INSTRUMENT READINESS PLAN (IRP)

FOR THE

NSLS–II 23–ID BEAMLINE, FRONT END AND INSERTION DEVICE

OCTOBER 1, 2014

PS–C–XFD–PLN–006

PREPARED BY

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FOR THE

U.S. DEPARTMENT OF ENERGY
OFFICE OF SCIENCE BASIC ENERGY SCIENCE
UNDER CONTRACT DE–AC02–98CD10886

BROOKHAVEN
NATIONAL LABORATORY

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PREPARED BY:

M. McQueen, Instrument Readiness Coordinator

APPROVED AS A PLAN TO ACHIEVE READINESS BY:

P. Zschack, IRR Technical Authority

CONCURRENCE BY:

R. Lee, ESH Manager

APPROVED – IRP HAS BEEN FULLY IMPLEMENTED AND INSTRUMENT IS READY FOR COMMISSIONING:

15 Oct 2014

P. Zschack, IRR Technical Authority

CONCURRENCE BY:

10-15-14

R. Lee, ESH Manager

VERSION HISTORY LOG

VERSION	DESCRIPTION	DATE
1	Initial Issue	September 4, 2014
2	Revised per comments received from IRR; split IRP from 23–ID and 28–ID into only 23–ID	October 1, 2014

TABLE OF CONTENTS

ATTACHMENTS

1.0 INTRODUCTION

1.1 Purpose and Scope

The purpose of this Instrument Readiness Plan (IRP) is to set forth the readiness criteria required to declare the NSLS–II 23–ID Project Beamline ready for commissioning with ≤50 mA electron beam current in the Storage Ring. The scope of this IRP includes the 23–ID Beamline (including the Front End, Insertion Device and End Station Diagnostics), and was prepared in accordance with the *Instrument Readiness Review Procedure* (PS–C–ESH–PRC–001). Experimental equipment in the End Station is outside the scope of this plan.

This IRP will be used as a tool for planning and certifying the achievement of readiness. The completion of this IRP requires that all procedures, documentation and hardware, including credited controls and other safety systems are complete, tested, and independently certified, where required. In addition, staff and users that will be involved in commissioning must be trained and qualified to conduct their work safely, securely and in an environmentally sound manner.

1.2 23–ID Beamline, Front End and Insertion Device

The 23–ID Beamline, Front End and Insertion Device [Coherent Soft X–ray Scattering (CSX)] is designed to provide the highest coherent flux, worldwide, in the energy range 270 eV to 1.5 keV. The coherence branch of this Beamline is ideally suited to the study of real space electronic textures in strongly correlated materials and their associated glassy dynamics. The polarization branch provides the unique capability to fast switch the polarization state for detection of weak dicroism signals. This can be applied to many types of device physics such as spintronic materials.

The source of the 23–ID Beamline is an elliptically polarized undulator (EPU), and the credited controls include shielding, burn–through devices (Front End), and personnel protection system (PPS) interlocks in accordance with the NSLS–II Accelerator Safety Envelope (ASE) (PS–C–ESH–ROASE–001).

1.3 Instrument Readiness Review (IRR)

As part of the verification of readiness for commissioning, an IRR is required in accordance with the *Instrument Readiness Review Procedure* (PS–C–ESH–PRC–001). An independent IRR Team will use the readiness criteria developed as part of this IRP to verify that the 23–ID Beamline, Front End and Insertion Device is ready for commissioning with ≤50 mA electron beam current in the Storage Ring. An IRR, performed by an independent team, will be conducted upon the completion of this IRP. Pre–start and post–start findings will be identified by the team.

1.4 Authorization to Proceed with Commissioning

The completion of this IRP, as well as the closure of any pre–start findings from the IRR are used as the basis for the Associate Laboratory Director (ALD) for Photon Sciences (PS) to authorize the start of the 23–ID Beamline, Front End and Insertion Device commissioning, in accordance with the *Instrument Readiness Review Procedure* (PS–C–ESH–PRC–001).

2.0 INSTRUMENT READINESS PLAN

2.1 Readiness Criteria

Readiness criteria are provided in Attachments A through D. The criteria were developed by the Instrument Readiness Coordinator (IRC) and Readiness Team members, using the *General Readiness Criteria* provided in Attachment A and the *Instrument Readiness Guide* provided in Attachment C of the *Instrument Readiness Review Procedure* (PS–C–ESH–PRC–001).

