

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist		
Number:	NSLSII-23ID-CHK-001	Revision:	3
Effective:	24AUG2018	Page:	1 of 19

NSLS-II Beamline 23-ID Radiological Interlock Test Checklist

Test Reason:	Test Result: <input type="checkbox"/> Passed <input type="checkbox"/> Failed		
	Test Type:	<input type="checkbox"/> Full Certification	<input type="checkbox"/> Annual <input type="checkbox"/> Partial
Test Date:	Start Time:	Finish Time:	
Tester 1:	Assistant 1:		
Tester 2:	Assistant 2:		
Tester 1 Signature:	Tester 2 Signature:		
*Reviewer 1:	Reviewer 1 Signature:		
Reviewer 2:	Reviewer 2 Signature:		
** Safety Signature 23-ID (Beamline HMI)	Previous 23-ID SS#	Date: / /	
A Chain: B Chain:	A Chain:	B Chain:	
** Safety Signature Pentant 1 Beamline (SR HMI)	Previous Pentant 1 SS#	Date: / /	
A Chain: B Chain:	A Chain:	B Chain:	

* A review by an Accelerator Safety Systems Engineer and a designated specialist (Reviewer 2) is only required upon a Test failure.
 **If Current Safety Signature number (found in top left corner on HMI) is different from previous number, contact the Accelerator Safety Systems Cognizant Engineer.

PREPARATION:

I. All hutch door switches have been evaluated by NSLS-II Engineering for proper positioning	
II. Inform Control Room Lead Operator that testing will be done	
III. Obtain Beamline enable and PPS reset keys from Control Room	
IV. Verify that beamline vacuum and water interlocks are satisfied	
V. 23-ID Beamline Staff close isolation vacuum valves in preparation for vacuum sensor test steps	
VI. Place muffler on beam imminent sounder	
VII. Request Lead Operator enable Master Shutters	

- Test steps highlighted in **Red (Ann)** will be performed during annual test of critical devices
- Test steps in **Red (Ann)** and **Blue** will be performed during Full Certifications

A1 Verify System Lockouts (Ann)

- Gun HVPS Enable Switch _____
- Linac modulator line cords (3) OR Booster Dipole F PS 480 V _____
- Booster RF HVPS 480 V OR Booster low level RF drive termination _____
- SR System C low level RF drive termination OR SR System C RF output connection to cavity _____
- SR System D low level RF drive termination OR SR System D RF output connection to cavity _____

A2 Verify Search and Time Beam Imminent Alarm

Verify that search path is free from obstacles and line of sight is clear in search mirrors in accordance with NSLSII-ESH-PRC-032, *Beamline Enclosure Search and Secure and Breaking Security*. _____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist		
Number:	NSLSII-23ID-CHK-001	Revision:	3
Effective:	24AUG2018	Page:	2 of 19

A

Close all hutch secondary doors

 "Entry Permitted" signs (2) are ON

Using the keypad, lock the closed doors

Press SB1

 SB1 illuminates

 Search sounder sounds

 Search yellow beacon flashing

Press SB2

 SB2 illuminates

Exit hutch and close main door

*Press SBE and **begin timing***

 Beam imminent alarm sounds for 30 seconds

 After warning, FOE Interlocked A and B ON (**green**), HMI

 "Interlocked" signs (2) are ON

 Maglock A and B ON (**green**), all doors, HMI

Press the SBE/Access Button

 "Interlocked" signs (2) are OFF, "Entry Permitted" signs (2) are ON

 FOE Interlocked A and B OFF, HMI

 Maglock A OFF (may require opening Maglock on keypad)

Open door

 Door opens, Maglock B OFF

A3 **Out of Sequence Search**

A

Press SB2

 SB2 does not illuminate

Press SB1

 SB1 illuminates

Close hutch door and press SBE

 Hutch does NOT secure

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist		
Number:	NSLSII-23ID-CHK-001	Revision:	3
Effective:	24AUG2018	Page:	3 of 19

A4 **Search Timeout**

A

*Press first search button and **begin timing***

*Complete search **without pressing Final Search button***

Search sounders off in 2 minutes

Press Final Search button

Search does not complete

A5 **Shutter Enable**

A

Place actuators on FOE door switches and attach Maglock devices.

Beamline Online A and B OFF

Enable beamline with key and perform a reset

Beamline Online A and B ON (**green**)

Search the FOE

FE Shutter Permits A and B ON *after* Beam

Imminent Warning

Open FE Shutters

FE Shutters A and B indicate open (**green**)

3 "Beam On" signs are ON

Close FE Shutters

FE Shutters A and B indicate closed (**red**)

3 "Beam On" signs are OFF

Line 1 Enable Key is out of place

L1A1 Shutter A and B Permits OFF, HMI

Cycle Line 1 Enable Key in place

L1A1 Shutter A and B Permits ON (**green**), HMI

Open L1A1 Shutter

L1A1 Shutter A and B indicate open (**green**)

Cycle Line 1 Enable Key out of place

L1A1 Shutter A and B indicate closed (**red**)

L1A1 Shutter A and B Permits OFF, HMI

Line 2 Enable Key is out of place

L2A2 Shutter A and B Permits OFF, HMI

Cycle Line 2 Enable Key in place

L2A2 Shutter A and B Permits ON (**green**), HMI

Open L2A2 Shutter

L2A2 Shutter A and B indicate open (**green**)

