



Memorandum

Date: May 19, 2017

To: Robert Caradonna, Federal Project Director, NEXT Project

From: John Hill, NSLS-II Director 

Subject: NEXT KPP Attainment

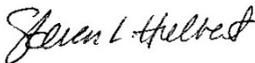
This memo is to formally notify you of the completion of all of the Key Performance Parameters (KPPs) for the NEXT project. The attached memos From Steve Hulbert, NEXT Project Manager, and Paul Zschack, Photon Science Division Director provide the back-up evidence that the KPPs contained in the NEXT Project Execution Plan have been met, and in many cases exceeded.

I look forward to a successful OPA CD-4 review of the project on May 31- June 1, 2017, and following up on any recommendations to pursue a CD-4 decision for the project.

Attachment: Achievement of NEXT Key Performance parameters (Hulbert to Hill);
May 17, 2017 and attachments.

cc: J. Misewich, BNL
S. Hulbert, BNL
E. Johnson, BNL
P. Zschack, BNL

Memo

Date: May 17, 2017
To: John Hill, NSLS-II Director
From: Steve Hulbert, NEXT Project Manager 
Subject: Achievement of NEXT Key Performance Parameters

I am delighted to inform you that all Key Performance Parameters (KPPs) for the NEXT Project have been achieved, and with this memo and its attachments provide a summary of the evidence to support this assertion. If on the basis of the provided information you concur, I would like to request that you, as Director of the NSLS-II facility, inform the NEXT Federal Project Director Mr. Robert Caradonna (BHSO) that in your opinion the NEXT Project KPPs have been met.

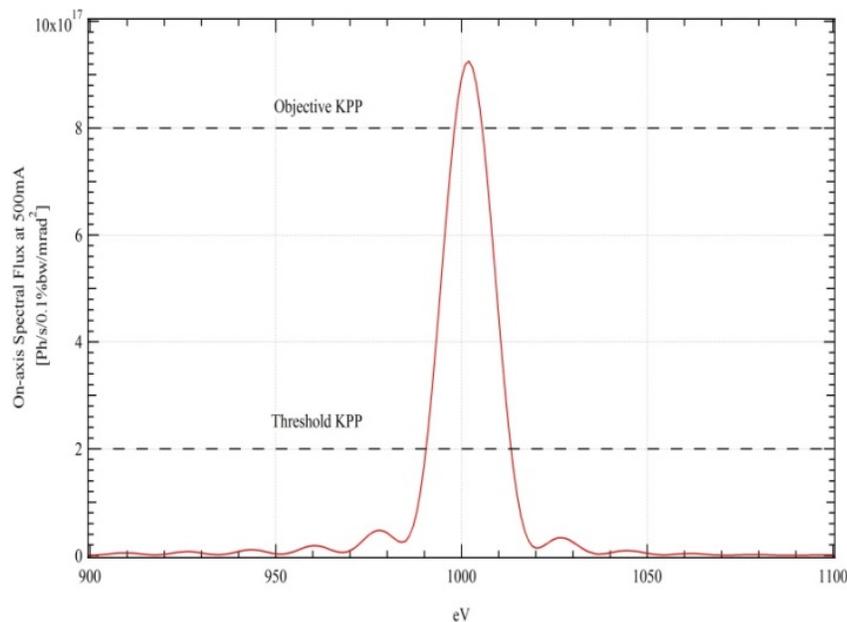
The following table summarizes the NEXT Key Performance Parameters as laid out in the Project Execution Plan, and the performance attained:

Performance Measure	CD-2 Threshold KPP	CD-2 Objective KPP	KPP Achieved	Threshold KPP Met or Exceeded?
Beamlines designed	6	6	6	Met
Beamlines installed and ready for commissioning with x-ray beam	5	6	5	Met
Photon Delivery System branches installed and accepted by NSLS-II facility operations	5	6	5	Met
Endstations installed and accepted*by NSLS-II facility operations	5	7	7	Exceeded
Synchrotron flux value measured at an endstation position of ESM*	10^{10} photons/s	10^{11} photons/s	2×10^{11} photons/s	Exceeded
Synchrotron flux value measured at an endstation position of ISR*	2×10^{11} photons/s	2×10^{12} photons/s	2.4×10^{12} photons/s	Exceeded
Synchrotron flux value measured at an endstation position of ISS*	2×10^{12} photons/s	2×10^{13} photons/s	2.5×10^{13} photons/s	Exceeded
Synchrotron flux value measured at an endstation position of SIX*	1.5×10^{10} photons/s	1.5×10^{11} photons/s	1×10^{12} photons/s	Exceeded
Synchrotron flux value measured at an endstation position of SMI*	10^{12} photons/s	1×10^{13} photons/s	1.06×10^{13} photons/s	Exceeded
On-axis spectral angular intensity capability at 1 keV for a delivered EPU insertion device*	2×10^{17} ph/s/0.1%bw/mrad ²	8×10^{17} ph/s/0.1%bw/mrad ²	9.2×10^{17} ph/s/0.1%bw/mrad ²	Exceeded

* Scaled to 500 mA ring current

Evidence for the attainment of the KPPs includes:

1. Final design of all 6 NEXT beamlines (ESM, FXI, ISR, ISS, SMI, and SIX) was documented by the Final Design Report and associated CD-3 Final Design Review (March 2014), in addition to internal final design reviews for each beamline (2013-2014)
2. 5 of the 6 beamlines (ESM, ISR, ISS, SMI, and SIX) were fully constructed by NEXT, and were ready for commissioning with beam following successful completion of their Instrument Readiness Reviews (IRRs), held in 2016-2017
3. The 5 Photon Delivery Systems (PDSs), one for each of the beamlines constructed by NEXT, as well as 7 endstations, one each for the ESM, ISS, SMI, and SIX beamlines and 3 for the ISR beamline, were accepted into the NSLS-II operating beamline portfolio by the NSLS-II Photon Science Division Director on May 16, 2017 (memos attached)
4. The measured flux values for each of the 5 beamlines constructed by NEXT achieved the corresponding KPP values, as documented in memos from the NEXT Project Manager to the NSLS-II Photon Science Division Director (April-May 2017, attached). The measured flux value for each beamline exceeded its objective KPP value.
5. The on-axis spectral angular intensity at 1 keV photon energy calculated for the 3.5m-long EPU57 insertion device for the SIX beamline, based on its measured (in house) magnetic field profile, exceeded the objective KPP value. The calculated on-axis spectral angular intensity is shown in the following figure, along with the threshold and objective KPP values. The calculations were performed by Oleg Chubar (NSLS-II).



Cc: E. Johnson, P. Zschack



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Memo

Date: 2 May 2017

To: Steve Hulbert, NEXT Project Manager

From: Paul Zschack, Photon Science Division Director

A handwritten signature in blue ink, appearing to read "Paul Zschack", written over the "From:" line.

Subject: Acceptance of ESM Beamline by NSLS-II Photon Science Division

The ESM Lead Beamline Scientist has confirmed that the ESM beamline construction and installation activities are complete and that photon beam has been delivered to the ESM end station. Furthermore, the ESM Key Performance Parameters (KPPs) as defined in the NEXT Project Execution Plan have been achieved. As a result, the ESM beamline has achieved the necessary objectives that permit the Photon Science Division to accept this beamline into our operating portfolio. Congratulations to you and your team on this important accomplishment!

cc: E. Johnson, J. Hill, E. Vescovo, S. Wilkins



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Memo

Date: 8 May 2017

To: Steve Hulbert, NEXT Project Manager

From: Paul Zschack, Photon Science Division Director

A handwritten signature in blue ink, appearing to read "Paul Zschack", written over the "From:" line.

