

INSTRUMENT READINESS PLAN (IRP)

FOR THE

NSLS-II 2-ID (SIX) FRONT END AND INSERTION DEVICE



OCTOBER 2016

NSLSII-2ID-PLN-001

PREPARED BY

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FOR THE

U.S. DEPARTMENT OF ENERGY
OFFICE OF SCIENCE BASIC ENERGY SCIENCE
UNDER CONTRACT DE-SC0012704

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PREPARED BY:



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APPROVED AS A PLAN TO ACHIEVE READINESS BY:



T. Shaftan, IRR Technical Authority

CONCURRENCE BY:



R. Lee, ESH Manager

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



T. Shaftan, IRR Technical Authority

CONCURRENCE BY:



R. Lee, ESH Manager

REVISION HISTORY

REVISION	DESCRIPTION	LIST OF REVIEWERS	DATE
1	First Issue	See completed tables	October 2016

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Attachment D, *Completion of IRR Pre-Start Findings*

1.0 INTRODUCTION

1.1 Purpose and Scope

The purpose of this Instrument Readiness Plan (IRP) is to establish the readiness criteria required to declare the NSLS-II 2-ID (Soft Inelastic X-ray Scattering [SIX]) Front End and Insertion Device ready for commissioning. The scope of this IRP includes the 2-ID Front End and Insertion Device, and was prepared in accordance with the *Instrument Readiness Review Procedure* (PS-C-ESH-PRC-001). The 2-ID Beamline will undergo an IRR at a later date.

This IRP will be used as a tool for planning and certifying readiness. The completion of this IRP requires that all procedures, documentation and hardware listed in the plan are completed, tested, and where required, independently certified. In addition, Staff and Users that will be involved in commissioning shall be trained and qualified to conduct their work safely, securely and in an environmentally sound manner.

1.2 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 2-ID Front End and Insertion Device are ready for commissioning in accordance with the appropriate Commissioning Plans. Pre-start and post-start findings will be identified by the team.

1.3 Authorization to Proceed with Commissioning

The completion of this IRP, together with closure of any pre-start findings from the IRR, is used as the basis for the NSLS-II Director to authorize the start of commissioning of the 2-ID Front End and Insertion Device.

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 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 NSLS-II Director 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 are responsible for ensuring that their specific readiness criteria are achieved.

The Insertion Devices Group Leader and the Mechanical Engineering Group Leader are responsible for certifying that all of the readiness criteria associated with the subject Front End and Insertion Device 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 completion of the IRR pre-start findings, if identified, the IRR Technical Authorities and the ESH Manager will certify that all IRR pre-start findings relative to the 2-ID 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.

4.0 REFERENCES

- 4.1 PS-C-ESH-PRC-001, *Instrument Readiness Review Procedure*
- 4.2 PS-C-ESH-ROASE-001, *NSLS-II Accelerator Safety Envelope (ASE)*