The readiness criteria for the 23–ID Beamline, Front End and Insertion Device are grouped into the following categories:

- Pillar I – Documentation
- Pillar II – Hardware
- Pillar III – Personnel
- Completion of IRR Pre–start Findings

3.0 IRP IMPLEMENTATION

3.1 Readiness Team

A Readiness Team will be appointed by the IRC in accordance with the *Instrument Readiness Review Procedure* (PS–C–ESH–PRC–001). The Readiness Team members that have responsibility for completing the IRP are listed as the Responsible Person in the Attachments.

3.2 Achieving Readiness – Responsibilities

The Readiness Team members, as designated on the Attachments, are responsible for ensuring that their specific readiness criteria are achieved.

The Lead Beamline Scientist is responsible for certifying that all of the readiness criteria associated with the Beamline (including the Front End, Insertion Device and End Station Diagnostics) are achieved.

3.3 Execution of the IRP

The Readiness Team members shall execute this IRP by preparing, installing, documenting, or training (as appropriate), the specific scope of work (readiness criteria) assigned to them as listed in the Attachments. The Readiness Team members shall develop, compile or assemble the documented evidence that clearly demonstrates that the readiness criteria have been met. This evidence shall be listed on the Attachments.

3.4 Certifying Readiness

Upon completion of the readiness criteria, the Readiness Team members will certify that the criteria for which they are responsible for are complete by signing the Attachments in the appropriate section. The Attachments shall not be signed until the readiness criteria have been fully achieved.

For Pillars I, II, and III, the Lead Beamline Scientist will certify that all readiness criteria for their instrument have been achieved by signing the Readiness Certification block Attachment C.

For Completion of the IRR Pre–start Findings, the IRR Technical Authority and the ESH Manager will certify that all IRR pre–start findings relative to the 23–ID Beamline, Front End and Insertion Device have been completed, and that the associated ATS Actions have been closed by signing Attachment D in the appropriate section. The Independent Verifier will concur that these actions have been adequately completed and closed by signing Attachment D in the appropriate section.

ATTACHMENT A – PILLAR I DOCUMENTATION

23-ID BEAMLINE, FRONT END AND INSERTION DEVICE

	READINESS CRITERIA	RESPONSIBLE PERSON	DOCUMENTED EVIDENCE (LIST DOCUMENT NAME, NUMBER, SECTION, ETC.)	CERTIFICATION OF READINESS*
PILLAR I DOCUMENTATION	**Functional Description** A brief description of the Beamline has been prepared and it includes its primary research capabilities, physical layout and location on the experimental floor, source, major optical and radiation safety components, a high level summary of its design performance parameters, and a list of all credited controls for the Beamline and Front End (PPS, shielding, ARMs, burn–through devices, O2 monitoring).	S. Wilkins Lead Beamline Scientist	- Functional Description	Signature: 
	Hazards Analysis & Mitigation Strategy The principal conventional and radiological hazards associated with Beamline commissioning have been identified, and the processes and systems are in place to mitigate them. This should include any temporary systems (e.g., cryogens, etc.).	S. Wilkins Lead Beamline Scientist	- SAD (including Appendices) (PS-C-ESH-RPT-001) - Revised ODH analysis - ASE (PS-C-ESH-ROASE-001)	Signature: 
	USI Evaluations / Screenings All USI evaluation / screening documentation complete.	S. Moss Authorization Basis Manager	- USI Evaluation Log - USI Evaluations	Signature: 
	Commissioning Plan A commissioning plan has been developed in accordance with PS–C–CMD–PLN–001, *NSLS–II Process Description: Review Process for Facility Additions and Modifications.*	S. Wilkins Lead Beamline Scientist	- 23-ID Commissioning Plan (PS-C-CMD-PLN-002) - NSLS-II Insertion Devices and Front Ends Commissioning Sequence (PS-C-ASD-PRC-166)	Signature: 

*Signature certifies that the readiness criteria are met. The Responsible Person shall not sign prior to completion.