Cycle Line 2 Enable Key out of place

L2A2 Shutter A and B indicate closed (**red**)

L2A2 Shutter A and B Permits OFF, HMI

Rotate keys to enable both lines

L1A1 and L2A2 A and B Permits ON (**green**), HMI

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory				
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist			
Number:	NSLSII-23ID-CHK-001	Revision:	3	Effective: 24AUG2018
				Page: 4 of 19

A6 Emergency Stops (ES) FOE (A Hutch)

For each ES search hutch	<u>ES1</u>	<u>ES2</u>	<u>ES3</u>
<i>Open FE Shutters from keypad</i>	_____	_____	_____
FE Shutters A and B open (green)	_____	_____	_____
FOE Interlocked A and B ON (green)	_____	_____	_____
FE Shutter Permits A and B ON (green)	_____	_____	_____
FE Critical Device Permits A and B ON	_____	_____	_____
Upstream Maglock A and B ON (green)	_____	_____	_____
Downstream Right Maglock A and B ON (green)	_____	_____	_____
Downstream Left Maglock A and B ON (green)	_____	_____	_____
<i>Press ES</i>	_____	_____	_____
FE Shutters A and B closed (red)	_____	_____	_____
FOE Interlocked A and B OFF	_____	_____	_____
FE Shutter Permits A and B OFF	_____	_____	_____
FE Critical Device Permits A and B OFF	_____	_____	_____
Upstream Maglock A OFF	_____	_____	_____
Downstream Right Maglock A OFF	_____	_____	_____
Downstream Left Maglock A OFF	_____	_____	_____
<i>Pull out ES</i>	_____	_____	_____
ES Sum Latch OFF	_____	_____	_____
<i>Reset fault</i>	_____	_____	_____
ES Sum Latch ON (green)	_____	_____	_____

A7 Labyrinth Switches and Latch

Place actuators on the labyrinth switches/latch and downstream left door switches and Maglock. _____

Repeat steps for each switch and latch.	<u>A1</u>	<u>A2</u>	<u>B1</u>	<u>B2</u>	<u>Latch</u>
<i>Search hutch</i>	_____	_____	_____	_____	_____
<i>Open FE Shutters from keypad</i>	_____	_____	_____	_____	_____
FE Shutters A and B open (green)	_____	_____	_____	_____	_____
FOE Interlocked A and B ON (green)	_____	_____	_____	_____	_____
FE Shutter Permits A and B ON (green)	_____	_____	_____	_____	_____
Cable Lab Switches/Latch A and B ON (green)	_____	_____	_____	_____	_____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory							
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist						
Number:	NSLSII-23ID-CHK-001	Revision:	3	Effective:	24AUG2018	Page:	5 of 19

FE Critical Device Permits A and B ON	_____	_____	_____	_____	_____
<i>Remove one switch actuator</i>	_____	_____	_____	_____	_____
Cable Lab Switch/Latch Permit OFF	_____	_____	_____	_____	_____
FOE Interlocked OFF	_____	_____	_____	_____	_____
FE Shutter Permit OFF	_____	_____	_____	_____	_____
FE Shutters A and B closed (red)	_____	_____	_____	_____	_____
FE Critical Device Permits A and B OFF	_____	_____	_____	_____	_____
<i>Replace switch actuator and reset fault</i>	_____	_____	_____	_____	_____
Remove labyrinth actuators and close labyrinth door	_____	_____	_____	_____	_____

A8 Door Switches: Upstream Door

Place actuators on the upstream door switches and Maglock. _____

Check the corresponding Permits for each switch tested (e.g., A Permit for switch A1).

	<u>A1</u>	<u>A2</u>	<u>B1</u>	<u>B2</u>	<u>Reed</u>
<i>Open FE Shutters from keypad</i>	_____	_____	_____	_____	_____
FE Shutters A and B open (green)	_____	_____	_____	_____	_____
FOE Interlocked A and B ON (green)	_____	_____	_____	_____	_____
FE Shutter Permits A and B ON (green)	_____	_____	_____	_____	_____
FOE Door Switch Sum A and B ON (green)	_____	_____	_____	_____	_____
FE Critical Device Permits A and B ON	_____	_____	_____	_____	_____
<i>Remove one switch actuator</i>	_____	_____	_____	_____	_____
FE Shutters A and B closed (red)	_____	_____	_____	_____	_____
FOE Interlocked OFF	_____	_____	_____	_____	_____
FE Shutter Permit OFF	_____	_____	_____	_____	_____
FOE Door Switch Sum OFF	_____	_____	_____	_____	_____
FE Critical Device Permits A and B OFF	_____	_____	_____	_____	_____
<i>Replace switch actuator and reset fault</i>	_____	_____	_____	_____	_____
Remove actuators and close door	_____	_____	_____	_____	_____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory				
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist			
Number:	NSLSII-23ID-CHK-001	Revision:	3	Effective: 24AUG2018
				Page: 6 of 19

A9 Door Switches: Downstream Right Door

Place actuators on the downstream right door switches and Maglock.

Check the corresponding Permits for each switch tested (e.g., A Permit for switch A1).

