83.1
BCWP	75.9	77.5	78.8	79.8	80.7	82.1	82.5	82.8				
ACWP	80.4	82.5	83.3	84.4	86.5	87.3	87.8	89.0				
SPI	0.96	0.96	0.96	0.97	0.98	0.99	0.99	1.00				
CPI	0.94	0.94	0.95	0.95	0.93	0.94	0.94	0.93				
ETC									0.34	0.07	0.03	0.00

NEXT as of 3/31/2017	Current Period	Cum-to-Date
Plan (BCWS) $k	37	83,017
Earned (BCWP) $k	266	82,801
Actual (ACWP) $k	1240	88,994
SV $k	228	-217
CV $k	-974	-6,193
SPI	7.10	1.00
CPI	0.21	0.93
Budget at Completion $k (PMB [UB])		83,093
Planned % Complete (BCWS/BAC)		99.9%
Earned % Complete (BCWP/BAC)		99.7%
Contingency $k		6,907
Contingency / (BAC – BCWP)		2358.2%
EAC $k		89,333
Contingency / (EAC – BCWP)		105.7%
(Contingency + VAC) / (EAC – ACWP)		197.0%
TPC = PMB + Contingency		90,000

The NEXT project Schedule Variance (SV) for March 2017 is +$228k, with an associated monthly Schedule Performance Index (SPI) of 7.10 (red status). The largest contributors to the current month schedule variance are provided in the table below. The cumulative SPI is 1.00 (green status), 0.01 higher than it was in February.

The NEXT project Cost Variance (CV) for March 2017 is -$974k, with an associated monthly Cost Performance Index (CPI) of 0.21 (red status). The significant contributors to the current month CV are provided in the table below. The cumulative CPI is 0.93 (green status), 0.01 lower than it was in February.

Leading Current Month Variances [$k], March 2017

WBS	Title	PV	EV	AC	Schedule		Cost	
					SV	Issues	CV	Issues
2.01	Project Support	34	35	74	1	--	-39	Accruals processed this month for project support activities earned earlier.
2.03	Common Systems	4	13	9	9	--	3	--
2.04	Controls	0	6	19	6	--	-13	--
2.07	ISR Beamline	0	121	117	121	Activities earned this month that were scheduled to be performed earlier: receipt and approval of commissioning reports for the Dual Phase Plate Assembly ($71k) and the 6-Circle Diffractometer ($50k)	4	--
2.09	SIX Beamline	0	76	963	76	Activities earned this month that were scheduled to be performed earlier: receipt of the M4 mirror (+$17k) and installation and commissioning of the emission spectrometer (+$59k).	-886	Accruals processed this month for emission spectrometer activities earned earlier.
2.10	SMI Beamline	0	15	58	15	--	-43	Extra labor and small-value purchases during final installation.
	Total	**37**	**266**	**1240**	**228**	**Total**	**-974**	

