

# EQUIPMENT READINESS PLAN (ERP)

FOR THE

## NSLS-II 23-ID-1 (CSX) HOLOGRAPHY CHAMBER



AUGUST 2018

NSLSII-23ID1-PLN-002

PREPARED BY

BROOKHAVEN NATIONAL LABORATORY  
P.O. BOX 5000  
UPTON, NY 11973-5000

MANAGED BY

BROOKHAVEN SCIENCE ASSOCIATES

FOR THE

U.S. DEPARTMENT OF ENERGY  
OFFICE OF SCIENCE BASIC ENERGY SCIENCE  
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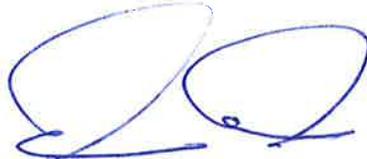
# EQUIPMENT READINESS PLAN (ERP)

FOR THE

## NSLS-II 23-ID-1 (CSX) HOLOGRAPHY CHAMBER

AUGUST 2018

PREPARED BY:



9/20/2018

A. Ackerman, Equipment Readiness Coordinator

APPROVED AS A PLAN TO ACHIEVE READINESS BY:



9/20/2018

S. Wilkins, ERP Manager

CONCURRENCE BY:



9-24-18

R. Lee, ESH Manager

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



9/25/18

S. Wilkins, ERP Manager

CONCURRENCE BY:



9-25-18

R. Lee, ESH Manager



**REVISION HISTORY LOG**

| <b>REVISION</b> | <b>DESCRIPTION</b> | <b>DATE</b> |
|-----------------|--------------------|-------------|
| 1               | Initial Issue      | AUGUST 2018 |



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Attachment C, *Pillar III Personnel, 23-ID-1 (CSX) Chamber*

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



## 1.0 INTRODUCTION

### 1.1 Purpose and Scope

The purpose of this Equipment Readiness Plan (ERP) is to establish the readiness criteria required to declare the NSLS-II 23-ID-1 (CSX) Chamber ready for operations. The scope of this ERP includes the new holography of 23-ID Beamline and associated equipment, including a new electromagnet, and was prepared in accordance with NSLSII-23ID1-PLN-001, *Tailored Instrument Readiness Reviews Plan*.

This ERP will be used as a tool for planning and certifying readiness. The completion of this ERP 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 23-ID-1 Beamline: New Holography Chamber

The 23-ID Beamlines consist of 23-ID-1 (CSX) and 23-ID-2 (IOS). The new chamber will be located at the end of current CSX beamline and connected to the current downstream Diagnostic chamber. The upstream chambers will be in place but will be used as a transport pipe to propagate the beam to the CSX holography chamber when taking x-ray beam using this chamber.

The new chamber is based on an 8" 5-way cross with fast CCD detector in-line and in-vacuum electromagnet for an in-situ magnetic field. Top port is connected with a manipulator for sample transfer, upstream port is connected to the end of current beamline, downstream port is connected to fast CCD camera in transmission geometry, two side-ports are for in-vacuum magnet installation and a Pfeiffer HiPace 400 turbo molecular pump (TMP). The detector for this new chamber is a fast CCD camera, which is an identical one as the one used in current TARDIS chamber and will be operated in same way. In-vacuum magnet is new component and fabricated in house, magnet coils by superconducting magnetic division and magnetic core by central shops.

### 1.3 Equipment Readiness Review (ERR)

As part of the verification of readiness for commissioning, an ERR is required in accordance with *Instrument Readiness Reviews* (NSLSII-DPT-PDN-008). An independent ERR Team will use the readiness criteria developed as part of this ERP to verify that the 23-ID-1 (CSX) Chamber is ready for operations. Pre-start and post-start findings will be identified by the team.



### **1.4 Authorization to Proceed with Commissioning**

The completion of this ERP, together with closure of any pre-start findings from the ERR, is used as the basis for the NSLS-II Director to authorize the start of operations with the 23-ID-1 (CSX) Chamber.