	<u>A1</u>	<u>A2</u>	<u>B1</u>	<u>B2</u>	<u>Reed</u>
<i>Open FE Shutters from keypad</i>	_____	_____	_____	_____	_____
FE Shutters A and B open (green)	_____	_____	_____	_____	_____
FOE Interlocked A and B ON (green)	_____	_____	_____	_____	_____
FE Shutter Permits A and B ON (green)	_____	_____	_____	_____	_____
FOE Door Switch Sum A and B ON (green)	_____	_____	_____	_____	_____
FE Critical Device Permits A and B ON	_____	_____	_____	_____	_____
<i>Remove one switch actuator</i>	_____	_____	_____	_____	_____
FE Shutters A and B closed (red)	_____	_____	_____	_____	_____
FOE Interlocked OFF	_____	_____	_____	_____	_____
FE Shutter Permit OFF	_____	_____	_____	_____	_____
FOE Door Switch Sum OFF	_____	_____	_____	_____	_____
FE Critical Device Permits A and B OFF	_____	_____	_____	_____	_____
<i>Replace switch actuator and reset fault</i>	_____	_____	_____	_____	_____
Remove actuators and close door	_____	_____	_____	_____	_____

A10 Door Switches: Downstream Left Door

Place actuators on the downstream left door switches and Maglock.

Check the corresponding Permits for each switch tested (e.g., A Permit for switch A1).

<i>Open FE Shutters from keypad</i>	_____	_____	_____	_____	_____
FE Shutters A and B open (green)	_____	_____	_____	_____	_____
FOE Interlocked A and B ON (green)	_____	_____	_____	_____	_____
FE Shutter Permits A and B ON (green)	_____	_____	_____	_____	_____
FOE Door Switch Sum A and B ON (green)	_____	_____	_____	_____	_____
FE Critical Device Permits A and B ON	_____	_____	_____	_____	_____
<i>Remove one switch actuator</i>	_____	_____	_____	_____	_____
FE Shutters A and B closed (red)	_____	_____	_____	_____	_____
FOE Interlocked OFF	_____	_____	_____	_____	_____
FE Shutter Permit OFF	_____	_____	_____	_____	_____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory				
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist			
Number:	NSLSII-23ID-CHK-001	Revision:	3	Effective: 24AUG2018
				Page: 7 of 19

FOE Door Switch Sum OFF	_____	_____	_____	_____	_____
FE Critical Device Permits A and B OFF	_____	_____	_____	_____	_____
<i>Replace switch actuator and reset fault</i>	_____	_____	_____	_____	_____
Remove actuators and close door					_____

A11 Magnetic Lock Test

Connect the FOE test box to the PPS cabinet. Use the box to turn ON the Maglocks (set switches to "Normal").

Repeat steps for each door: Upstream (US), Downstream Right (DSR) and Downstream Left (DSL).

	<u>US</u>	<u>DSR</u>	<u>DSL</u>
<i>Search hutch</i>			
FOE Interlocked A and B ON (green)	_____	_____	_____
FE Shutter Permits A and B ON (green)	_____	_____	_____
Door Maglock A and B ON (green)	_____	_____	_____
<i>Open FE Shutters</i>	_____	_____	_____
FE Shutters open (green)	_____	_____	_____
<i>Using FOE test box, turn OFF Maglock</i>	_____	_____	_____
Door Maglock A OFF	_____	_____	_____
FOE Shutters closed (red)	_____	_____	_____
FOE Interlocked A OFF	_____	_____	_____
FE Shutter Permit A OFF	_____	_____	_____
<i>Turn On Maglock and reset fault</i>	_____	_____	_____
<i>Search hutch</i>	_____	_____	_____
<i>Using FE Shutter test fixture, Open FE Shutters</i>	_____	_____	_____
FE Critical Device Permits A and B ON	_____	_____	_____
<i>Using FOE test box, turn OFF Maglock</i>	_____	_____	_____
<i>Within 3 seconds:</i> FE Critical Device Permit A chain OFF	_____	_____	_____
<i>Close FE Shutters and reset fault</i>	_____	_____	_____
Disconnect FOE test box			_____

A12 Vacuum Sensors Beamline 23-ID-1

Qualified Beamline Staff will perform vacuum venting.

Perform steps for each vacuum sensor

Vacuum sensor SW A and B ON (green)

<u>SW1</u>	<u>SW2</u>	<u>SW3</u>	<u>SW4</u>
_____	_____	_____	_____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist		
Number:	NSLSII-23ID-CHK-001	Revision:	3
Effective:	24AUG2018	Page:	8 of 19