Subject: Acceptance of ISR Beamline by NSLS-II Photon Science Division

The ISR Lead Beamline Scientist has confirmed that the ISR beamline construction and installation activities are complete and that photon beam has been delivered to the ISR end stations. Furthermore, the ISR Key Performance Parameters (KPPs) as defined in the NEXT Project Execution Plan have been achieved. As a result, the ISR beamline has achieved the necessary objectives that permit the Photon Science Division to accept this beamline into our operating portfolio. Congratulations to you and your team on this important accomplishment!

cc: E. Johnson, J. Hill, C. Nelson, E. Dooryhee



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Memo

Date: 2 May 2017

To: Steve Hulbert, NEXT Project Manager

From: Paul Zschack, Photon Science Division Director

A handwritten signature in blue ink, appearing to read "Paul Zschack", written over the "From:" line.

Subject: Acceptance of ISS Beamline by NSLS-II Photon Science Division

The ISS Lead Beamline Scientist has confirmed that the ISS beamline construction and installation activities are complete and that photon beam has been delivered to the ISS end station. Furthermore, the ISS Key Performance Parameters (KPPs) as defined in the NEXT Project Execution Plan have been achieved. As a result, the ISS beamline has achieved the necessary objectives that permit the Photon Science Division to accept this beamline into our operating portfolio. Congratulations to you and your team on this important accomplishment!

cc: E. Johnson, J. Hill, K. Attenkofer



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Memo

Date: 17 May 2017

To: Steve Hulbert, NEXT Project Manager

From: Paul Zschack, Photon Science Division Director

A handwritten signature in blue ink, appearing to read "Paul Zschack", is placed over the "From:" line of the memo header.

Subject: Acceptance of SIX Beamline by NSLS-II Photon Science Division

The SIX Lead Beamline Scientist has confirmed that the SIX beamline construction and installation activities required for operations are complete and that photon beam has been delivered to the SIX end station. Although the triple rotating flange (TRF) is scheduled for a late July delivery, this item is not required to initiate operations. Other ongoing work in the endstation is related to operational activities.

Furthermore, the SIX Key Performance Parameters (KPPs) as defined in the NEXT Project Execution Plan have been achieved. As a result, the SIX beamline has achieved the necessary objectives that permit the Photon Science Division to accept this beamline into our operating portfolio. Congratulations to you and your team on this important accomplishment!

cc: E. Johnson, J. Hill, I. Jarrige, S. Wilkins



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Memo

Date: 2 May 2017

To: Steve Hulbert, NEXT Project Manager

From: Paul Zschack, Photon Science Division Director

A handwritten signature in blue ink, appearing to read "Paul Zschack", written over the "From:" line.

Subject: Acceptance of SMI Beamline by NSLS-II Photon Science Division

The SMI Lead Beamline Scientist has confirmed that the SMI beamline construction and installation activities are complete and that photon beam has been delivered to the SMI end station. Ongoing work in the endstation is related to operational activities.

Furthermore, the SMI Key Performance Parameters (KPPs) as defined in the NEXT Project Execution Plan have been achieved. As a result, the SMI beamline has achieved the necessary objectives that permit the Photon Science Division to accept this beamline into our operating portfolio. Congratulations to you and your team on this important accomplishment!

cc: E. Johnson, J. Hill, E. DiMasi, R. Pindak



Memo

Date: April 28, 2017

To: Paul Zschack, Photon Science Division Director

From: Steve Hulbert, NEXT Project Manager

Subject: Acceptance of ISS Beamline by NSLS-II Facility Operations

Construction of the ISS beamline at 8-ID, one of five insertion device beamlines delivered by the NEXT Project, is complete and light has been delivered to its endstation. The milestones achieved during the transition from construction to operation for this beamline are provided below. Successful achievement of these milestones is evidence that the ISS beamline is ready for operational status in the NSLS-II Facility:

- ISS Photon Delivery System complete and ISS IRR complete (24-Mar-2016)
- Authorization from the NSLS-II Director to Start ISS Commissioning (3-Apr-2016)
- ISS First Light (5-Apr-2016)
- ISS Flux verified (23-Jun-2016)
- ISS Endstation construction complete (28-Oct-2016)

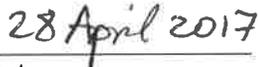
The endstation for ISS features a sample chamber for in-situ, operando measurements and detectors for absorption (pin diodes, silicon drift diodes) and emission (von Hamos spectrometers) measurements.