## **2.0 EQUIPMENT READINESS PLAN**

### **2.1 Readiness Criteria**

Readiness criteria are provided in Attachments A through D. The criteria were developed by the Equipment Readiness Coordinator (ERC) 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 Reviews* (NSLSII-DPT-PDN-008).

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 ERP IMPLEMENTATION**

### **3.1 ERP Team**

An ERP Team will be appointed by the NSLS-II Director in accordance with *Instrument Readiness Reviews* (NSLSII-DPT-PDN-008). The ERP Team members that have responsibility for completing the ERP are listed as the Responsible Person in the Attachments.

### **3.2 Achieving Readiness – Responsibilities**

The ERP Team members are responsible for ensuring that their specific readiness criteria are achieved.

The Lead Project Scientist is responsible for certifying that all of the readiness criteria associated with the chamber is achieved.



### **3.3 Execution of the ERP**

The ERP Team members shall execute this ERP by preparing, installing, documenting, or training (as appropriate), the specific scope of work (readiness criteria) assigned to them as listed in the Attachments. The ERP 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 ERP Team members will certify that the criteria for which they are responsible for are complete by signing and dating the Attachments in the appropriate section. The Attachments shall not be signed until the readiness criteria have been fully achieved.

For completion of the ERR pre-start findings, if identified, the ERP Manager and the ESH Manager will certify that all ERR pre-start findings relative to the 23-ID-1 (CSX) Chamber have been completed, and that the associated ATS Actions have been closed by signing and dating Attachment D in the appropriate section. The Independent Verifier will concur that these actions have been adequately completed and closed by signing and dating Attachment D in the appropriate section.



**ATTACHMENT A – PILLAR I DOCUMENTATION**

**23-ID-1 (CSX) CHAMBER**

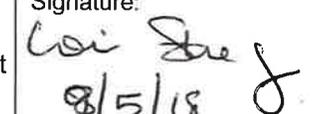
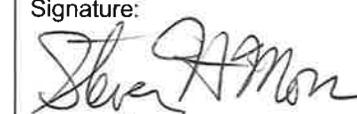
|   | <b>READINESS CRITERIA</b>   | <b>RESPONSIBLE PERSON</b>                              | <b>ACTIONS</b>   | <b>DOCUMENTED EVIDENCE</b>   | <b>CERTIFICATION OF READINESS*</b>  |
|---|---|--|--|--|---|
| <b>PILLAR I DOCUMENTATION (PLANNING &amp; PROCEDURES)</b> | <p><b>Functional Description</b><br/>An overview presentation is prepared that defines the scope of the ERR and includes the following information:</p> <ul style="list-style-type: none"> <li>- Primary capabilities</li> <li>- Physical layout and location</li> <li>- Design reviews and performance parameters</li> <li>- Source characteristics</li> <li>- Photon beam performance goals</li> <li>- Radiation Safety Committee reviews</li> <li>- Self-identified pre-start findings</li> <li>- Description and status for each item listed in the Equipment Readiness Plan</li> </ul> | <p align="center">W. Hu<br/>Lead Project Scientist</p> | <ul style="list-style-type: none"> <li>• Develop the presentation and document described for the beamline</li> </ul>   | <ul style="list-style-type: none"> <li>• Presentation</li> <li>• Functional Description Document</li> </ul>              | <p>Signature:</p> <p align="center"><i>Wen Hu</i></p> <p align="center">9/25/18</p>       |
|   | <p><b>Chamber Design</b><br/>Components are designed in accordance with NSLSII-DPT-PDN-006, <i>Engineering Design for NSLS-II Structures, Systems and Components (SSCs)</i></p>   | <p align="center">W. Hu<br/>Lead Project Scientist</p> | <ul style="list-style-type: none"> <li>• Complete Engineering Design Reviews that address thermal management, mechanical support, configuration control, and vacuum</li> </ul> | <ul style="list-style-type: none"> <li>• Internal and contractor supplied design review documents and reports</li> </ul> | <p>Signature:</p> <p align="center"><i>Wen Hu</i></p> <p align="center">9/12/18</p>       |
|   | <p><b>Radiation Safety Components Design</b><br/>Radiation Safety Components are designed in accordance with NSLS-II requirements.</p>  | <p align="center">D. Bacescu<br/>Program Engineer</p>  | <ul style="list-style-type: none"> <li>• Complete requirements analysis and design of radiation safety components (beam stop)</li> </ul>                                       | <ul style="list-style-type: none"> <li>• Internal design review documents and reports</li> <li>• RSC Report</li> </ul>   | <p>Signature:</p> <p align="center"><i>D. Bacescu</i></p> <p align="center">9/24/2018</p> |

