

INSTRUMENT READINESS REVIEW

OF

NSLS-II 7-ID SPECTROSCOPY SOFT AND TENDER (SST) INSERTION DEVICE AND FRONT END

November 8, 2017



NSLSII-7ID-RPT-001



An Instrument Readiness Review (IRR) of the 7-ID Spectroscopy Soft and Tender (SST) Front End and Insertion Device was conducted on November 8th, 2017 with NSLS II staff. The team agreed on one pre-start finding concerning documenting the requirements for the U42 insertion device beacon operation, four post-start findings, and a range of observations and recommendations for improvement.

INSTRUMENT READINESS REVIEW
OF
NSLS-II 18-ID FULL FIELD X-RAY IMAGING (FXI) BEAMLINE
AND
FRONT END

TEAM MEMBERS

TEAM LEAD	 _____ Lee Hammons	<u>1/9/18</u> DATE
MEMBER	 _____ Mario Cubillo	<u>1/8/18</u> DATE
MEMBER	 _____ Asher Etkin	<u>1/9/18</u> DATE
MEMBER	 _____ Richard Farnsworth	<u>1/8/18</u> DATE
MEMBER	 _____ Raymond Filler	<u>1/9/18</u> DATE
MEMBER	 _____ Thomas Nehring	<u>1/8/18</u> DATE
MEMBER	 _____ Alena Stavitski	<u>1/8/18</u> DATE
MEMBER	 _____ Andrew Walter	<u>1/8/18</u> DATE

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SUMMARY

This report provides a summary of the Instrument Readiness Review (IRR) completed at the Brookhaven National Laboratory (BNL) National Synchrotron Light Source II (NSLS-II) for the 7-ID Spectroscopy Soft and Tender (SST) front end and insertion device. The IRR is a structured method for comprehensively verifying that the hardware, procedures, personnel, and processes needed for beamline commissioning are ready to permit these activities to be undertaken in a safe, effective, and environmentally sound manner. A team of BNL Subject Matter Experts was assembled to complete this review. The team members are identified in section 1.4.

The scope of this review was defined in Instrument Readiness Plans (IRP) developed specifically for 7-ID (NSLSII-7ID-PLN-001). This document was developed to assure completion of the documentation, hardware, procedures, and personnel qualification requirements associated with installation and the planned commissioning of these insertion devices and front end.

The review team met on 8 November 2017 to receive presentations delivered by NSLS-II staff discussing the scientific and technical features of the insertion devices and front end as well as their readiness for commissioning. These presentations were followed by a tour of the insertion device and front end for visual inspection. The method of the review was to sample enough elements representing the processes, equipment, and personnel qualifications necessary to assure the safe and effective commissioning of these devices and verify the readiness of the facilities based on the plan developed by NSLS-II.

The team concluded that there was one pre-start finding regarding the documentation of a warning beacon for the U42 undulator insertion device. The team found that the beacon was not behaving in a manner that was expected, and, after inquiry, it was explained that the logic for the beacon should cause the green lamp to illuminate on power-up if the device is ready. The team found that the requirements for the operation of the beacon were not clearly documented.

In addition, the team also agreed on four post-start findings. One of these findings concerned the e-stop for the EPU-60 control panel. The team found that there was no yellow ring behind the actuator of the e-stop as required to conform with the NFPA-79 Electrical Standard for Industrial Machinery.

Another post-start finding concerned inconsistent dates found on front-end utility leak-test reports. Although the authorized inspector (third-party witness) should sign at the same or a later time than the department representative, it was found that, in some instances, this was not the case. Furthermore, the team found that the design pressure or the maximum allowable working pressure (MAWP) was not filled out in two out of three forms examined. Although the test pressures used were correct, for documentation purposes, the form should be filled out completely and accurately. The team also observed that this is a recurring issue despite improvements in practices overall at NSLS-II.

Furthermore, the team concluded as a post-start finding that several travelers were found to be incomplete. In particular, travelers were found to occasionally be missing dates or data. Some cross-outs on the travelers were not made in red as required and, in some cases, the changes were not initialed. Also, attachments to travelers were found not to always meet the requirements for controlled documents, e.g., pages were sometimes not numbered and did not always make proper reference to the associated travelers number or its title. The team found that documentation was missing for one traveler, and, in several cases, the required information, including the data and other pertinent information were found to be missing for several travelers. These errors are also noted as a post-start finding.