ISS beamline scope was verified at the NEXT Scope Verification Review held 27-28 February 2017 and completion has been documented via WBS Closeout Acknowledgments.

The purpose of this memo is to report this status and request your acknowledgment that the NSLS-II Facility has accepted the ISS photon delivery system and endstation into its operating portfolio.



Steve Hulbert, NEXT Project Manager



Date

Cc: E. Johnson, J. Hill

Memo

Date: April 28, 2017

To: Paul Zschack, Photon Science Division Director

From: Steve Hulbert, NEXT Project Manager

Subject: Acceptance of ISR Beamline by NSLS-II Facility Operations

Construction of the ISR beamline at 4-ID, one of five insertion device beamlines delivered by the NEXT Project, is complete and light has been delivered to its endstations. The milestones achieved during the transition from construction to operation for this beamline are provided below. Successful achievement of these milestones is evidence that the ISR beamline is ready for operational status in the NSLS-II Facility:

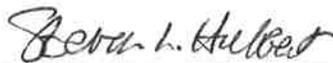
- ISR Photon Delivery System complete and ISR IRR complete (29-Jun-2016)
- Authorization from the NSLS-II Director to Start ISR Commissioning (7-Jul-2016)
- ISR First Light (11-Jul-2016)
- ISR Flux verified (8-Aug-2016)
- ISR Endstation construction complete (24-Mar-2017)

The endstations for ISR include:

1. Base Diffractometer #1, featuring an instrumented six-circle diffractometer
2. Base Diffractometer #2, featuring a two-circle diffractometer and translation stages accommodating large high-field magnets
3. Base Diffractometer #3, featuring KB focusing mirrors and a gas handling system to support x-ray scattering measurements of in-situ modification and growth

ISR beamline scope was verified at the NEXT Scope Verification Review held 27-28 February 2017 and completion has been documented via WBS Closeout Acknowledgments.

The purpose of this memo is to report this status and request your acknowledgment that the NSLS-II Facility has accepted the ISR photon delivery system and endstations into its operating portfolio.



Steve Hulbert, NEXT Project Manager

28 April 2017
Date

Cc: E. Johnson, J. Hill

Memo

Date: April 28, 2017

To: Paul Zschack, Photon Science Division Director

From: Steve Hulbert, NEXT Project Manager

Subject: Acceptance of ESM Beamline by NSLS-II Facility Operations

Construction of the ESM beamline at 21-ID, one of five insertion device beamlines delivered by the NEXT Project, is complete and light has been delivered to its endstation. The milestones achieved during the transition from construction to operation for this beamline are provided below. Successful achievement of these milestones is evidence that the ESM beamline is ready for operational status in the NSLS-II Facility:

- ESM Photon Delivery System complete and ESM IRR complete (29-Jun-2016)
- Authorization from the NSLS-II Director to Start ESM Commissioning (22-Jul-2016)
- ESM First Light (25-Jul-2016)
- ESM Flux verified (15-Aug-2016)
- ESM Endstation construction complete (26-Apr-2017)

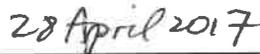
The angle-resolved photoemission spectroscopy (ARPES) endstation for ESM features a sample chamber with static and micro-scanning stage sample manipulation capabilities as well as heating/cooling and sample preparation and characterization tools. Electron detection is provided by a high resolution multi-channel (energy and angle) hemispherical electron energy analyzer.