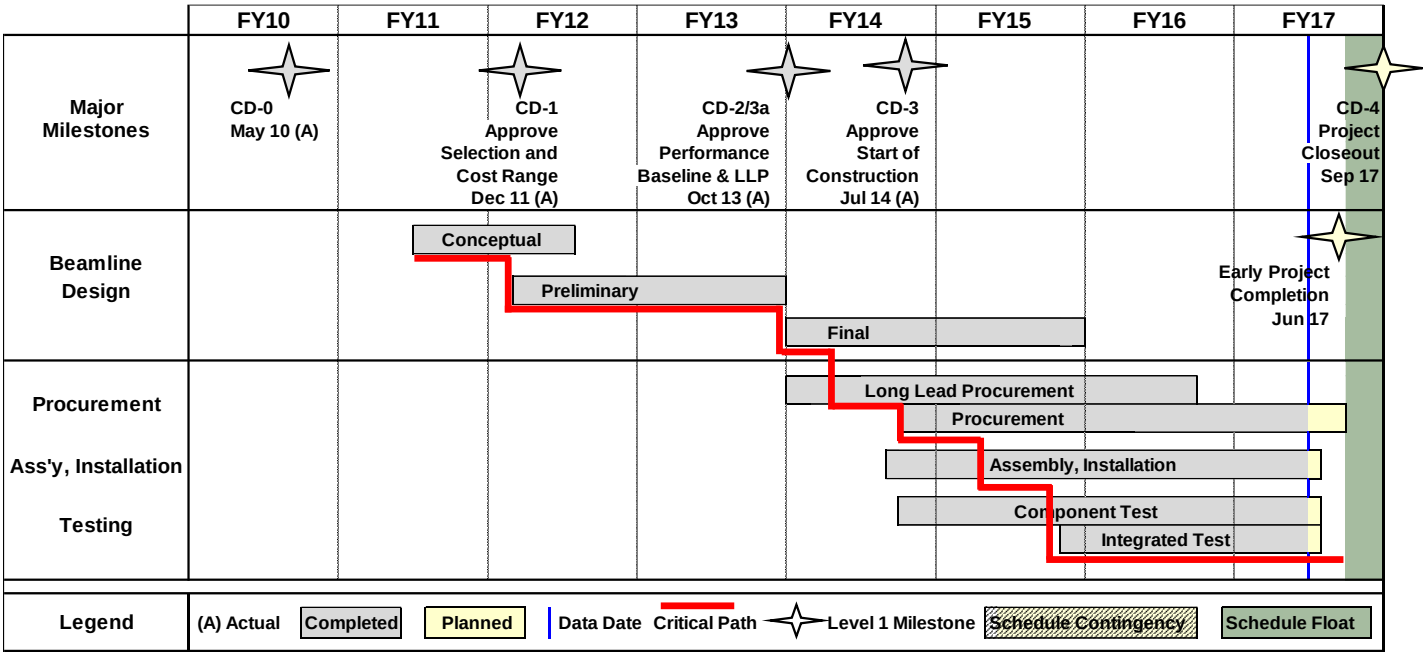
As of March 31, 2017, the project is 99.7% complete with 2358.2% contingency ($6.91M) for $0.29M Budget At Completion (BAC) work remaining, based on PCRs processed and approved through March 2017. The project EAC for March is reported at $89,333k against a Performance Measurement Baseline (PMB)/Undistributed Budget (UB) of $83,093k. The Variance At Completion (VAC) is given by VAC = BAC – EAC, with EAC = ACWP + ETC. Through March 2017, the VAC (-$6,239k) is driven by the cumulative cost variance (-$6,193k), which is dominated by labor cost overage on work performed to date.

The March EAC ($89.33M) is $0.11M greater than the February value, the increase being dominated by relatively minor excess labor costs in SIX and SMI Beamline Systems incurred during final installation and testing. As of the end of March, contingency on EAC is $0.67M, which represents 197.0% of $0.34M EAC work remaining. Outstanding commitments on fixed-price equipment contracts total $0.28M, so the $0.67M contingency on EAC represents 1115.8% of $0.06M unobligated EAC work to go. ETC will continue to be assessed monthly through project completion to contain costs while maintaining the good schedule performance that the project has demonstrated to date.

No PCRs were processed in March and none are planned for April.

Milestones – Near Term		**Planned**	**Actual**	**Projected**
L3	WBS 2.04 – Beamline Control Systems Complete	14-Sep-16	31-Mar-17	
L3	SMI – Installation of Beamline Components Complete	16-Sep-16		April 2017
L3	ESM – Installation of Beamline Components Complete	29-Sep-16		April 2017
L3	SIX – Installation of Beamline Components Complete	30-Sep-16		June 2017
L2	Early Project Completion – incl. IRR	31-Jan-17		15-Jun-2017

PROJECT SCHEDULE



As of March 2017, the critical path runs through activities related to the Triple Rotating Flange, a component of the SIX endstation sample chamber (WBS 2.09.02.03, SIX Beamline Systems Endstation Equipment).