L1A1 Shutter Permits A and B ON (green)	_____	_____	_____	_____
<i>Open Beamline Photon Shutter LIA1</i>	_____	_____	_____	_____
L1A1 Shutter open (green)	_____	_____	_____	_____
<i>Beamline Staff vents up section</i>	_____	_____	_____	_____
Vacuum sensor SW A and B OFF	_____	_____	_____	_____
L1A1 Shutter Permits A and B OFF	_____	_____	_____	_____
L1A1 Shutter closed (red)	_____	_____	_____	_____
FE Critical Device Permits A and B ON	_____	_____	_____	_____
<i>Open LIA1 and FE Shutters with test devices</i>	_____	_____	_____	_____
LIA1 and FE Shutters open	_____	_____	_____	_____
FE Critical Devices A and B OFF	_____	_____	_____	_____
<i>Close all Shutters and reset FE Critical Devices</i>	_____	_____	_____	_____
<i>Beamline Staff returns vacuum</i>	_____	_____	_____	_____
L1A1 Shutter Permits A and B OFF	_____	_____	_____	_____
<i>Reset fault</i>	_____	_____	_____	_____
Vacuum sensor SW A and B ON (green)	_____	_____	_____	_____
L1A1 Shutter Permits A and B ON (green)	_____	_____	_____	_____
<i>Open Beamline Photon Shutter LIA1</i>	_____	_____	_____	_____
L1A1 Shutter open (green)	_____	_____	_____	_____
		<u>SW5</u>	<u>SW6</u>	<u>SW7</u>
Vacuum sensor SW A and B ON (green)	_____	_____	_____	_____
L1A3 Shutter Permits A and B ON (green)	_____	_____	_____	_____
<i>Open Beamline Photon Shutter LIA3</i>	_____	_____	_____	_____
L1A3 Shutter open (green)	_____	_____	_____	_____
<i>Beamline Staff vents up section</i>	_____	_____	_____	_____
Vacuum sensor SW A and B OFF	_____	_____	_____	_____
L1A3 Shutter Permits A and B OFF	_____	_____	_____	_____
L1A3 Shutter closed (red)	_____	_____	_____	_____
FE Critical Device Permits A and B ON	_____	_____	_____	_____
<i>Open LIA3, LIA1 and FE Shutters with test devices</i>	_____	_____	_____	_____
LIA3, LIA1 and FE Shutters open	_____	_____	_____	_____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist		
Number:	NSLSII-23ID-CHK-001	Revision:	3
		Effective:	24AUG2018
			Page: 9 of 19

FE Critical Devices A and B OFF	_____	_____	_____
<i>Close all Shutters and reset FE Critical Devices</i>	_____	_____	_____
<i>Beamline Staff returns vacuum</i>	_____	_____	_____
L1A3 Shutter Permits A and B OFF	_____	_____	_____
<i>Reset fault</i>	_____	_____	_____
Vacuum sensor SW A and B ON (green)	_____	_____	_____
L1A3 Shutter Permits A and B ON (green)	_____	_____	_____
<i>Open Beamline Photon Shutter L1A3</i>	_____	_____	_____
L1A3 Shutter open (green)	_____	_____	_____

A13 Vacuum Sensors Beamline 23-ID-2

Qualified Beamline Staff will perform vacuum venting.

	<u>SW1</u>	<u>SW2</u>
Perform steps for each vacuum sensor	_____	_____
Vacuum sensor SW A and B ON (green)	_____	_____
L2A2 Shutter Permits A and B ON (green)	_____	_____
<i>Open Beamline Photon Shutter L2A2</i>	_____	_____
L2A2 Shutter open (green)	_____	_____
<i>Beamline Staff vents up section</i>	_____	_____
Vacuum sensor SW A and B OFF	_____	_____
L2A2 Shutter Permits A and B OFF	_____	_____
L2A2 Shutter closed (red)	_____	_____
FE Critical Device Permits A and B ON	_____	_____
<i>Open L2A2 and FE Shutters with test devices</i>	_____	_____
L2A2 and FE Shutters open	_____	_____
FE Critical Devices A and B OFF	_____	_____
<i>Close all Shutters and reset FE Critical Devices</i>	_____	_____
<i>Beamline Staff returns vacuum</i>	_____	_____
L2A2 Shutter Permits A and B OFF	_____	_____
<i>Reset fault</i>	_____	_____
Vacuum sensor SW A and B ON (green)	_____	_____
L2A2 Shutter Permits A and B ON (green)	_____	_____
<i>Open Beamline Photon Shutter L2A2</i>	_____	_____
L2A2 Shutter open (green)	_____	_____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist		
Number:	NSLSII-23ID-CHK-001	Revision:	3
		Effective:	24AUG2018
			Page: 10 of 19

	<u>SW3</u>	<u>SW4</u>	<u>SW5</u>
Vacuum sensor SW A and B ON (green)	_____	_____	_____
L2A4 Shutter Permits A and B ON (green)	_____	_____	_____
<i>Open Beamline Photon Shutter L2A4</i>	_____	_____	_____
L2A4 Shutter open (green)	_____	_____	_____
<i>Beamline Staff vents up section</i>	_____	_____	_____
Vacuum sensor SW A and B OFF	_____	_____	_____
L2A4 Shutter Permits A and B OFF	_____	_____	_____
L2A4 Shutter closed (red)	_____	_____	_____
FE Critical Device Permits A and B ON	_____	_____	_____
<i>Open L2A4, L2A2 and FE Shutters with test devices</i>	_____	_____	_____
L2A4, L2A2 and FE Shutters open	_____	_____	_____
FE Critical Devices A and B OFF	_____	_____	_____
<i>Close all Shutters and reset FE Critical Devices</i>	_____	_____	_____
<i>Beamline Staff returns vacuum</i>	_____	_____	_____
L2A4 Shutter Permits A and B OFF	_____	_____	_____
<i>Reset fault</i>	_____	_____	_____
Vacuum sensor SW A and B ON (green)	_____	_____	_____
L2A4 Shutter Permits A and B ON (green)	_____	_____	_____
<i>Open Beamline Photon Shutter L2A4</i>	_____	_____	_____
L2A4 Shutter open (green)	_____	_____	_____

A14 Water Interlock

Water flow meters are located on top of the hutch (Figure 1) and downstream of the hutch (Figure 2).