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



**ATTACHMENT A – PILLAR I DOCUMENTATION**

**23-ID-1 (CSX) CHAMBER**

| READINESS CRITERIA  |   | RESPONSIBLE PERSON                         | ACTIONS   | DOCUMENTED EVIDENCE   | CERTIFICATION OF READINESS*   |
|---|---|--|---|---|---|
| <b>PILLAR I<br/>DOCUMENTATION<br/>(PLANNING &amp; PROCEDURES)</b> | <p><b>Secondary Radiation Scatter Analysis</b><br/>Secondary Bremsstrahlung and Synchrotron scatter is analyzed in accordance with LT-C-ESH-STD-001, <i>Guidelines for the NSLS-II Beamline Radiation Shielding Design</i>.</p>                       | M. Benmerrouche<br>Radiation Physicist     | <ul style="list-style-type: none"> <li>Complete GB and SR analysis</li> </ul>   | <ul style="list-style-type: none"> <li>BNL Technical Note Report</li> </ul>   | Signature:<br><br>09/05/2018 |
|   | <p><b>National Environmental Protection Act (NEPA) Evaluation</b><br/>NEPA requirements evaluation completed.</p>   | L. Stiegler<br>ESH Operations Group Leader | <ul style="list-style-type: none"> <li>Complete a NEPA evaluation</li> </ul>  | <ul style="list-style-type: none"> <li>NEPA evaluation report</li> </ul>  | Signature:<br><br>8/5/18     |
|   | <p><b>Unreviewed Safety Issue (USI) Evaluations/Screenings</b><br/>Authorization basis hazard identification is managed through USI evaluation/screening.</p>   | S. Moss<br>Authorization Basis Manager     | <ul style="list-style-type: none"> <li>Verify that the SAD and ASE accurately cover the hazards associated with the chamber; including temporary systems</li> </ul> | <ul style="list-style-type: none"> <li>SAD and ASE USI screenings/evaluations</li> <li>Applicable waivers based on prior Beamline Authorization and following USI Screenings Per new additions</li> </ul> | Signature:<br><br>07/27/18   |
|   | <p><b>Resolution of Open Action Tracking System (ATS) Actions</b><br/>All action items from previous internal and external oversight groups (e.g., RSC, Design Reviews, etc.) have been closed.<br/><br/>Previous IRR action items are addressed.</p> | J. Zipper<br>QA Engineer                   | <ul style="list-style-type: none"> <li>ATS action items for the chamber shown as closed with supporting evidence</li> </ul>   | <ul style="list-style-type: none"> <li>ATS System</li> </ul>  | Signature:<br><br>9/18/18  |