Staffing Report

Staffing as of 3/31/2017	Current Period		Cumulative-to-Date	
	Planned ** (FTE-yr)	Actual (FTE-yr)	Planned ** (FTE-yr)	Actual (FTE-yr)
WBS 2.01 Project Management and Support	0.09	0.07	41.82	37.23
WBS 2.02 Conceptual and Advanced Conceptual Design	0.00	0.00	8.74	8.74
WBS 2.03 Common Beamline Systems	0.04	0.04	33.29	19.69 *
WBS 2.04 Control System	0.17	0.17	22.43	21.33
WBS 2.05 ESM Beamline	0.00	0.00	15.75	18.52
WBS 2.06 FXI Beamline	0.00	0.00	4.77	4.60
WBS 2.07 ISR Beamline	0.00	0.00	17.76	16.22
WBS 2.08 ISS Beamline	0.00	0.00	14.96	14.92
WBS 2.09 SIX Beamline	0.56	0.52	23.30	27.16
WBS 2.10 SMI Beamline	0.24	0.22	18.15	16.93
WBS 2.11 Insertion Devices	0.00	0.00	7.74	7.20
WBS 2.12 ID & FE Installation	0.00	0.00	3.88	7.97
Total	**1.09**	**1.02**	**212.59**	**200.51**

** Based on the NEXT working schedule

* A large fraction of utilities installation has been performed by contractors (M&S) rather than staff as originally planned

Number of individuals who worked on NEXT during March 2017: 55

Funding Profile

Funding Type	NEXT Funding Profile ($M)						
	FY11	FY12	FY13	FY14	FY15	FY16	Total
OPC	3.0						3.0
TEC – Design		3.0	2.0				5.0
TEC – Fabrication		9.0	10.0	25.0	22.5	15.5	82.0
Total Project Cost	**3.0**	**12.0**	**12.0**	**25.0**	**22.5**	**15.5**	**90.0**

Key NEXT Personnel

Title	Name	Email	Phone
Federal Project Director	Robert Caradonna	rcaradonna@bnl.gov	631-344-2945
NEXT Project Manager	Steve Hulbert	hulbert@bnl.gov	631-344-7570

COST PERFORMANCE REPORT

CONTRACT PERFORMANCE REPORT FORMAT 1 - WORK BREAKDOWN STRUCTURE				FORM APPROVED $ OMB No. 0704-0188
1. CONTRACTOR	2. CONTRACT	3. PROGRAM		4. REPORT PERIOD
a. NAME	a. NAME	a. NAME		a. FROM (YYYYMMDD)
Brookhaven National Laboratory	NEXT	NSLS-II Experimental Tools (NEXT) Project		2017 / 03 / 01
b. LOCATION (Address and ZIP Code)	b. NUMBER	b. PHASE		b. TO (YYYYMMDD)
	c. TYPE / d. SHARE RATIO	c. EVMS ACCEPTANCE	NO X YES (YYYYMMDD)	2017 / 03 / 31