Lastly, the team identified as a post-start finding that the photos used for configuration control do not meet the minimum requirements for an operator aid as defined in the [SBMS Document Control Subject Area](#).

The team made a wide range of observations including opportunities for improvement that are detailed in the report. Among these are:

- Simplify the commissioning procedure to commissioning the IDs and front ends (PS-C-ASD-PRC-166) to include only the steps necessary for commissioning of the front ends and IDs themselves, excluding those steps that involve the accelerator, for example, the lattice.
- Remove the phase 3 radiation surveys because they are not specifically germane to the ID and FE. The phase 3 radiation survey appears to be more important to the operation of the accelerator ring as a whole.
- Develop a formal test plan for incorporating a new ID and FE into the active interlock system.
- Clarify a statement attached to the EPU60 undulator that is confusing because it shows a picture of the device that does not match the appearance of the field-deployed arrangement and requires undue effort to interpret the text on the statement.
- Place at least one of the insertion-device warning signs in a position that is more visible to provide better warning to workers in the vicinity of hazards and restrictions.
- Provide awareness training to ensure that all workers near the undulators understand the warning beacons associated with these devices.
- Label e-stops to more clearly indicate their function.
- Add a link to travelers on the IRR website.
- Better guard or remove the cooling fans on the downstream EPU that protrude beyond the equipment guard.
- Define the term “nominal gap” as used in the document PS-C-ASD-PRC-16.
- Develop formal requirements and procedures for formatting warning signage for insertion devices.

- Secure lexan guards on the U42 undulator in a manner that cannot be easily bypassed to prevent personnel from reaching under or over the guard into the hazard area. Also, consider attaching warning labels to the guards to warn about the pinch hazard.

Finally, the team appreciates working with counterparts that were diligent, thoughtful, and responsive to our questions and concerns. The NSLS-II staff worked hard to fulfill our requests, locate documents, provide additional information as quickly as possible. The team is very grateful for their assistance.

1. INTRODUCTION

1.1. Purpose and Scope of Instrument Readiness Review

The purpose of this Instrument Readiness Review (IRR) was to verify the readiness of the 7-ID Spectroscopy Soft and Tender (SST) front end and insertion device for safe and effective commissioning. The IRR team was charged with ensuring that the required processes, procedures, equipment, and personnel qualifications were adequate and completed in accordance with the readiness plans established by NSLS-II for the insertion devices and front end. The plan is detailed in the following document:

- NSLSII-7ID-PLN-001, *Instrument Readiness Plan (IRP) for the NSLS-II 7-ID (SST) Front End and Insertion Device*

The scope of the review included the 7-ID front end including the sources, comprised of a refurbished U42 undulator as well as an EPU60 undulator, the straight section comprised of the EPU vacuum chamber, permanent canting magnets, beamline instrumentation, and the photon and safety shutter, both of which will remain locked out during commissioning and are not presently connected to the personnel-protection- and equipment-protection-systems.

1.2. Review Process and Method

To verify the readiness of the instruments, the team was guided by the lines of inquiry encapsulated in the Instrument Readiness Plan. The readiness plan is organized into three “pillars” of readiness: documents, hardware and physical plant, and personnel.

A collection of documents was made available to the review team in advance of the review to allow the team to begin inspection. The documents included the readiness plan for the insertion devices and front end; PowerPoint overviews of the beamline and front end including functional descriptions, scientific, and technical goals; radiation survey plans; design documents and drawings; procedures; reports; and checklists.

The review was held for a full day on 8 November. Overviews of the front end and insertion devices were presented to the review team by members of the NSLS-II staff, followed a tour of the front end. The team conducted visual inspections and asked questions during the tour. Members of the teams focused on various functional areas including:

- Accelerator safety
- Beamline design
- Commissioning plans
- Configuration control
- Cryogenic/ODH safety

- Electrical safety
- Equipment protection systems
- Industrial safety
- Instrument controls
- Pressure vessel safety
- Personnel protection systems
- Procedures
- Quality assurance
- Radiological controls and safety

Next, the team conducted interviews with selected NSLS-II staff members and document reviews, sampling as many elements of the processes, procedures, and staff qualifications as possible within the time available to verify the readiness of the instruments according to the instrument readiness plan for the insertion devices and front end. By the end of the review period, the team reported on their final observations, assembling pre- and post-start findings. The team leader collected these findings and prepared a preliminary statement. A written preliminary report followed, and the review culminated with a final report.