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



**ATTACHMENT A – PILLAR I DOCUMENTATION**

**23-ID-1 (CSX) CHAMBER**

| READINESS CRITERIA  |  | RESPONSIBLE PERSON              | ACTIONS   | DOCUMENTED EVIDENCE  | CERTIFICATION OF READINESS*  |
|---|--|---------------------------------|---|--|--|
| <b>PILLAR I<br/>DOCUMENTATION<br/>(PLANNING &amp; PROCEDURES)</b> | <p><b>Procedures</b><br/>Procedures needed for safe, secure, and environmentally sound commissioning have been developed, reviewed, validated (where applicable), and approved. Existing procedures are sufficient for new hazards introduced by this chamber, if any.</p> | K. Rubino<br>Procedure Support  | <ul style="list-style-type: none"> <li>Develop any system specific procedures/work instructions</li> <li>Verify that existing procedures are sufficient for any new hazards introduced</li> </ul> | <ul style="list-style-type: none"> <li>23-ID Radiological Interlock Test Procedure</li> </ul>  | Signature:<br><br>9/10/18   |
|   | <p><b>Experiment Safety Review (ESR)</b><br/>An Experiment Safety Review has been submitted, executed and approved within the BNL ESR system.</p>  | W. Hu<br>Lead Project Scientist | <ul style="list-style-type: none"> <li>Complete submission and pursue approval of an Experiment Safety Review through use of the BNL electronic system</li> </ul>                                 | <ul style="list-style-type: none"> <li>Approved BNL ESR</li> </ul>   | Signature:<br><br>9-12-18   |
|   | <p><b>Proposal Allocation Safety &amp; Scheduling (PASS)</b><br/>The instrument is active within PASS with approvals to proceed with Technical Commissioning.</p>  | W. Hu<br>Lead Project Scientist | <ul style="list-style-type: none"> <li>Assure that PASS is configured to administer the instrument</li> </ul>   | <ul style="list-style-type: none"> <li>Defined resource within PASS</li> <li>Submitted Technical commissioning proposal</li> <li>Submitted Safety Approval Form</li> </ul> | Signature:<br><br>9-12-18 |

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**ATTACHMENT B – PILLAR II HARDWARE**

**23-ID-1 (CSX) CHAMBER**

| READINESS CRITERIA   |  | RESPONSIBLE PERSON  | ACTIONS  | DOCUMENTED EVIDENCE  | CERTIFICATION OF READINESS*                             |
|--|--|---|--|--|---|
| <b>PILLAR II<br/>SAFETY CRITICAL HARDWARE<br/>(INSTALLATION)</b> | <p><b>Radiation Safety Components: Installation</b><br/>Radiation safety components are installed in accordance with the assembly drawing.</p>   | <p>W. Hu<br/>Lead Project Scientist</p>                       | <ul style="list-style-type: none"> <li>• Install in accordance with assembly drawing</li> <li>• Confirm mechanical survey data meets design documents specifications</li> </ul>        | <ul style="list-style-type: none"> <li>• Assembly Drawing</li> <li>• Survey Report</li> <li>• <del>Discrepancy Reports</del><br/>Traveler<br/>9/19/18</li> </ul> | <p>Signature:<br/><br/>Wen Hu<br/>9/25/18</p>           |
|  | <p><b>Radiation Safety Components: Configuration Control</b><br/>Update the current Radiation Safety Component Checklist template in accordance with NSLSII-ESH-PRC-004, <i>Radiation Safety Component Inspection Procedure</i>.</p> | <p>W. Hu<br/>Lead Project Scientist</p>                       | <ul style="list-style-type: none"> <li>• Update Radiation Safety Component Checklist</li> </ul>  | <ul style="list-style-type: none"> <li>• Approved beamline specific Radiation Safety Component Checklist with RSC review</li> </ul>                              | <p>Signature:<br/><br/>Wen Hu<br/>9-12-18</p>           |
|  | <p><b>Personnel Protection System (PPS) Interlocks: Installed and Certified</b><br/>Hardware/Software installed in accordance with PS-C-XFD-SPC-PPS-001, <i>Beamline Personnel Protection System (BLPPS) Design Description</i>.</p> | <p>G. Ganetis<br/>Electrical Engineering<br/>Group Leader</p> | <ul style="list-style-type: none"> <li>• Generate system schematics and logic diagrams</li> <li>• Install PPS components</li> <li>• Certify PPS</li> </ul>                             | <ul style="list-style-type: none"> <li>• Overall PPS Checklist</li> <li>• Executed Beamline Radiological Interlock Test Checklist</li> </ul>                     | <p>Signature:<br/><br/>George L Ganetis<br/>9/20/18</p> |
|  | <p><b>Electrical Power</b><br/>SBMS electrical power distribution requirements are satisfied. SBMS Electrical Equipment Inspection (EEI) requirements are satisfied.</p>   | <p>G. Ganetis<br/>Electrical Engineering<br/>Group Leader</p> | <ul style="list-style-type: none"> <li>• Generate and approve one-line drawings</li> <li>• Complete system electrical inspection</li> <li>• Complete needed EEI inspections</li> </ul> | <ul style="list-style-type: none"> <li>• Approved AC Power one-line drawings</li> <li>• EEI database entries</li> </ul>  | <p>Signature:<br/><br/>George L Ganetis<br/>9/24/18</p> |