ATTACHMENT A – PILLAR I DOCUMENTATION

23-ID BEAMLINE, FRONT END AND INSERTION DEVICE

	READINESS CRITERIA	RESPONSIBLE PERSON	DOCUMENTED EVIDENCE (LIST DOCUMENT NAME, NUMBER, SECTION, ETC.)	CERTIFICATION OF READINESS*
PILLAR I DOCUMENTATION	**Radiation Survey Plan – Beamlines** A plan describing the steps required during commissioning has been generated and includes component testing with beam, radiation surveys, hold points, plans for ramping up electron beam current, additional safety review processes prior to scientific commissioning.	Z. Xia Associate Radiation Physicist	- NSLS-II Beamlines Radiation Safety Commissioning Plan (PS-C-XFD-PRC-004) - Beamline CSX (23-ID) Radiation Survey Plan (PS-C-XFD-PRC-038)	Signature:
	Radiation Survey Plan – Front Ends & Insertion Devices A plan describing the steps required during commissioning has been generated and includes component testing with beam, radiation surveys, hold points, plans for ramping up electron beam current, additional safety review processes prior to scientific commissioning.	Z. Xia Associate Radiation Physicist	- NSLS-II Insertion Devices and Front Ends Radiation Survey Plan (PS-C-ESH-PRC-061)	Signature:
	Ray Traces – Beamline Final Beamline ray traces are approved and released in Vault.	S. Wilkins Lead Beamline Scientist	- 23-ID Beamline Ray Trace Drawings	Signature:
	Ray Traces – Front End Final Front End ray traces are approved and released in Vault.	C. Amundsen Front End Mechanical Engineer	- 23-ID FE Ray Trace Drawings	Signature:
	Radiation Safety Components – Beamline A Radiation safety component checklist template has been prepared in accordance with PS–C–ESH–PRC–025, *NSLS–II Radiation Safety Component Inspection Procedure* and includes shielding, hutches, beam shutters, scatter shields, PPS apertures, exclusion zones, labyrinths, beam stops, beam masks, collimators, hutch guillotine, and beam transport pipes, etc.	S. Wilkins Lead Beamline Scientist	- 23-ID Beamline Radiation Safety Component Checklist template (approved) - Photos	Signature:

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ATTACHMENT A – PILLAR I DOCUMENTATION

23-ID BEAMLINE, FRONT END AND INSERTION DEVICE

	READINESS CRITERIA	RESPONSIBLE PERSON	DOCUMENTED EVIDENCE (LIST DOCUMENT NAME, NUMBER, SECTION, ETC.)	CERTIFICATION OF READINESS*
PILLAR I DOCUMENTATION	**Radiation Safety Components – Front End** A Radiation Safety Component Checklist template has been prepared in accordance with PS–C–ESH–PRC–025, *NSLS–II Radiation Safety Component Inspection Procedure* and includes shielding, shutters, scatter shields, burn–through devices, beam masks, collimators, and beam transport pipes, etc..	T. Shaftan Storage Ring Manager	- Pentant 1 Radiation Safety Component Checklist template (approved) - Photos	Signature:
	Procedures Procedures needed for safe, secure, and environmentally sound commissioning have been developed, reviewed, validated (where applicable), and approved.	M. McQueen Procedure Support	- Procedure List - Procedures	Signature:
	Resolution of Open ATS Actions All actions items from previous internal and external oversight groups (e.g., RSC, Design Reviews, etc.) have been closed.	J. Zipper QA Engineer	- Table	Signature:

*Signature certifies that the readiness criteria are met. The Responsible Person shall not sign prior to completion.

ATTACHMENT B – PILLAR II HARDWARE

23-ID BEAMLINE, FRONT END AND INSERTION DEVICE

	READINESS CRITERIA	RESPONSIBLE PERSON	DOCUMENTED EVIDENCE (LIST DOCUMENT NAME, NUMBER, SECTION, ETC.)	CERTIFICATION OF READINESS*
PILLAR II SAFETY CRITICAL HARDWARE	**Radiation Safety Components – Beamline** Radiation safety components are installed and confirmed in accordance with the Traveler and placed under configuration control.	S. Wilkins Lead Beamline Scientist	- Traveler - Labels - Photos	Signature:
	Radiation Safety Components – Front End Radiation safety components are installed and confirmed in in accordance with the Travelers and placed under configuration control.	S. Sharma Mechanical Engineering Group Leader	- Travelers - Labels - Photos	Signature:
	Area Radiation Monitors (ARMs) Required ARMs are installed at the locations identified in the design drawing and have been certified in accordance with PS–C–ASD–PRC–008, *NSLS–II Area Radiation Monitor PPS Test.*	M. Benmerrouche ARM Technical Authority	- Design Drawing - ARM PPS Test Report	Signature:
	Personnel Protection System (PPS) Interlocks Hardware/Software installed and ready in accordance with PS–C–XFD–SPC–PPS–001, *Beamline Personnel Protection System (BLPPS) and Front End Personnel Protection System (FEPPS) Design Description.*	G. Ganetis Electrical Engineering Group Leader	- PPS Inspection Traveler - PPS Certification Report	Signature:
	PPS has been certified in accordance with PS–C–XFD–PRC–033, *Beamline 23–ID Radiological Interlock Test*	R. Lee ESH Manager	- PPS Certification Report	Signature:

*Signature certifies that the readiness criteria are met. The Responsible Person shall not sign prior to completion.