1.3. Definitions

1.3.1. Pre-Start Finding:

A condition, deficiency, or performance issue identified in the IRR report that has safety significance or has a substantive impact on any of the attributes, performance requirements, or criteria used to determine startup readiness. Pre-start findings are required to be resolved prior to proceeding with an ARR, commissioning or operations.

1.3.2. Post-Start Finding:

A condition, deficiency, or performance issue identified in the IRR report that has no safety significance and does not have a substantive impact on any of the attributes, performance requirements, or criteria used to determine startup readiness.

1.3.3. Observation:

Areas, components, or processes that were reviewed by the IRR team. Observations constitute objective evidence that may lead to opportunities for improvement, noteworthy practices, pre- or post-start findings. When the observation leads to none of these, it is cited merely in the **Observations** section of the report.

1.3.4. Noteworthy Practices:

Performance that exceeds expectations in terms of efficiency and/or effectiveness and provides a model for others to follow. A noteworthy practice is a positive condition or strength.

1.3.5. Opportunities for Improvement and Recommendations:

A suggested means of improving an activity or fulfilling the intent of a requirement.

1.4. Composition of the IRR Team

The members of the Review Team:

- Lee Hammons, Team Lead, Collider-Accelerator Department
Review Areas: Procedures, Conduct of Operations, Training

- Mario Cubillo, Safety and Health Services Division
Review Areas: Cryogenics/ODH, Industrial Safety, Pressure Safety, Utilities

- Asher Etkin, Collider-Accelerator Department
Review Areas: Experimental Protection System, Personnel Protection System

- Richard Farnsworth, NSLS-II
Review Areas: Controls, Personnel Protection System

- Raymond Filler, NSLS-II
Review Areas: Radiological Controls, Shielding, Radiation Survey Plans, Unreviewed Safety Issues

- Thomas Nehring, Energy and Utilities Division
Review Areas: Electrical Power Distribution, Electrical Equipment Inspection

- Alena Stavitski, Planning, Performance and Quality Management Office
Review Areas: Quality Assurance, Travelers, Training, Verification of Action Closure

- Andrew Walter, NSLS-II
Review Areas: Commissioning Plan, Design, Radiological Controls, Configuration Control, Management

2. FINDINGS/CONCLUSIONS

2.1. Pillar I – Documentation

2.1.1. Pre-Start Finding

2.1.1.1. None.

2.1.2. Post-Start Findings

2.1.2.1. None.

2.1.3. Observations

2.1.3.1. The following ATS action items related to 7-ID front end and insertion device were verified as closed:

- 8053.38.3
- 8053.38.9

The 8053.38.8 action item related to the front end is complete (status open due to open beamline item).

2.1.3.2. The front-end fixed mask FDR was reviewed. Two recommendations were made and no actions were required. (No ATS actions were required.)

2.1.3.3. A spelling mistake was observed in the document PS-C-XFD-SST-BMM-001. In the version control log section and section 3.1 table, the encoders should be labeled as 'Renishaw', not 'Ranashaw'.

2.1.3.4. Discrepancy report was reviewed, all actions are closed.

2.1.3.5. Verified that Centrally-Controlled LOTO applied for both insertion devices as required. Verified that correct logbook entries were made in the Centrally-Controlled LOTO logbook in the control room.

2.1.3.6. Checked radiation safety checklist for pentant 3. All items are called out, labeled, pictured, checked off, and posted in the control room as required. Ray traced were also checked, and no issues were found.

2.1.3.7. The following USI screenings were sampled:

- 7-ID (SST) Front End and Insertion Device/NIST - 23 October 2017
- Review of Ray Tracing Designs of SST (7-ID) Front-ends - 5 October 2017
- DR-1711, SST/BM - The upstream vacuum flange was welded on incorrectly. REWORK - F. DePaola - 13 October 2017
- ECO-0045237 Storage Ring, Insertion Device, SST, EPU60, Initial Release - 4 October 2017

- ECO-005201 Storage Ring, Insertion Device, SST, U42, Initial Release - 4 October 2017. No issues were observed.