8. PERFORMANCE DATA

WBS (2) / WBS (3) / ITEM	CURRENT PERIOD					CUMULATIVE TO DATE					AT COMPLETION		
	BUDGETED COST		ACTUAL	VARIANCE		BUDGETED COST		ACTUAL	VARIANCE		BUDGETED	ESTIMATED	VARIANCE
	WORK SCHEDULED	WORK PERFORMED	COST WORK PERFORMED	SCHEDULE	COST	WORK SCHEDULED	WORK PERFORMED	COST WORK PERFORMED	SCHEDULE	COST			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(14)	(15)	(16)
2.01 Project Management and Support	33,646	34,619	73,814	973	(39,195)	9,981,136	9,982,109	10,919,528	973	(937,420)	10,057,456	11,005,663	(948,206)
2.01.01 Project Management	10,907	9,081	10,843	(1,826)	(1,762)	4,618,419	4,616,594	4,217,426	(1,826)	399,168	4,644,967	4,244,716	400,252
2.01.02 Project Support	22,740	25,538	62,971	2,798	(37,433)	5,362,717	5,365,515	6,702,102	2,798	(1,336,587)	5,412,489	6,760,947	(1,348,458)
2.02 Conceptual Design and Advanced Conceptual Design	0	0	0	0	0	1,807,316	1,807,316	1,807,316	0	0	1,807,316	1,807,316	0
2.02.02 Conceptual Design and Analysis of Photon Delivery Systems	0	0	0	0	0	849,881	849,881	849,881	0	0	849,881	849,881	0
2.02.04 ESM Advanced Conceptual Design	0	0	0	0	0	101,376	101,376	101,376	0	0	101,376	101,376	0
2.02.05 FXI Advanced Conceptual Design	0	0	0	0	0	120,634	120,634	120,634	0	0	120,634	120,634	0
2.02.06 ISR Advanced Conceptual Design	0	0	0	0	0	210,700	210,700	210,700	0	0	210,700	210,700	0
2.02.07 ISS Advanced Conceptual Design	0	0	0	0	0	163,508	163,508	163,508	0	0	163,508	163,508	0
2.02.08 SIX Advanced Conceptual Design	0	0	0	0	0	179,533	179,533	179,533	0	0	179,533	179,533	0
2.02.09 SMI Advanced Conceptual Design	0	0	0	0	0	181,684	181,684	181,684	0	0	181,684	181,684	0
2.03 Common Beamline Systems	3,788	12,834	9,429	9,045	3,405	7,347,994	7,347,994	8,519,908	0	(1,171,914)	7,347,994	8,519,908	(1,171,914)
2.03.01 Utilities	0	9,045	3,153	9,045	5,892	4,210,031	4,210,031	4,358,382	0	(148,351)	4,210,031	4,358,382	(148,351)
2.03.02 Personnel Protection System (PPS)	0	0	1,406	0	(1,406)	1,620,824	1,620,824	2,363,032	0	(742,208)	1,620,824	2,363,032	(742,208)
2.03.03 Equipment Protection System (EPS)	0	0	718	0	(718)	680,294	680,294	957,343	0	(277,049)	680,294	957,343	(277,049)
2.03.04 Control Station	0	0	1,080	0	(1,080)	306,744	306,744	221,069	0	85,675	306,744	221,069	85,675
2.03.05 Common Beamline Systems Management	3,788	3,788	3,071	0	717	530,101	530,101	620,082	0	(89,981)	530,101	620,082	(89,981)
2.04 Control System	0	5,607	18,862	5,607	(13,255)	4,648,844	4,648,844	4,983,376	0	(334,532)	4,648,844	4,983,376	(334,532)
2.04.01 Control System Management	0	0	0	0	0	294,427	294,427	257,275	0	37,152	294,427	257,275	37,152
2.04.02 Control System Design & Implementation	0	5,607	18,289	5,607	(12,682)	2,929,314	2,929,314	3,391,825	0	(462,512)	2,929,314	3,391,825	(462,512)
2.04.03 Control System Equipment	0	0	573	0	(573)	1,425,103	1,425,103	1,334,275	0	90,828	1,425,103	1,334,275	90,828
2.05 ESM Beamline	0	0	0	0	0	9,422,464	9,362,517	10,128,136	(59,947)	(765,619)	9,422,464	10,183,659	(761,195)
2.05.01 ESM Management	0	0	0	0	0	610,744	610,744	474,027	0	136,718	610,744	474,027	136,718