ESM beamline scope was verified at the NEXT Scope Verification Review held 27-28 February 2017 and completion has been documented via WBS Closeout Acknowledgments.

The purpose of this memo is to report this status and request your acknowledgment that the NSLS-II Facility has accepted the ESM photon delivery system and endstation into its operating portfolio.



Steve Hulbert, NEXT Project Manager



Date

Cc: E. Johnson, J. Hill

Memo

Date: April 28, 2017

To: Paul Zschack, Photon Science Division Director

From: Steve Hulbert, NEXT Project Manager

Subject: Acceptance of SMI Beamline by NSLS-II Facility Operations

Construction of the SMI beamline at 12-ID, one of five insertion device beamlines delivered by the NEXT Project, is complete and light has been delivered to its endstation. The milestones achieved during the transition from construction to operation for this beamline are provided below. Successful achievement of these milestones is evidence that the SMI beamline is ready for operational status in the NSLS-II Facility:

- SMI Photon Delivery System complete and SMI IRR complete (3-Nov-2016)
- Authorization from the NSLS-II Director to Start SMI Commissioning (7-Nov-2016)
- SMI First Light (7-Nov-2016)
- SMI Flux verified (3-Dec-2016)
- SMI Endstation construction complete (21-Apr-2017)

The endstation for SMI features a sample chamber tailored to soft matter systems, with integrated goniometers and pixel array detectors (PADs) for wide-angle X-ray scattering (WAXS) and grazing incidence WAXS (GIWAXS), followed by an 8m-long chamber and PAD for small-angle X-ray scattering (SAXS) and grazing-incidence SAXS (GISAXS).

SMI beamline scope was verified at the NEXT Scope Verification Review held 27-28 February 2017 and completion has been documented via WBS Closeout Acknowledgments.

The purpose of this memo is to report this status and request your acknowledgment that the NSLS-II Facility has accepted the SMI photon delivery system and endstation into its operating portfolio.



Steve Hulbert, NEXT Project Manager



Date

Cc: E. Johnson, J. Hill

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Memo

Date: May 4, 2017
To: Paul Zschack, Photon Science Division Director
From: Steve Hulbert, NEXT Project Manager
Subject: Acceptance of SIX Beamline by NSLS-II Facility Operations

Construction of the SIX beamline at 2-ID, one of five insertion device beamlines delivered by the NEXT Project, is complete and light has been delivered to its endstation. The milestones achieved during the transition from construction to operation for this beamline are provided below. Successful achievement of these milestones is evidence that the SIX beamline is ready for operational status in the NSLS-II Facility:

- SIX Photon Delivery System complete and SIX IRR complete (15-Feb-2017)
- Authorization from the NSLS-II Director to Start SIX Commissioning (17-Feb-2017)
- SIX First Light (21-Feb-2017)
- SIX Flux verified (26-Feb-2017)
- SIX Endstation construction complete (4-May-2017)

The endstation for SIX features a sample chamber with static and scanning sample capabilities as well as temperature control, sample preparation, and characterization tools. Detection of the inelastically scattered photons is provided by a custom high resolution spectrometer with soft X-ray CCD detector.

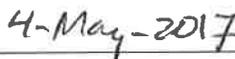
The multi-port fixed-angle vacuum connection between the sample chamber and spectrometer provides capability for commissioning of the combined beamline and spectrometer during the initial period of SIX operations. When ready, this vacuum connection will be replaced by the triple-rotating-flange version which provides continuous angle selection capability under ultra-high vacuum conditions.

SIX beamline scope was verified at the NEXT Scope Verification Review held 27-28 February 2017 and completion has been documented via WBS Closeout Acknowledgments.

The purpose of this memo is to report this status and request your acknowledgment that the NSLS-II Facility has accepted the SIX photon delivery system and endstation into its operating portfolio.



Steve Hulbert, NEXT Project Manager



Date

Cc: E. Johnson, J. Hill