2.1.4. Noteworthy Practices

2.1.4.1. None.

2.1.5. Opportunities for Improvement and Recommendations

- 2.1.5.1. Consider defining the term “nominal gap” as used in the document PS-C-ASD-PRC-16. Also note that the terms “height” and “gap” are used interchangeably. Consider using one term or the other for clarity.
- 2.1.5.2. Consider adding a link to the travelers from the IRR website.
- 2.1.5.3. Consider simplifying the procedure to commission the ID's and front ends (PS-C-ASD-PRC-166). The procedure seems overly specific. Suggest removing steps that are not germane to the commissioning of the ID and FR specifically (such as measurement of accelerator lattice parameters, etc.)
- 2.1.5.4. Consider developing a formal test plan for incorporating a new ID and FE into the active interlock system. Note that procedures do exist for verifying the active interlock function.
- 2.1.5.5. Note that the Instrument Readiness Plan for SST (NSLSII-7ID-PLN-001), section 1.2 references the Instrument Readiness Review Procedure (PS-C-ESH-PRC-001). However, the Instrument Readiness Review Procedure has not been reviewed according to the stated frequency. (The procedure is in version 6 with an effective date of 18 September 2014. The review frequency is every 3 years.)
- 2.1.5.6. Consider removing the Phase III radiation surveys. These surveys are not germane to the ID and FE specifically. They are more germane to the operation of the accelerator ring as a whole. The argument may be made that the installation of the ID and FE changes the effective shielding. Though this argument may be valid, there are no equivalent surveys prior to the installation to compare against. In addition, the process of dumping the beam near the ID is not as precise an exercise as would be required to allow for a direct comparison to FLUKA calculations.

2.2. Pillar II – Hardware and Physical Plant

2.2.1. Pre-Start Findings

- 2.2.1.1. **Pre-Start 1 Condition:** The team observed that the status/warning beacon for U42 undulator was in an indeterminate state. Upon observation, it was found that the green lamp was not illuminated even though power to the e-stop was present, and after inquiring, it was determined that the expected behavior required that the green lamp should be illuminated when power is on. The green lamp should only be off when the device is powered off (or green lamp broken), or when a fault or moving state is present (meaning the red and amber lamps should be illuminated, respectively). When the e-stop was pressed, the red lamp illuminated. The team concluded that the U42 device has a broken green lamp or is in an undetermined state.
- **Post-Start 1 Finding:** The beacon for the U42 insertion device is not behaving as expected. The requirements for operation of the beacon are not clearly documented.

2.2.2. Post-Start Findings

- 2.2.2.1. **Post-Start 1 Condition:** The team observed that the photos being used for configuration control of radiation safety components do not meet the minimum requirements for an Operator Aid as defined in the [SBMS Document Control Subject Area](#), including, most notably, dates.
- **Post-Start 1 Finding:** The photos being used for configuration control of radiation safety components do not meet the minimum requirements for an Operator aid as defined in the [SBMS Document Control Subject Area](#).
- 2.2.2.2. **Post-Start 2 Condition:** Inspection of the front-end utilities leak test reports revealed a variety of deficiencies including instances where the dates of the signatories were inconsistent. Authorized inspectors (third-party witnesses) should sign at the same time or a later time than the department representative carrying out the test. In several instances, the signature dates of the inspectors precede the dates of those who conducted the tests leading to inconsistencies. Furthermore, in two out of three forms inspected, the design pressures or maximum allowable working pressures (MAWP) were not filled out completely or accurately although the test pressures were correct. It was noted that this is an issue that has been observed at NSLS-II in past reviews.

- **Post-Start 2 Finding:** The front-end utilities leak test reports showed several inconsistencies in the dates of the signatories and, in two out of three instances, the design pressures or MAWPs were not filled out accurately or completely although the actual pressures used for testing were correct.

2.2.2.3. **Post-Start 3 Condition:** The team observed that the e-stop on the EPU60 control panel should include a yellow ring behind the actuator in conformance with accepted consensus standard NFPA-79 Electrical Standard for Industrial Machinery (see Fig. 1):

- ¶ 10.7.3 Emergency Stop Actuators. Actuators of emergency stop devices shall be colored RED. The background immediately around pushbuttons and disconnect switch actuators used as emergency stop devices shall be colored YELLOW. The actuator of a pushbutton-operated device shall be of the palm or mushroom-head type and shall effect an emergency stop when depressed. The RED/YELLOW color combination shall be reserved exclusively for emergency stop applications.

- **Post-Start 3 Finding:** The e-stop on the EPU60 control panel lacks a yellow ring behind the actuator in conformance with the accepted consensus standard NFPA-79 Electrical Standard for Industrial Machinery.



Figure 1 - Emergency stop button for the EPU60 undulator.