Figure 1: Water Meters on Top of Hutch



Figure 2: Water Flow Meters DS of Hutch

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory				
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist			
Number:	NSLSII-23ID-CHK-001	Revision:	3	Effective: 24AUG2018
				Page: 11 of 19

The PPS Water Safety Trip Amplifiers (STA) are located in the cabinet to the upper right of the meters on top of the hutch (Figure 3).

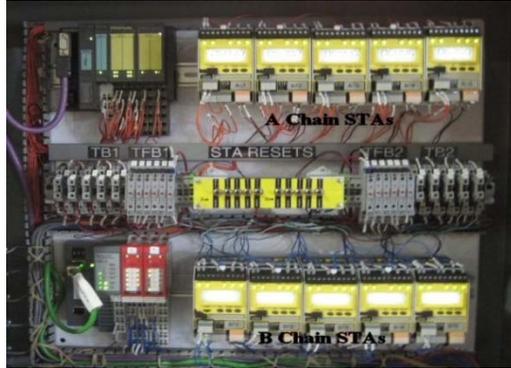


Figure 3: PPS Water STAs

Record the pretest water flows for the PPS meters in GPM. Valve numbers are in parentheses.

Meter Reading	Meter Reading	Current STA A	Current STA B
A1(5)= _____	B1= _____	A STA1= _____	B STA1= _____
A2(11)= _____	B2= _____	A STA2= _____	B STA2= _____
A3(13)= _____	B3= _____	A STA3= _____	B STA3= _____
A4(14)= _____	B4= _____	A STA4= _____	B STA4= _____
A5(18)= _____	B5= _____	A STA5= _____	B STA5= _____

The current programmed trip settings for the amplifiers are in column 1. The STA readouts for each tested A and B chain STAs will be recorded in columns 3 and 4. These recordings should be within 15% of the programmed trip point (column 2).

Trip Points	Trip Points (- 15 %)	Recorded A Trip	Recorded B Trip
PPS 1: 2.25 GPM	1.91 GPM	A STA1= _____	B STA1= _____
PPS 2: 0.65 GPM	0.55 GPM	A STA2= _____	B STA2= _____
PPS 3: 0.65 GPM	0.55 GPM	A STA3= _____	B STA3= _____
PPS 4: 0.4 GPM	0.34 GPM	A STA4= _____	B STA4= _____
PPS 5: 0.4 GPM	0.34 GPM	A STA5= _____	B STA5= _____

Repeat each step for all water flow meters	PPS1	PPS2	PPS3	PPS4	PPS5
<i>Open FE Shutters</i>	_____	_____	_____	_____	_____
FE Shutters A and B open (green)	_____	_____	_____	_____	_____
Water Permits A and B ON (green), HMI	_____	_____	_____	_____	_____
FE Shutter Permits A and B ON (green), HMI	_____	_____	_____	_____	_____
<i>Using the valve, lower water flow to trip point</i>	_____	_____	_____	_____	_____
FE Shutters A and B closed (red)	_____	_____	_____	_____	_____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory				
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist			
Number:	NSLSII-23ID-CHK-001	Revision:	3	Effective: 24AUG2018
				Page: 12 of 19

In 5 seconds: FE Shutter Permits A and B OFF, HMI	_____	_____	_____	_____	_____
Water Permits A and B OFF, HMI	_____	_____	_____	_____	_____
Recorded STA A and B levels above; within 15%	_____	_____	_____	_____	_____
<i>Return water flow to pretest values</i>	_____	_____	_____	_____	_____
Water Permits A and B remain OFF, HMI	_____	_____	_____	_____	_____
<i>Reset fault at PPS cabinet</i>	_____	_____	_____	_____	_____
Water Permits A and B ON (green), HMI	_____	_____	_____	_____	_____
FE Shutter Permits A and B ON (green), HMI	_____	_____	_____	_____	_____