**ATTACHMENT A – PILLAR I DOCUMENTATION
2-ID FRONT END AND INSERTION DEVICE**

	READINESS CRITERIA	RESPONSIBLE PERSON	ACTIONS	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*	
PILLAR I DOCUMENTATION (PLANNING & PROCEDURES)	<p>Functional Description An overview presentation is prepared that defines the scope of the IRR and includes the following FE and ID specific information:</p> <ul style="list-style-type: none"> - Primary capabilities - Physical layout and location - Radiation Safety Components - Summary of design performance parameters - List of credited controls - Self-identified pre-start findings - Description and status for each item listed in this Instrument Readiness Plan 	<p>G. Fries Accelerator Division Liaison Engineer</p>	<ul style="list-style-type: none"> • Develop the presentation described for the FE and ID 	<ul style="list-style-type: none"> • Presentation 	<p>Signature:</p> 	
	<p>FE & ID Design Components are designed in accordance with PS-QAP-0412, <i>Design Reviews</i> and PS-C-QAS-PRC-010, <i>Engineering Design by Others</i>.</p>	<p>Front End: S. Sharma Mechanical Engineering Group Leader</p>	<p>Insertion Device: T. Tanabe ID Group Leader</p>	<ul style="list-style-type: none"> • Complete Engineering Design Reviews for the FE and ID that address thermal management, mechanical support, configuration control, and vacuum 	<p>FE and ID:</p> <ul style="list-style-type: none"> • Requirements, Specifications, and Interface report (RSI) • Internal design review documents 	<p>Signature:</p> 
		<p>S. Sharma Mechanical Engineering Group Leader</p>				<p>Signature:</p> 
<p>Radiation Safety Components Design Radiation Safety Components for the FE designed in accordance with NSLS-II requirements, PS-QAP-0412, <i>Design Reviews</i> and PS-C-QAS-PRC-010, <i>Engineering Design by Others</i>.</p>	<p>S. Sharma Mechanical Engineering Group Leader</p>	<ul style="list-style-type: none"> • Complete requirements analysis and design of radiation safety components for the FE 	<ul style="list-style-type: none"> • Internal design review documents • RSC Report 	<p>Signature:</p> 		

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

**ATTACHMENT A – PILLAR I DOCUMENTATION
2-ID FRONT END AND INSERTION DEVICE**

	READINESS CRITERIA	RESPONSIBLE PERSON	ACTIONS	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*
PILLAR I DOCUMENTATION (PLANNING & PROCEDURES)	<p>Ray Traces Bremsstrahlung and Synchrotron Ray Traces generated in accordance with PS-C-ASD-PRC-147, <i>Insertion Device and Front End Ray Tracing Procedure</i></p>	<p>C. Amundsen Mechanical Engineer</p>	<ul style="list-style-type: none"> • Prepare the Ray Traces for the FE 	<ul style="list-style-type: none"> • Primary Bremsstrahlung Ray Traces • Maximum Synchrotron Ray Traces 	<p>Signature: </p>
	<p>Unreviewed Safety Issue (USI) Evaluations/Screenings Authorization basis hazard identification is managed through USI evaluation/screening.</p>	<p>S. Moss Authorization Basis Manager</p>	<ul style="list-style-type: none"> • Verify that the SAD and ASE accurately cover the hazards associated with the subject, FE and ID • Complete any associated USI evaluations/screenings 	<ul style="list-style-type: none"> • SAD and ASE USI screenings/evaluations • Applicable waivers 	<p>Signature: </p>
	<p>Resolution of Open Action Tracking System (ATS) Actions Instrument specific action items from previous internal and external oversight groups (e.g., RSC, Design Reviews, etc.) are addressed. Previous IRR action items are addressed.</p>	<p>E. Cheswick QA Engineer</p>	<ul style="list-style-type: none"> • ATS action items for the FE and ID shown as closed with supporting evidence 	<ul style="list-style-type: none"> • ATS System 	<p>Signature: </p>

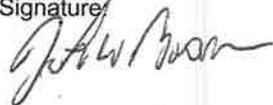
*Signature certifies that the readiness criteria are met. The Responsible Person shall not sign prior to completion.