2.2.2.4. **Post-Start 4 Condition:** During the traveler review, several were found to be missing information. Furthermore, corrections to some of the

documents were not properly executed: cross-outs were not in red, and, in some cases, not initialed. Also, the attachments to the travelers did not always meet the requirements for controlled documents; for example, some of the pages were not numbered or did not carry a reference to the traveler (title or ID number).

- **Post-Start 4 Finding:** Several travelers were found to be missing information include dates, data, or indication that a given field on the form was not applicable. In addition, cross outs were not always marked in red and properly initialed. Furthermore, some of the documents attached to the travelers did not have fully numbered pages and references to the travelers including the title of traveler and/or the traveler ID number as required of controlled documents.

2.2.3. Observations

- 2.2.3.1. Observed that X-ray flag has been tested and is designed to retract if beam current rises above 2 mA.
- 2.2.3.2. Observed completed EPS test report.
- 2.2.3.3. Inspected low-voltage cable design and installation. No issues found.
- 2.2.3.4. Inspected as-built schematics for electrical installation. No issues found.
- 2.2.3.5. Inspected high-voltage cable design and installation. No issues found.
- 2.2.3.6. All appropriate electrical components certified by NRTL as required.
- 2.2.3.7. Inspection of conduit installation found no issues.
- 2.2.3.8. Bonding of stands, racks, and cable tray was found to be adequate.
- 2.2.3.9. Labeling of racks and cables was found to be adequate.
- 2.2.3.10. Labeling of hazards was found to be adequate.

2.2.4. Noteworthy Practices

- 2.2.4.1. Cable management was found to be very good.

2.2.5. Opportunities for Improvement and Recommendations

- 2.2.5.1. It was not clear to the review team whether people have received the awareness training necessary to understand the meaning of the beacons that are attached to the undulators. If staff have not been trained on the meaning of the beacons, then consider conducting awareness training.

- 2.2.5.2. Clear lexan guards on U42 undulator are not secured to the machine frame in a manner that is not easily bypassed and does not prevent personnel from easily reaching under or over into the hazard area. If the purpose of the guards is to prevent personnel from reaching into the magnet gap, consider upgrades to these guards to meet minimum standards. Additionally, consider attaching warning labels on the guards to warn about the pinch hazard.
- 2.2.5.3. The statement attached to the EPU60 undulator appears to be confusing. The statement indicates that a magnetic field measurement has been performed and roughly indicates the field around the magnet. However, this picture does not match the appearance of the field-deployed arrangement since the picture seems to have been taken before final installation. Also, actual values obtained from the measurement are confusing and require effort to interpret from the text that appears at the bottom of the report. Recommend a more concise statement of the field measurements be attached to the unit and that the picture be updated to show the present configuration, or the picture should be eliminated.
- 2.2.5.4. At least one of the insertion device warnings was placed in a position that was not obvious. Consider placing the signage in more useful and prominent locations (see Fig. 2).



Figure 2 – Warning sign for insertion device placed in a location that partially obscures sign.

- 2.2.5.5. No labels on e-stops to indicate their function. Consider adding appropriate labeling around the e-stop (see Fig. 1).
- 2.2.5.6. The downstream EPU has cooling fans on the downstream end that protrude beyond the guard, inviting tampering or accidental breakage. Upon discussion with staff members, it was suggested that these fans may not be necessary. Consider removing the fans or guarding them better.
- 2.2.5.7. Observed that there are no formal requirements in procedure for warning signage for insertion devices. Recommend that requirements and formatting for insertion devices be added to NSLS-II procedures.

2.3. Pillar III – Personnel

2.3.1. Pre-Start Findings

- 2.3.1.1. None.

2.3.2. Post-Start Findings

- 2.3.2.1. None.

2.3.3. Observations

- 2.3.3.1. Reviewed training records for staff involved in commissioning. Weekly training status reports reviewed for lead operators, scientific operations, and floor coordinators. Also reviewed training of support staff to ensure sufficient number of staff trained. No issues noted.

2.3.4. Noteworthy Practices

- 2.3.4.1. None.

2.3.5. Opportunities for Improvement and Recommendations

- 2.3.5.1. None.

3. READINESS DETERMINATION

The team has agreed on one pre-start finding that must be resolved prior to commissioning of the 18-ID beamline. This finding concerns the lack of clarity in documenting the requirements for the U42 insertion device beacon operation.

Authorization to begin beamline technical commissioning of 7-ID must await closure of the pre-start items referenced above.

In addition, the IRR team identified several post-start findings and offered several recommendations to enhance the instrument readiness process.