A15 Water Safety Trip Amplifier Faults

	<u>PPS1</u>	<u>PPS2</u>	<u>PPS3</u>	<u>PPS4</u>	<u>PPS5</u>
Repeat each step for all water flow meters.	_____	_____	_____	_____	_____
<i>Open FE Shutters with keypad</i>	_____	_____	_____	_____	_____
FE Shutters A and B open (green)	_____	_____	_____	_____	_____
Water Permits A and B ON (green), HMI	_____	_____	_____	_____	_____
FE Shutter Permits A and B ON (green), HMI	_____	_____	_____	_____	_____
<i>Press A chain fault/reset button</i>	_____	_____	_____	_____	_____
FE Shutters A and B closed (red)	_____	_____	_____	_____	_____
Water Permit A OFF, HMI	_____	_____	_____	_____	_____
In 5 seconds: FE Shutter Permit A OFF, HMI	_____	_____	_____	_____	_____
<i>Reset fault</i>	_____	_____	_____	_____	_____
<i>Open FE Shutters with keypad</i>	_____	_____	_____	_____	_____
FE Shutters A and B open (green)	_____	_____	_____	_____	_____
Water Permits A and B ON (green), HMI	_____	_____	_____	_____	_____
FE Shutter Permits A and B ON (green), HMI	_____	_____	_____	_____	_____
<i>Press B chain fault/reset button</i>	_____	_____	_____	_____	_____
FE Shutters A and B closed (red)	_____	_____	_____	_____	_____
Water Permit B OFF, HMI	_____	_____	_____	_____	_____
In 5 seconds: FE Shutter Permit B OFF, HMI	_____	_____	_____	_____	_____
<i>Reset fault</i>	_____	_____	_____	_____	_____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist		
Number:	NSLSII-23ID-CHK-001	Revision:	3
Effective:	24AUG2018	Page:	13 of 19

A16 Observe Beamline Photon Shutter Operation

	<u>L1A1</u>	<u>L1A3</u>	<u>L2A2</u>	<u>L2A4</u>
Repeat steps for each Beamline Photon Shutter				
<i>Close Beamline Photon Shutter</i>	_____	_____	_____	_____
Shutter indicates closed A and B (red), HMI	_____	_____	_____	_____
<i>Open Beamline Photon Shutter</i>	_____	_____	_____	_____
Shutter opens smoothly without hesitation	_____	_____	_____	_____
Shutter indicates open A and B (green), HMI	_____	_____	_____	_____
<i>Close Beamline Photon Shutter</i>	_____	_____	_____	_____
Shutter indicates closed A and B (red), HMI	_____	_____	_____	_____

A17 Observe FE Safety Shutter(s) Operation

With Maintenance Door open, connect FE Shutter test fixture.	_____
Shutters are in the closed (down) position	_____
FE Shutters A and B closed (red), HMI	_____
<i>Turn the "Air" switch ON</i>	_____
<i>Open FE SSs A and B and Photon Shutter</i>	_____
Shutters open freely without hesitation	_____
Shutters are in the open (up) position	_____
FE Shutters A and B open (green), HMI	_____
<i>Actuate Shutters closed</i>	_____
FE Shutters A and B closed (red), HMI	_____

A18 FE Safety Shutters Can Only be Closed if FE Photon Shutter is Closed

<i>Search hutch</i>	FOE Interlocked A and B ON (green), HMI	_____
	FE Critical Device Permits A and B ON (green), HMI	_____
<i>Open FE SSA</i>	SSA Open	_____
<i>Open FE Photon Shutter</i>	FE Critical Device Permits A and B OFF, HMI	_____
<i>Close Shutters</i>		_____
<i>Reset fault</i>	FE Critical Device Permits A and B ON (green), HMI	_____
<i>Open FE SSB</i>	SSB Open	_____
<i>Open FE Photon Shutter</i>	FE Critical Device Permits A and B OFF, HMI	_____
<i>Close Shutters</i>		_____
<i>Reset fault</i>	FE Critical Device Permits A and B ON (green), HMI	_____

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist		
Number:	NSLSII-23ID-CHK-001	Revision:	3
		Effective:	24AUG2018
			Page: 14 of 19

A19 Beamline Enable Key (Opening Shutter Without Key Trips SR RF and Dipole PS)

<i>Remove beamline enable key</i>	Beamline Online A and B OFF	_____
<i>Search FOE</i>	FOE Interlocked A and B ON (green), HMI	_____
	FE Critical Device Permits A and B ON (green), HMI	_____
<i>Using FE Shutter test fixture, Open FE Shutters</i>	FE Critical Device Permits A and B OFF	_____
<i>Using FE Shutter test fixture, Close FE Shutters</i>		_____
<i>Replace beamline enable key and reset faults</i>	Beamline Online A and B ON (green)	_____
	FE Critical Device Permits A and B ON (green), HMI	_____

Live Testing

A20 Reach Back FOE Door Switches (Ann)

<i>Secure P1 through P5</i>	SR secure, A and B chain, SR HMI	_____
<i>Place actuators on FOE hutch door switches and Maglock</i>		_____
<i>Search hutch</i>	FOE Interlocked A and B ON (green), HMI	_____
	FE Critical Device Permits A and B ON (green), HMI	_____
<i>Check Control Room SR HMI (Beamline Page)</i>	FE Critical Device Permits A and B ON (green), SR HMI	_____
<i>Check I/O Box 23 Beamline Enable Panel</i>	FE Critical Devices Permits A and B LEDs ON	_____
<i>Check I/O Box 28 Beamline Enable Panel</i>	FE Critical Device Permit Sum A and B LEDs ON	_____
<i>Check Dipole PS (positive) Beamline Interface</i>	A and B Permits ON, Dipole PS Pos. Interface	_____
<i>Check Dipole PS (negative) Beamline Interface</i>	A and B Permits ON, Dipole PS Neg. Interface	_____
<i>Check SR RF System C HVPS Beamline Interface</i>	A and B Permits ON, SR RF System C HVPS Interface	_____
<i>Check SR RF System D HVPS Beamline Interface</i>	A and B Permits ON, SR RF System D HVPS Interface	_____
<i>Operator enables SR Dipole PS</i>	SR Dipole PS is ON	_____
<i>Operator enables SR RF System C HVPS</i>	SR RF System C HVPS is ON	_____
<i>Operator enables SR RF System D HVPS</i>	SR RF System D HVPS is ON	_____
<i>Using FE Shutter test fixture, open the FE Shutters (SSA, SSB and Photon)</i>		_____
	FE Shutters open	_____
<i>Remove an "A chain" door switch actuator from beamline hutch door</i>		_____
	FOE Interlocked A OFF, HMI	_____
	FE Critical Device Permit A chain OFF, HMI	_____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist		
Number:	NSLSII-23ID-CHK-001	Revision:	3
Effective:	24AUG2018	Page:	15 of 19