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



**ATTACHMENT B – PILLAR II HARDWARE**

**23-ID-1 (CSX) CHAMBER**

| READINESS CRITERIA   |  | RESPONSIBLE PERSON                                | ACTIONS  | DOCUMENTED EVIDENCE   | CERTIFICATION OF READINESS*  |
|--|--|---|--|---|--|
| <b>PILLAR II<br/>SAFETY CRITICAL HARDWARE<br/>(INSTALLATION)</b> | <b>Utilities</b><br>Permanent facility and beamline utility systems are installed and tested (i.e., Compressed Air, DI Water, Gaseous Nitrogen, Process Chilled Water) in accordance with design, labeling, and attachment requirements. | J. Gosman<br>Mechanical Utilities<br>Group Leader | <ul style="list-style-type: none"> <li>• Generate system schematics</li> <li>• Perform pressure test</li> <li>• Assure SBMS and NSLS-II labeling and hardware attachment requirements are met</li> </ul> | <ul style="list-style-type: none"> <li>• Approved system schematics</li> <li>• System pressure testing reports</li> </ul> | Signature:<br><br>9-24-18 |
|  |  | W. Hu<br>Lead Project<br>Scientist                |  |   | <br>9/25/18               |

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**ATTACHMENT B – PILLAR II HARDWARE**

**23-ID-1 (CSX) CHAMBER**

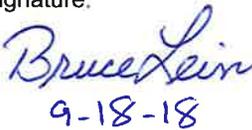
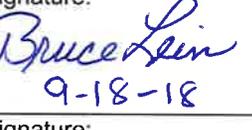
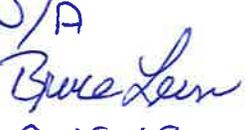
| READINESS CRITERIA                                     |   | RESPONSIBLE PERSON                 | ACTIONS   | DOCUMENTED EVIDENCE   | CERTIFICATION OF READINESS*   |
|--|---|------------------------------------|---|---|---|
| <b>PILLAR II<br/>OTHER HARDWARE<br/>(INSTALLATION)</b> | <b>Equipment Protection System (EPS) Interlocks</b><br>Hardware/Software installed and tested in accordance with the Traveler.  | G. Bischof<br>Controls Engineer    | <ul style="list-style-type: none"> <li>• Generate and execute Traveler</li> <li>• Verify EPICS integration</li> <li>• Generate Test Report</li> </ul>                   | <ul style="list-style-type: none"> <li>• Test Report</li> <li>• Completed Traveler</li> </ul>           | Signature:<br>             |
|  | <b>Controls</b><br>Hardware/Software installed and tested in accordance with NSLS-II requirements.  | J. Sinsheimer<br>Controls Engineer | <ul style="list-style-type: none"> <li>• Test system performance</li> <li>• Complete integral testing</li> </ul>  | <ul style="list-style-type: none"> <li>• Performance and integral testing documentation</li> </ul>      | Signature:<br>             |
|  | <b>Vacuum</b><br>Vacuum hardware has been installed and tested in accordance with the Traveler and has the capability of achieving full vacuum needed during commissioning. | R. Todd<br>Vacuum Engineer         | <ul style="list-style-type: none"> <li>• Generate and execute Top Level Traveler</li> <li>• Identify overpressure devices</li> <li>• Test system performance</li> </ul> | <ul style="list-style-type: none"> <li>• Completed Top Level Traveler</li> <li>• Test Report</li> </ul> | Signature:<br><br>9/24/18 |

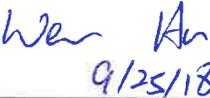
\*Signature certifies that the readiness criteria are met. The Responsible Person shall not sign prior to completion.