4. SUMMARY OF PRE-START AND POST-START FINDINGS

IDENTIFIER	REVIEW AREA	FINDING
Pre-Start 1	Pillar II – Hardware and Physical Plant: Other Front End Components	Pre-Start 1 Finding: The beacon for the U42 insertion device is not behaving as expected. The requirements for operation of the beacon are not clearly documented.
Post-Start 1	Pillar II – Hardware and Physical Plant: Radiation Safety Components: Configuration Control	Post-Start 1 Finding: The photos being used for configuration control of radiation safety components do not meet the minimum requirements for an Operator aid as defined in the SBMS Document Control Subject Area .
Post-Start 2	Pillar II – Hardware and Physical Plant: Utilities	Post-Start 2 Finding: The front-end utilities leak test reports showed several inconsistencies in the dates of the signatories and, in two out of three instances, the design pressures or MAWPs were not filled out accurately or completely although the actual pressures used for testing were correct.
Post-Start 3	Pillar II – Hardware and Physical Plant: Other Front End Components	Post-Start 3 Finding: The e-stop on the EPU60 control panel lacks a yellow ring behind the actuator in conformance with the accepted consensus standard NFPA-79 Electrical Standard for Industrial Machinery.
Post-Start 4	Pillar II – Hardware and Physical Plant: Other Front End Components	Post-Start 4 Finding: Several travelers were found to be missing information including dates, data, or indication that a given field on the form was not applicable. In addition, cross outs were not always marked in red and properly initialed. Furthermore, some of the documents attached to the travelers did not have fully numbered pages and references to the travelers including the title of traveler and/or the traveler ID number as required of controlled documents.

APPENDIX A CHARGE AND REVIEW TEAM

NOVEMBER 2, 2017

NSLS II IRR READINESS TEAMS: 7-ID FRONT END & IDs

ACKERMAN

Review Team

Charge:

The review team is charged with verifying readiness to begin technical commissioning of the instruments listed above through review of documentation, physical instrument inspection, and personnel interviews. Scope specifics are defined in the Instrument Readiness Plan.

The assigned topics below are to provide review structure. Review team members are encouraged to collaborate on all of the readiness criteria.

Members and assigned topics:

Mario Cubillo

- Cryo/ODH; utilities; industrial safety; vacuum

Asher Etkin

- EPS and PPS

Richard Farnsworth

- Controls; PPS

Ray Filler

- Radiological controls; shielding; radiation survey plans; USI

Lee Hammons

- Team leader

Thomas Nehring

- Electrical power distribution; EEI

Alena Stavitski

- QA; travelers; training; verify action closure

Andrew Walter

- Commissioning plan; design; radiological controls; configuration control; management

Readiness Preparation Team

Ackerman, Andrew
Amundsen, Christopher
Bassan, Harmanpreet
Bebon, Michael
Benmerrouche, Mo
Boerner, Al
Broadbent, Andrew
Buckley, Michael
Carlucci-Dayton, Mary
Cheswick, Ed
Chitra, Sunil
Chmiel, Robert
Doom, Lewis

Fischer, Dan
Filler, Raymond
Fries, Gregory
Ganetis, George
Gosman, John
Heneveld, Brian
Hetzl, Charles
Jaye, Cherno
Lee, Robert
Lein, Bruce
Loftus, Mike
McDonald, Tom
Moss, Steven

Padrazo, Danny
Rank, James
Rubino, Kristen
Shaftan, Timur
Sharma, Sushil
Shoemaker-Skokov, Ashley
Stebbins, Christopher
Stiegler, Lori
Tanabe, Toshiya
Todd, Robert
Wang, Guimei
Zhong, Zhong

APPENDIX B REVIEW AGENDA

AGENDA

MEETING DATE: NOVEMBER 8, 2017

NSLS II IRR: 7-ID FRONT END & IDs

ACKERMAN

Review Scope: This meeting time is scheduled for completion of an Instrument Readiness Review for the subject instrument. A detailed scope is defined in Instrument Readiness Plan.