<i>Check I/O Box 23 Beamline Enable Panel</i>	FE Critical Device Permit A LED OFF	_____
<i>Check I/O Box 28 Beamline Enable Panel</i>	FE Critical Device Permit Sum A LED OFF	_____
<i>Check Control Room SR HMI (Beamline Page)</i>	FE Critical Device Permit A OFF (red), SR HMI	_____
<i>Check SR RF System C HVPS Beamline Interface</i>	A Permit OFF, SR RF System C HVPS Interface	_____
<i>Check SR RF System D HVPS Beamline Interface</i>	A Permit OFF, SR RF System D HVPS Interface	_____
<i>Check Dipole PS (positive) Beamline Interface</i>	A Permit OFF, Dipole PS Pos. Interface	_____
<i>Check Dipole PS (negative) Beamline Interface</i>	A Permit OFF, Dipole PS Neg. Interface	_____
	SR RF System C HVPS is OFF	_____
	SR RF System D HVPS is OFF	_____
	SR Dipole PS is OFF	_____
<i>Close FE Shutters with FE Shutter test fixture</i>	FE Shutters closed	_____
Replace “ A chain ” door switch actuator and reset fault(s)		_____
<i>Search hutch</i>	FOE Interlocked A and B ON (green), HMI	_____
	FE Critical Device Permits A and B ON (green), HMI	_____
<i>Check Control Room SR HMI (Beamline Page)</i>	FE Critical Device Permits A and B ON (green), SR HMI	_____
<i>Check I/O Box 23 Beamline Enable Panel</i>	FE Critical Devices Permits A and B LEDs ON	_____
<i>Check I/O Box 28 Beamline Enable Panel</i>	FE Critical Device Permit Sum A and B LEDs ON	_____
<i>Check Dipole PS (positive) Beamline Interface</i>	A and B Permits ON, Dipole PS Pos. Interface	_____
<i>Check Dipole PS (negative) Beamline Interface</i>	A and B Permits ON, Dipole PS Neg. Interface	_____
<i>Check SR RF System C HVPS Beamline Interface</i>	A and B Permits ON, SR RF System C HVPS Interface	_____
<i>Check SR RF System D HVPS Beamline Interface</i>	A and B Permits ON, SR RF System D HVPS Interface	_____
<i>Operator enables SR Dipole PS</i>	SR Dipole PS is ON	_____
<i>Operator enables SR RF System C HVPS</i>	SR RF System C HVPS is ON	_____
<i>Operator enables SR RF System D HVPS</i>	SR RF System D HVPS is ON	_____
<i>Using FE Shutter test fixture, open the FE Shutters (SSA, SSB and Photon)</i>		_____
	FE Shutters open	_____
Remove “ B chain ” switch actuator	FOE Interlocked B OFF, HMI	_____
	FE Critical Device Permit B OFF, HMI	_____
<i>Check I/O Box 23 Beamline Enable Panel</i>	FE Critical Device Permit B LED OFF	_____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist		
Number:	NSLSII-23ID-CHK-001	Revision:	3
Effective:	24AUG2018	Page:	16 of 19

<i>Check Control Room SR HMI (Beamline Page)</i>	FE Critical Device Permit B OFF (red), SR HMI	_____
<i>Check I/O Box 28 Beamline Enable Panel</i>	FE Critical Device Permit Sum B LED OFF	_____
<i>Check SR RF System C HVPS Beamline Interface</i>	B Permit OFF, SR RF System C HVPS Interface	_____
<i>Check SR RF System D HVPS Beamline Interface</i>	B Permit OFF, SR RF System D HVPS Interface	_____
<i>Check Dipole PS (positive) Beamline Interface</i>	B Permit OFF, Dipole PS Pos. Interface	_____
<i>Check Dipole PS (negative) Beamline Interface</i>	B Permit OFF, Dipole PS Neg. Interface	_____
	SR Dipole PS is OFF	_____
	SR RF System C HVPS is OFF	_____
	SR RF System D HVPS is OFF	_____
<i>Close FE Shutters with FE Shutter test fixture</i>	FE Shutters closed	_____
<i>Remove beamline hutch switch actuators and Maglock actuator</i>		_____