**ATTACHMENT D – COMPLETION OF IRR PRE-START FINDINGS**

**23-ID-1 (CSX) CHAMBER**

| READINESS CRITERIA          |  | RESPONSIBLE PERSON               | ACTIONS  | DOCUMENTED EVIDENCE   | CERTIFICATION OF READINESS*   |
|-----------------------------|--|----------------------------------|--|---|---|
| <b>PILLAR III PERSONNEL</b> | <b>Lead Beamline Scientist (LBS) / Cognizant Space Manager (CSM)</b><br>LBS and CSM personnel are assigned and Trained/Qualified.  | B. Lein<br>Training Group Leader | <ul style="list-style-type: none"> <li>Assign JTA for LBS and CSM</li> </ul> | <ul style="list-style-type: none"> <li>BTMS record</li> </ul>   | Signature:<br><br>9-18-18                |
|                             | <b>Authorized Beamline Staff</b><br>Sufficient personnel to begin operations are assigned and Trained/Qualified.   | B. Lein<br>Training Group Leader | <ul style="list-style-type: none"> <li>Assign JTA</li> </ul>                 | <ul style="list-style-type: none"> <li>BTMS record</li> <li>Sufficient Staff Documentation <i>N/A BX</i></li> </ul> | Signature:<br><br>9-18-18                |
|                             | <b>Support Staff</b><br>Other, non-beamline dedicated personnel needed to perform operations (e.g., Beamline Engineers and Controls Personnel) are assigned and Trained/Qualified.   | B. Lein<br>Training Group Leader | <ul style="list-style-type: none"> <li>Assign JTA</li> </ul>                 | <ul style="list-style-type: none"> <li>BTMS record</li> </ul>   | Signature:<br><br>9-18-18                |
|                             | <b>Lead Operators &amp; FLOCOS (Accelerator Division)</b><br>Trained/Qualified to: <ul style="list-style-type: none"> <li>Execute the Beamline Enable procedure</li> <li>Perform roles assigned in any new procedures</li> </ul> | B. Lein<br>Training Group Leader | <ul style="list-style-type: none"> <li>Train Operators</li> </ul>            | <ul style="list-style-type: none"> <li>BTMS record</li> </ul>   | Signature:<br><i>N/A</i><br><br>9-18-18 |

|                                  |  |   |
|----------------------------------|--|---|
| <b>* READINESS CERTIFICATION</b> | <b>W. Hu</b><br>Lead Project Scientist | Signature: <br>9/25/18 |
|----------------------------------|--|---|

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



**ATTACHMENT D – COMPLETION OF ERR PRE-START FINDINGS  
23-ID-1 (CSX) CHAMBER**

| READINESS CRITERIA            |  | RESPONSIBLE PERSON                  | DOCUMENTED EVIDENCE  | CERTIFICATION OF READINESS* |
|-------------------------------|--|-------------------------------------|--|-----------------------------|
| <b>IRR PRE-START FINDINGS</b> | <b>No Pre-Start Findings Identified</b><br>No pre-start findings associated with the 23-ID-1 CSX Chamber have been identified by the ERR Team and therefore the following lines do not require sign-off. | R. Lee<br>ESH Manager               | <ul style="list-style-type: none"> <li>• IRR Preliminary Report</li> </ul>     | Signature:                  |
|                               |  | E. Cheswick<br>Independent Verifier |  | Signature:                  |
|                               | <b>Pre-Start Actions Complete</b><br>All actions associated with the 23-ID-1 CSX Chamber ERR pre-start findings are complete.  | S. Wilkins<br>ERP Manager           | <ul style="list-style-type: none"> <li>• Pertinent closure evidence</li> </ul> | Signature:                  |
|                               | <b>Pre-Start Actions Verified</b><br>All actions associated with the 23-ID-1 CSX Chamber ERR pre-start findings have been verified complete.   | R. Lee<br>ESH Manager               | <ul style="list-style-type: none"> <li>• Pertinent closure evidence</li> </ul> | Signature:                  |
|                               | <b>Pre-Start Actions Independently Verified</b><br>Actions associated with the 23-ID-1 CSX Chamber ERR pre-start findings have been satisfactorily complete.   | E. Cheswick<br>Independent Verifier | <ul style="list-style-type: none"> <li>• Pertinent closure evidence</li> </ul> | Signature:                  |

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