ATTACHMENT B – PILLAR II HARDWARE

23-ID BEAMLINE, FRONT END AND INSERTION DEVICE

	READINESS CRITERIA	RESPONSIBLE PERSON	DOCUMENTED EVIDENCE (LIST DOCUMENT NAME, NUMBER, SECTION, ETC.)	CERTIFICATION OF READINESS*
PILLAR II SAFETY CRITICAL HARDWARE	**Hutch Structures (Life Safety)** Hutch structures installed with adequate provision for life safety issues (egress and fall protection) in accordance with LT–SOW–XF–HU–0001, *Statement of Work for NSLS–II Beamline Shielding Enclosures ("Hutches")*, LT–C–XFD–SPC–HU–001, *NSLS–II Lead/Steel Beamline Shielding Enclosures*, and LT–C–XFD–SPC–HU–002, *NSLS–II Steel Beamline Shielding Enclosures*.	E. Haas Beamline Engineer	- Traveler	Signature: Edwin Haas
	Electrical Power Distribution Electrical power distribution has been installed, inspected and tested in accordance with SBMS requirements.	A. Boerner Electrical Distribution Group Leader	- Traveler	Signature:
	Utilities – Beamline Permanent utility systems needed are installed and tested (Compressed Air, DI Water, Gaseous Nitrogen, Process Chilled Water) in accordance with the design drawings.	J. Gosman Utilities Group Leader	- Installation Traveler - Balancing Traveler	Signature:
	Utilities – Front End Permanent utility systems needed are installed and tested (Compressed Air, DI Water) in accordance with the design drawings.	S. Sharma Mechanical Engineering Group Leader	- Design Drawing - Traveler	Signature:
	Utilities – ID Permanent utility systems needed are installed and tested (Air, DI Water) in accordance with the design drawings.	J. Gosman Utilities Group Leader	- Design Drawing - Traveler	Signature:

*Signature certifies that the readiness criteria are met. The Responsible Person shall not sign prior to completion.

ATTACHMENT B – PILLAR II HARDWARE

23-ID BEAMLINE, FRONT END AND INSERTION DEVICE

	READINESS CRITERIA	RESPONSIBLE PERSON	DOCUMENTED EVIDENCE (LIST DOCUMENT NAME, NUMBER, SECTION, ETC.)	CERTIFICATION OF READINESS*
PILLAR II OTHER HARDWARE	**Other Photon Transport Components and Optics – Beamline** All photon transport components that are not radiation safety components are installed, tested and confirmed in accordance with the Traveler.	S. Wilkins Lead Beamline Scientist	- Traveler	Signature:
	Other Photon Transport Components and Optics – Front End All photon transport components that are not radiation safety components are installed, tested and confirmed in accordance with the Travelers.	S. Sharma Mechanical Engineering Group Leader	- Traveler	Signature:
	Commissioning Diagnostics Diagnostic equipment needed for commencing technical commissioning is installed.	S. Wilkins Lead Beamline Scientist	- Field Walkdown	Signature:
	Controls Control systems installed, tested and confirmed in accordance with the Traveler.	J. DeLong Deputy Controls Group Leader	- Traveler	Signature:

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ATTACHMENT B – PILLAR II HARDWARE