A21 **Water Interlock (Live)**

<i>Search FOE</i>	FOE Interlocked A and B ON (green), HMI	_____
	FE Shutter Permits A and B ON (green), HMI	_____
	FE Critical Device Permits A and B ON (green), HMI	_____
<i>Check I/O Box 23 Beamline Enable Panel</i>	FE Critical Device Permits A and B LEDs ON	_____
<i>Check I/O Box 28 Beamline Enable Panel</i>	FE Critical Device Permit Sum A and B LEDs ON	_____
<i>Check Control Room SR HMI (Beamline Page)</i>	FE Critical Device Permits A and B ON (green), SR HMI	_____
<i>Check Dipole PS (positive) Beamline Interface</i>	A and B Permits ON, Dipole PS Pos. Interface	_____
<i>Check Dipole PS (negative) Beamline Interface</i>	A and B Permits ON, Dipole PS Neg. Interface	_____
<i>Check SR RF System C HVPS Beamline Interface</i>	A and B Permits ON, SR RF System C HVPS Interface	_____
<i>Check SR RF System D HVPS Beamline Interface</i>	A and B Permits ON, SR RF System D HVPS Interface	_____
<i>Operator enables SR Dipole PS</i>	SR Dipole PS is ON	_____
<i>Operator enables SR RF System C HVPS</i>	SR RF System C HVPS is ON	_____
<i>Operator enables SR RF System D HVPS</i>	SR RF System D HVPS is ON	_____
<i>Using FE Shutter test fixture, turn on air and open the SSs then Photon Shutter</i>		_____
	FE Shutters indicate open (green), HMI	_____
<i>Using water trip points in Step A14, lower flow to one meter</i>		_____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist		
Number:	NSLSII-23ID-CHK-001	Revision:	3
Effective:	24AUG2018	Page:	17 of 19

- Water Permits A and B OFF, HMI _____
- Within 5 seconds
- FE Shutter Permits A and B OFF, HMI _____
- FE Critical Device Permits A and B OFF, HMI _____
- Check I/O Box 23 Beamline Enable Panel* FE Critical Device Permits A and B LEDs OFF _____
- Check I/O Box 28 Beamline Enable Panel* FE Critical Device Permit Sum A and B LEDs OFF _____
- Check Control Room SR HMI (Beamline Page)* FE Critical Device Permits A and B OFF, SR HMI _____
- Check SR RF System C HVPS Beamline Interface* A and B Permits OFF, SR RF System C HVPS Interface _____
- Check SR RF System D HVPS Beamline Interface* A and B Permits OFF, SR RF System D HVPS Interface _____
- Check Dipole PS (positive) Beamline Interface* A and B Permits OFF, Dipole PS Pos. Interface _____
- Check Dipole PS (negative) Beamline Interface* A and B Permits OFF, Dipole PS Neg. Interface _____
- SR RF System C HVPS is OFF _____
- SR RF System D HVPS is OFF _____
- SR Dipole PS is OFF _____
- Close FE Shutters with FE Shutter test fixture* FE Shutters closed _____
- Return water flow to recorded level* _____
- Reset fault(s)* _____

A22 Observe All Shutters Closed Sum (Ann)

- Check I/O Box 28 Beamline Enable Panel* FE Shutters closed A chain light ON _____
- FE Shutters closed B chain light ON _____
- Using FE Shutter test fixture, open both FE SSs and then Photon Shutter* _____
- FE Shutters open (green), HMI _____
- Check I/O Box 28 Beamline Enable Panel* FE Shutters closed A chain light OFF _____
- FE Shutters closed B chain light OFF _____
- Close FE Shutters and remove FE Shutter test fixture* _____

A23 FOE Area Radiation Monitor

Refer to NSLSII-ESH-PRC-007, Area Radiation Monitor PPS Test and complete Attachment D, NSLS-II Beamline (FOE) Area Radiation Monitor Checklist.

FRM 23-ID Test Checklist Completed _____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory							
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist						
Number:	NSLSII-23ID-CHK-001	Revision:	3	Effective:	24AUG2018	Page:	18 of 19

A24 **Test Completion (Ann)**

- Inspect all hutch doors and labyrinths to ensure all PPS switch and Maglock actuators have been removed _____
- Return Beamline enable key and Beamline PPS reset key to the Control Room _____
- Remove muffler from beam imminent sounder _____
- Ensure PPS cabinets are secure and locked; challenge locks _____
- Remove all LOTO _____
- Inform Lead Operator that testing is complete _____

The only official copy of this document is the one online in the NSLS-II Document and Records Center. Before using a printed copy, verify that it is current by checking the printed document's revision history log with that of the online version.

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 23-ID Radiological Interlock Test Checklist		
Number:	NSLSII-23ID-CHK-001	Revision:	3
		Effective:	24AUG2018
			Page: 19 of 19

Reviewed by:

X 

Scott Buda
Accelerator Safety Systems Group Leader
Signed by: sbuda

8/24/2018

X Robert Chmiel

Robert Chmiel
NSLS-II Safety Officer
Signed by: Chmiel, Robert

Approved by:

8/27/2018

X 

Robert Lee
NSLS-II ESH Manager
Signed by: Lee, Robert J

Revision History

Revision	Description	Date
1	First Issue.	14DEC2016
2	Edited required test headers to indicate what will be tested on the annual test of critical devices; added testing of Line 1 vacuum Switch # 7; edited vacuum switch test steps to be consistent with more recent checklist (i.e., 7-ID).	02AUG2018
3	Modified steps for the vacuum sensor tests.	24AUG2018