LOB3, Rm. 156

08:30 – 09:00	Review Team Executive Session	Review Team
09:00 – 09:45	FE & IDs Overview	All
09:45 – 10:00	Break	All
10:00 – 11:00	Tour	Review Team Amundsen, Bassan, Broadbent, Doom, Fries, Ganetis, Padrazo, Tanabe, Gosman. (All are welcome)
11:00 – 12:00	Discussion, document review, interviews	Review Team NSLS II staff as needed
12:00 – 1:00	Lunch (no host)	All
1:00 – 3:00	Discussion, document review, interviews	Review Team NSLS II staff as needed
3:00 – 4:00	Review Team Executive Session	Review Team
4:00 – 4:30	Close-Out with pre-start findings	All

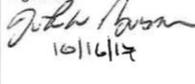
APPENDIX C READINESS PLAN FOR 7-ID

READINESS CRITERIA		RESPONSIBLE PERSON	ACTIONS	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*
PILLAR I DOCUMENTATION (PLANNING & PROCEDURES)	Functional Description An overview presentation is prepared that defines the scope of the IRR and includes the following FE and ID specific information: <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 	G. Fries Accelerator Division Liaison Engineer	<ul style="list-style-type: none"> • Develop the presentation described for the FE and ID 	FE and ID: • Presentation	Signature: <i>G. Fries</i> 11/7/17
	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> .	Front End: S. Sharma Mechanical Engineering Group Leader ID: T. Tanabe ID Group Leader	<ul style="list-style-type: none"> • Complete Engineering Design Reviews for the Mirror, FE and ID that address thermal management, mechanical support, configuration control, and vacuum 	FE and ID: • Requirements, Specifications, and Interface report (RSI) • Internal design review documents	Signature: <i>S. Sharma</i> 10/20/17 Signature: <i>T. Tanabe</i> 11/1/2017
	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> .	C. Amundsen Mechanical Engineer	<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 	Signature: <i>C. Amundsen</i> 10/20/17
PILLAR I DOCUMENTATION (PLANNING & PROCEDURES)	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>	C. Amundsen Mechanical Engineer	<ul style="list-style-type: none"> • Prepare the Ray Traces for the FE 	<ul style="list-style-type: none"> • Approved Primary Bremsstrahlung Ray Traces • Approved Maximum Synchrotron Ray Traces 	Signature: <i>C. Amundsen</i> 10/20/17
	Unreviewed Safety Issue (USI) Evaluations/Screenings Authorization basis hazard identification is managed through USI evaluation/screening.	S. Moss Authorization Basis Manager	<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 	Signature: <i>Steven Moss</i> 10/23/17
	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.	E. Cheswick QA Engineer	<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 	Signature: <i>E. Cheswick</i> 10/20/17 NOTE 8053.38.8 Complete for the FE, but remains open for Bk actions.

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

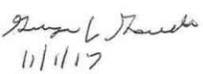
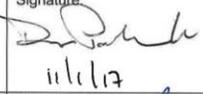
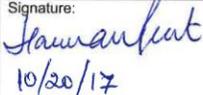
Instrumentation Readiness Review of NSLS-II 7-ID Spectroscopy Soft and Tender (SST) Insertion Device and Front End

	READINESS CRITERIA	RESPONSIBLE PERSON	ACTIONS	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*
PILLAR I DOCUMENTATION (PLANNING & PROCEDURES)	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.	K. Rubino Procedure Support	<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 Procedures Mirror Procedure: <ul style="list-style-type: none"> Opening & closing Gallium refilling Evacuating Baking 	Signature:  10/24/17
	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> .	G. Wang Accelerator Coordination Group Leader	<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) 	Signature:  10/31/2017
	Radiation Survey Procedures 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.	M. Benmerrouche Radiation Physicist	<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) 	Signature:  10/26/2017

	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.	C. Amundsen Mechanical Engineer	<ul style="list-style-type: none"> Generate and execute Top Level Traveler 	FE: <ul style="list-style-type: none"> Completed Traveler 	Signature:  10/20/17
	Radiation Safety Components: Configuration Control A Radiation Safety Component Checklist template is generated in accordance with NSLSII-ESH-PRC-004, <i>NSLS-II 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:  Greg Fies for Lewis Doom 11/1/17
	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:  10/31/17
	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 	<ul style="list-style-type: none"> Approved system schematics System pressure testing reports 	Signature:  10/16/17

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Instrumentation Readiness Review of NSLS-II 7-ID Spectroscopy Soft and Tender (SST) Insertion Device and Front End