23-ID BEAMLINE, FRONT END AND INSERTION DEVICE

	READINESS CRITERIA	RESPONSIBLE PERSON	DOCUMENTED EVIDENCE (LIST DOCUMENT NAME, NUMBER, SECTION, ETC.)	CERTIFICATION OF READINESS*
PILLAR II OTHER HARDWARE	**Equipment Protection System (EPS) Interlocks – Beamline** Hardware/Software installed, tested and confirmed in accordance with the Traveler.	J. DeLong Deputy Controls Group Leader	- Traveler	Signature:
	Equipment Protection System (EPS) Interlocks – Front End Hardware/Software installed and tested in accordance with PS–C–ASD–SPC–EPS–001, *Equipment Protection System (EPS) Design Description* and confirmed in accordance with the Traveler.	G. Ganetis Electrical Engineering Group Leader	- Test Reports	Signature:
	Vacuum – Beamline Vacuum hardware has been installed and confirmed in accordance with the Traveler and has the capability of achieving full vacuum needed during commissioning. The vacuum components are under sufficient vacuum to begin commissioning, which includes satisfying the EPS.	R. Todd Beamline Vacuum Engineer	- Traveler	Signature:
	Vacuum – Front End Vacuum hardware has been installed and confirmed in accordance with the Traveler and has the capability of achieving full vacuum needed during commissioning. The vacuum components are under sufficient vacuum to begin commissioning, which includes satisfying the EPS.	H. Hseuh Accelerator Vacuum Group Leader	- Traveler	Signature: C. HETZEL FOR H. HSEUH

*Signature certifies that the readiness criteria are met. The Responsible Person shall not sign prior to completion.

ATTACHMENT C – PILLAR III PERSONNEL

23–ID BEAMLINE, FRONT END AND INSERTION DEVICE

	READINESS CRITERIA	RESPONSIBLE PERSON	DOCUMENTED EVIDENCE (LIST DOCUMENT NAME, NUMBER, SECTION, ETC.)	CERTIFICATION OF READINESS*
PILLAR III PERSONNEL	**Lead Beamline Scientist** Trained/Qualified	B. Lein Training Group Leader	- JTA showing status	Signature: Bruce Lein
	Authorized Beamline Staff Sufficient Staff to begin commissioning is Trained/Qualified	B. Lein Training Group Leader	- JTAs showing status	Signature: Bruce Lein
	Support Staff Other, non Beamline–dedicated staff needed to begin commissioning (e.g., Beamline Engineers and Controls Personnel) are trained/qualified.	B. Lein Training Group Leader	- JTAs showing status	Signature: Bruce Lein
	Lead Operators (Accelerator Division) Trained/qualified to: – Execute the Beamline Enable procedure. – Perform roles assigned in any Beamline–specific procedures.	E. Zitvogel Beam Operations Group Leader	- JTAs showing status	Signature: Eric Zitvogel
	ROCO Roles Staff designated and trained/qualified to fill the roles of: – Research Space Managers. – Cognizant Space Managers for each Beamline.	B. Lein Training Group Leader	- JTAs showing status	Signature: Bruce Lein
	Training Information/Tracking A process is in place to inform managers when staff training and qualifications will expire for the roles listed above.	B. Lein Training Group Leader	- BTMS Automatic Notifications	Signature: Bruce Lein

* READINESS CERTIFICATION	S. Wilkins – Lead Beamline Scientist	Signature:

*Signature certifies that the readiness criteria are met. The Responsible Person shall not sign prior to completion.

ATTACHMENT D – COMPLETION OF IRR PRE–START FINDINGS

23-ID BEAMLINE, FRONT END AND INSERTION DEVICE

	READINESS CRITERIA	RESPONSIBLE PERSON	DOCUMENTED EVIDENCE (LIST DOCUMENT NAME, NUMBER, SECTION, ETC.)	CERTIFICATION OF READINESS*
IRR PRE–START FINDINGS	**Actions Complete** All actions associated with the 23–ID Beamline, Front End and Insertion Device IRR pre–start findings have been completed ~~and the ATS Actions have been closed.~~ Actions cannot be closed because they are combined with 28-ID (WEM) 10/15/14	P. Zschack IRR Technical Authority	- Pre-start Closure Report - ~~Screen Shot of Closed ATS Pre-start Actions~~ Email from J. Zipper stating 23-ID pre-start Actions are complete (WEM) 10/15/14	Signature: [signature]
	Actions Closed All actions associated with the 23–ID Beamline, Front End and Insertion Device IRR pre–start findings have been verified complete and the ATS Condition is closed. for 23ID only RLee 10-14-14 (ATS Condition No. 8.201.1) Note Condition closure is pending 28-ID action closure RLee 10-14-14	R. Lee ESH Manager	- Screen Shot of Closed ATS Pre-start Condition	Signature: [signature] 10-14-14
	Actions Verified Actions associated with the 23–ID Beamline, Front End and Insertion Device IRR pre–start findings have been satisfactorily completed.	C. Gortakowski Independent Verifier, QMO Office	- Verification Memo	Signature: [signature] Oct 15 - 2014

– END –

*Signature certifies that the readiness criteria are met. The Responsible Person shall not sign prior to completion.