**ATTACHMENT A – PILLAR I DOCUMENTATION
2-ID FRONT END AND INSERTION DEVICE**

READINESS CRITERIA	RESPONSIBLE PERSON	ACTIONS	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*
<p>Procedures Procedures needed for safe, secure, and environmentally sound commissioning have been developed, reviewed, validated (where applicable), and approved. Existing procedures are verified as sufficient for new hazards introduced by this FE and ID, if any.</p>	<p align="center">K. Rubino Procedure Support</p>	<ul style="list-style-type: none"> • Develop any system specific procedures • Verify that existing procedure are sufficient for any new hazards introduced 	<ul style="list-style-type: none"> • ID LOTO Procedure 	<p>Signature:</p> 
<p>Commissioning Plans A commissioning plan has been developed in accordance with PS-C-CMD-PLN-001, <i>NSLS-II Process Description: Review Process for Facility Additions and Modifications</i>.</p>	<p align="center">T. Shaftan Accelerator Coordination Group Leader</p>	<ul style="list-style-type: none"> • Verify that NSLS-II Insertion Device and Front End Commissioning Sequence (PS-C-ASD-PRC-166) adequately covers commissioning for the FE and ID 	<ul style="list-style-type: none"> • NSLS-II Insertion Device and Front End Commissioning Sequence (PS-C-ASD-PRC-166) 	<p>Signature:</p> 
<p>Radiation Survey Plans 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.</p>	<p align="center">M. Benmerrouche Radiation Physicist</p>	<ul style="list-style-type: none"> • Verify that the NSLS-II Insertion Devices and Front End Radiation Survey Plan (PS-C-ESH-PRC-061) adequately covers commissioning for the FE and ID 	<ul style="list-style-type: none"> • NSLS-II Insertion Devices and Front End Radiation Survey Plan (PS-C-ESH-PRC-061) 	<p>Signature:</p> 

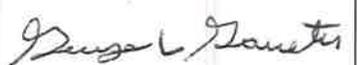
*Signature certifies that the readiness criteria are met. The Responsible Person shall not sign prior to completion.

**ATTACHMENT B – PILLAR II HARDWARE
2-ID FRONT END AND INSERTION DEVICE**

READINESS CRITERIA		RESPONSIBLE PERSON	ACTIONS	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*
PILLAR II SAFETY CRITICAL HARDWARE (INSTALLATION)	Radiation Safety Components: Installation Radiation Safety Components are installed in accordance with the Traveler.	M. Breitfeller Mechanical Engineer	<ul style="list-style-type: none"> Generate and execute Top Level Traveler 	FE: <ul style="list-style-type: none"> Completed Traveler 	Signature: 
	Radiation Safety Components: Configuration Control A Radiation Safety Component Checklist template is generated in accordance with PS-C-ESH-PRC-025, <i>NLSII Radiation Safety Component Inspection Procedure</i> .	L. Doom Accelerator Coordination Group Engineer	<ul style="list-style-type: none"> Verify that the existing FE Radiation Safety Component checklist includes the subject FE and ID 	<ul style="list-style-type: none"> Approved Storage Ring Radiation Safety Component Checklist Template 	Signature:  10/17/16
	Electrical Power SBMS electrical power distribution requirements are satisfied. SBMS Electrical Equipment Inspection (EEI) requirements are satisfied.	A. Boerner Electrical Distribution Engineer	<ul style="list-style-type: none"> Generate and approve one-line drawings Complete system electrical inspection Complete needed EEI inspections 	<ul style="list-style-type: none"> Approved AC Power one-line drawings EEI database entries 	Signature:  10/17/16
	Utilities Permanent utility systems are installed and tested (i.e., Compressed Air, DI Water, Gaseous Nitrogen, Process Chilled Water) in accordance with design drawings.	J. Gosman Mechanical Utilities Group Leader	<ul style="list-style-type: none"> Generate system schematics Perform pressure test 297 10-12-16 	<ul style="list-style-type: none"> Approved system schematics System pressure testing reports 	Signature:  10-12-16