2.05.02 ESM Beamline Systems	0	0	0	0	0	8,811,720	8,751,773	9,654,109	(59,947)	(902,337)	8,811,720	9,709,632	(897,912)
2.06 FXI Beamline	0	0	0	0	0	1,818,324	1,818,324	1,793,425	0	24,899	1,818,324	1,793,425	24,899
2.06.01 FXI Management	0	0	0	0	0	409,359	409,359	470,908	0	(61,549)	409,359	470,908	(61,549)
2.06.02 FXI Beamline Systems	0	0	0	0	0	1,408,965	1,408,965	1,322,516	0	86,448	1,408,965	1,322,516	86,448
2.07 ISR Beamline	0	120,952	116,914	120,952	4,038	10,392,425	10,392,425	10,527,624	0	(135,199)	10,392,425	10,527,624	(135,199)
2.07.01 ISR Management	0	0	0	0	0	1,105,394	1,105,394	1,034,389	0	71,005	1,105,394	1,034,389	71,005
2.07.02 ISR Beamline Systems	0	120,952	116,914	120,952	4,038	9,287,031	9,287,031	9,493,235	0	(206,205)	9,287,031	9,493,235	(206,205)
2.08 ISS Beamline	0	0	0	0	0	10,472,212	10,472,212	11,236,443	0	(764,231)	10,472,212	11,236,443	(764,231)
2.08.01 ISS Management	0	0	0	0	0	838,199	838,199	681,035	0	157,164	838,199	681,035	157,164
2.08.02 ISS Beamline Systems	0	0	0	0	0	9,634,013	9,634,013	10,555,409	0	(921,395)	9,634,013	10,555,409	(921,395)
2.09 SIX Beamline	0	76,413	962,796	76,413	(886,384)	11,741,332	11,589,849	13,534,561	(151,482)	(1,944,711)	11,741,332	13,711,227	(1,969,896)
2.09.01 SIX Management	0	0	3,546	0	(3,546)	729,841	729,841	752,713	0	(22,872)	729,841	749,304	(19,463)
2.09.02 SIX Beamline Systems	0	76,413	959,250	76,413	(882,837)	11,011,491	10,860,008	12,781,847	(151,482)	(1,921,839)	11,011,491	12,961,923	(1,950,433)
2.10 SMI Beamline	0	15,302	57,925	15,302	(42,622)	9,126,837	9,120,737	9,525,224	(6,100)	(404,487)	9,126,837	9,545,585	(418,748)
2.10.01 SMI Management	0	0	0	0	0	805,656	805,656	706,837	0	98,819	805,656	706,837	98,819
2.10.02 SMI Beamline Systems	0	15,302	57,925	15,302	(42,622)	8,321,181	8,315,081	8,818,387	(6,100)	(503,306)	8,321,181	8,838,748	(517,567)
2.11 Insertion Devices	0	0	0	0	0	4,805,392	4,805,392	4,565,517	0	239,876	4,805,392	4,565,517	239,876
2.11.01 ESM EPU Insertion Device	0	0	0	0	0	4,587,795	4,587,795	4,400,861	0	186,934	4,587,795	4,400,861	186,934
2.11.02 SIX EPU Insertion Device	0	0	0	0	0	117,137	117,137	70,375	0	46,762	117,137	70,375	46,762
2.11.03 Insertion Devices Management	0	0	0	0	0	100,460	100,460	94,281	0	6,179	100,460	94,281	6,179
2.12 ID & FE Installation & Testing	0	0	0	0	0	1,452,816	1,452,816	1,452,960	0	(143)	1,452,816	1,452,960	(143)
2.12.01 ID & FE Installation & Testing Management	0	0	0	0	0	20,739	20,739	20,739	0	0	20,739	20,739	0
2.12.02 ID Installation & Testing	0	0	0	0	0	584,560	584,560	584,560	0	(0)	584,560	584,560	(0)
2.12.03 FE Installation & Testing	0	0	0	0	0	847,517	847,517	847,660	0	(143)	847,517	847,660	(143)
Total Project Baseline	37,435	265,726	1,239,739	228,292	(974,013)	83,017,092	82,800,536	88,994,017	(216,556)	(6,193,481)	83,093,413	89,332,702	(6,239,289)
Management Reserve													
Undistributed Budget													
Performance Management Baseline (PMB)	37,435	265,726	1,239,739	228,292	(974,013)	83,017,092	82,800,536	88,994,017	(216,556)	(6,193,481)	83,093,413	89,332,702	(6,239,289)