READINESS CRITERIA		RESPONSIBLE PERSON	ACTIONS	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*
PILLAR II OTHER HARDWARE (INSTALLATION)	Other Front End Components All FE components that are not radiation safety components are installed and tested in accordance with the Travelers.	C. Amundsen Mechanical Engineer	<ul style="list-style-type: none"> • Generate Traveler and drawing • Execute Traveler • Perform pressure test 	FE: <ul style="list-style-type: none"> • Completed Traveler • System pressure testing reports 	Signature:  10/20/17
		J. Rank Insertion Devices Engineer	<ul style="list-style-type: none"> • Generate Traveler and drawing • Execute Traveler 	ID: <ul style="list-style-type: none"> • Completed Traveler 	Signature:  11/1/17
	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.	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:  11/1/17
	Controls and Diagnostics Hardware/Software installed and tested in accordance with NSLS-II requirements.	D. Padrazo Deputy Instrumentation Group Leader	<ul style="list-style-type: none"> • Test system performance • Complete integral testing 	FE: <ul style="list-style-type: none"> • Performance and integral testing checklist 	Signature:  11/1/17
H. Bassan Controls Group Engineer		<ul style="list-style-type: none"> • Test system performance • Complete integral testing 	ID: <ul style="list-style-type: none"> • Performance and integral testing documentation 	Signature:  10/20/17	

READINESS CRITERIA		RESPONSIBLE PERSON	ACTIONS	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*
PILLAR II OTHER HARDWARE (INSTALLATION)	Vacuum Vacuum hardware has been installed and tested in accordance with the Traveler and has the capability of achieving full vacuum needed during commissioning.	C. Hetzel Vacuum Group Leader	<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 • Completed Mirror Traveler 	Signature:  11/1/17

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Instrumentation Readiness Review of NSLS-II 7-ID Spectroscopy Soft and Tender (SST) Insertion Device and Front End

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	• Train Operators	• BTMS record	Signature: <i>Bruce Lein</i> 11-1-17
	Support Staff Staff needed to support FE and ID commissioning.	B. Lein Training Group Leader	• Identify Support Staff • Assign JTAs and train	• BTMS record that sufficient number of staff are trained to support commissioning	Signature: <i>Bruce Lein</i> 11-1-17

* READINESS CERTIFICATION	S. Sharma - Mechanical Engineering Group Leader	Signature: <i>S. Sharma</i> 11/1/17
* READINESS CERTIFICATION	T. Tanabe - Insertion Devices Group Leader	Signature: <i>T. Tanabe</i> 11/1/2017

READINESS CRITERIA		RESPONSIBLE PERSON	DOCUMENTED EVIDENCE	CERTIFICATION OF READINESS*
IRR PRE-START FINDINGS	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	• ATS	Signature:
		A. Stavitski Independent Verifier		
	Pre-start Actions Complete All actions associated with the 7-ID FE and ID IRR pre-start findings are completed and the ATS Actions are closed.	T. Shaftan IRR Technical Authority	• ATS	Signature:
	Pre-start Actions Verified All actions associated with the 7-ID FE and ID IRR pre-start findings have been verified complete.	R. Lee ESH Manager	• ATS	Signature:
	Pre-start Actions Independently Verified Actions associated with the 7-ID FE and ID IRR pre-start findings have been satisfactorily completed.	A. Stavitski Independent Verifier	• IRR Preliminary Report	Signature:

- END -

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

APPENDIX D
IRR PRELIMINARY REPORT

NSLS II BROOKHAVEN NATIONAL LABORATORY	Prepared by: Lee Hammons <i>LH</i> 11/9/2017

TITLE:

IRR Preliminary Report
7-ID Spectroscopy Soft and Tender (SST) Front End and Insertion Device

REVIEWERS:

M. Cubillo, A. Etkin, R. Farnsworth, R. Filler, L. Hammons, T. Nehring, A. Stavitski, A. Walter

DISTRIBUTION:

Reviewers listed above.

A. Ackerman, A. Broadbent, M. Bebon, G. Fries, E. Johnson, J. Hill, R. Lee, H. Robinson, K. Rubino, T. Shaftan, S. Sharma, Q. Shen, G. Wang, P. Zschack

The IRR Team has completed the on-site readiness review and document analysis for the subject instrument. This report provides preliminary status for the pre-start findings identified.

The Review Team identified one pre-start finding for the 7-ID front end:

- **Finding:** The beacon for the U42 insertion device is not behaving as expected. The logic for the beacon should cause the green lamp to illuminate on power-up if the device is ready. The requirements for operation of the beacon are not clearly documented.

Authorization to begin beamline technical commissioning of 7-ID (SST) must wait for closure of the pre-start item described above.

Post-start findings and observations will be detailed in a final IRR report.