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

**ATTACHMENT B – PILLAR II HARDWARE
2-ID FRONT END AND INSERTION DEVICE**

READINESS CRITERIA		RESPONSIBLE PERSON	ACTIONS	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*
PILLAR II OTHER HARDWARE (INSTALLATION)	<p>Other Front End Components All FE components that are not radiation safety components are installed and tested in accordance with the Travelers.</p>	M. Breitfeller Mechanical Engineer	<ul style="list-style-type: none"> • Generate Traveler and drawing • Execute Traveler • Perform pressure test 	<ul style="list-style-type: none"> • Completed Traveler • System pressure testing reports 	Signature: 
	<p>Equipment Protection System (EPS) Interlocks (Phase 1 installation for ID operation only) Hardware/Software installed and tested in accordance with PS-C-ASD-SPC-EPS-001, <i>Equipment Protection System (EPS) Design Description</i> and confirmed.</p>	G. Ganetis Electrical Engineering Group Leader	<ul style="list-style-type: none"> • Verify EPICS integration • Test system performance 	<ul style="list-style-type: none"> • Test Report Phase 1 Installation 	Signature: 
	<p>Controls and Diagnostics Hardware/Software installed and tested in accordance with NSLS-II requirements.</p>	D. Padrazo Deputy Instrumentation Group Leader	<ul style="list-style-type: none"> • Test system performance • Complete integral testing 	<ul style="list-style-type: none"> • Performance and integral testing checklist 	Signature: 
		H. Bassan Controls Group Engineer	<ul style="list-style-type: none"> • Test system performance • Complete integral testing 	<ul style="list-style-type: none"> • Performance and integral testing documentation 	Signature: 

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

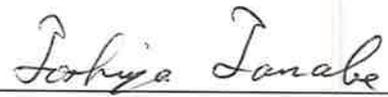
**ATTACHMENT B – PILLAR II HARDWARE
2-ID FRONT END AND INSERTION DEVICE**

READINESS CRITERIA		RESPONSIBLE PERSON	ACTIONS	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*
PILLAR II OTHER HARDWARE (INSTALLATION)	<p>Vacuum Vacuum hardware has been installed and tested in accordance with the Traveler and has the capability of achieving full vacuum needed during commissioning.</p>	<p>C. Hetzel Vacuum Group Leader</p>	<ul style="list-style-type: none"> • Generate and execute Top Level Traveler • Identify overpressure devices • Test system performance 	<ul style="list-style-type: none"> • Completed Top Level Traveler • Test Report 	<p>Signature:</p> 

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

**ATTACHMENT C – PILLAR III PERSONNEL
2-ID FRONT END AND INSERTION DEVICE**

READINESS CRITERIA		RESPONSIBLE PERSON	ACTIONS	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*
PILLAR III PERSONNEL	Lead Operators, Scientific Operators & FLOCOS Trained/Qualified to commission the FE and ID.	B. Lein Training Group Leader	<ul style="list-style-type: none"> • Train Operators 	<ul style="list-style-type: none"> • BTMS record 	Signature: 
	Support Staff Staff needed to support FE and ID commissioning.	B. Lein Training Group Leader	<ul style="list-style-type: none"> • Identify Support Staff • Assign JTAs and train 	<ul style="list-style-type: none"> • BTMS record that sufficient number of staff are trained to support commissioning 	Signature: 

* READINESS CERTIFICATION	S. Sharma - Mechanical Engineering Group Leader	Signature: 
* READINESS CERTIFICATION	T. Tanabe - Insertion Devices Group Leader	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
2-ID FRONT END AND INSERTION DEVICE**

READINESS CRITERIA		RESPONSIBLE PERSON	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*
IRR PRE–START FINDINGS	Actions Complete All actions associated with the 2-ID FE and ID IRR pre-start findings are completed and the ATS Actions are closed.	T. Shaftan IRR Technical Authority	<ul style="list-style-type: none"> • ATS 	Signature:
	Actions Closed All actions associated with the 2-ID Beamline, FE and ID IRR pre-start findings have been verified complete and the ATS Condition is closed. (ATS Condition No. _____)	R. Lee ESH Manager	<ul style="list-style-type: none"> • ATS 	Signature:
	Actions associated with the 2-ID FE and ID IRR pre-start findings have been satisfactorily completed.	M. Hauptmann Independent Verifier	<ul style="list-style-type: none"> • ATS 	Signature:
	No Pre-Start Findings Identified No pre-start findings have been identified by the Review Team and therefore the previous lines do not require sign-off.	R. Lee ESH Manager	<ul style="list-style-type: none"> • IRR Preliminary Report 	Signature:
		M. Hauptmann Independent Verifier	<ul style="list-style-type: none"> • IRR Preliminary Report 	Signature:

– END –

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