

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision:	1
Effective:	23DEC2016	Page:	1 of 19

NSLS-II Beamline 2-ID Radiological Interlock Test Checklist

Test Reason: <i>Initial Test</i>	Test Result: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
Test Date: <i>1/3/2017</i>	Test Type: <input type="checkbox"/> Pre-Certification <input checked="" type="checkbox"/> Certification <input type="checkbox"/> Partial
Tester 1: <i>Thomas McDonald; Gabrielle Stove</i>	Assistant 1: <i>AD Operations Staff</i>
Tester 2: <i>Robert Chmiel; Brian Heneveld</i>	Assistant 2:
Tester 1 Signature: <i>Thomas McDonald</i>	Tester 2 Signature: <i>Robert Chmiel</i>
*Reviewer 1:	Reviewer 1 Signature:
Reviewer 2:	Reviewer 2 Signature:
** Safety Signature 2-ID (Beamline HMI) A Chain: <i>C1A44E22</i> B Chain: <i>580A D599</i>	Previous 2-ID SS# Date: / / A Chain: B Chain:
** Safety Signature Pentant 2 Beamline (SR HMI) A Chain: <i>7F5450F3</i> B Chain: <i>5E744344</i>	Previous Pentant 2 SS# Date: / / 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. 2-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	✓

A1 **Verify System Lockouts**

- 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 PS-C-XFD-PRC-010, *Beamline Enclosure Search and Secure and Breaking Security Procedure* ✓

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision:	1
Effective:	23DEC2016	Page:	2 of 19

	<u>A</u>
<i>Close the Right door</i>	<u>✓</u>
"Entry Permitted" sign is ON	<u>✓</u>
<i>Using the keypad, lock the closed doors</i>	<u>✓</u>
<i>Press SB1</i>	<u>✓</u>
SB1 illuminates	<u>✓</u>
Search sounder sounds	<u>✓</u>
Search yellow beacon flashing	<u>✓</u>
<i>Press SB2</i>	<u>✓</u>
SB2 illuminates	<u>✓</u>
<i>Exit hutch and close main door</i>	<u>✓</u>
<i>Press SBE and begin timing</i>	<u>✓</u>
Beam imminent alarm sounds for 30 seconds	<u>✓</u>
After warning, FOE Interlocked A and B ON (green), HMI	<u>✓</u>
"Interlocked" sign is ON	<u>✓</u>
Maglock A and B ON (green), all doors, HMI	<u>✓</u>
<i>Press the SBE/Access Button</i>	<u>✓</u>
"Interlocked" sign OFF, "Entry Permitted" sign is ON	<u>✓</u>
FOE Interlocked A and B OFF, HMI	<u>✓</u>
Maglock A OFF (may require opening Maglock on key pad)	<u>✓</u>
<i>Open door</i>	<u>✓</u>
Door opens, Maglock B OFF	<u>✓</u>

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision:	1
Effective:	23DEC2016	Page:	3 of 19

A3 **Out of Sequence Search in the FOE (A Hutch)**

	A
<i>Press SB2</i>	<u>✓</u>
SB2 does not illuminate	<u>✓</u>
<i>Press SB1</i>	<u>✓</u>
SB1 illuminates	<u>✓</u>
<i>Close hutch door and press SBE</i>	<u>✓</u>
Hutch does NOT secure	<u>✓</u>

A4 **Search Timeout**

	A
<i>Press first search button and begin timing</i>	<u>✓</u>
<i>Complete search without pressing Final Search button</i>	<u>✓</u>
Search sounders off in 2 minutes	<u>✓</u>
<i>Press Final Search button</i>	<u>✓</u>
Search does not complete	<u>✓</u>

A5 **Shutter Enable**

Place actuators on FOE door switches and attach Maglock devices	<u>✓</u>
Beamline Online A and B OFF	<u>✓</u>
Enable beamline with key and perform a reset	<u>✓</u>
Beamline Online A and B ON (green)	<u>✓</u>
Search the FOE	<u>✓</u>
FE Shutter Permits A and B ON <i>after</i> Beam	<u>✓</u>
Imminent Warning	<u>✓</u>
Open FE Shutters	<u>✓</u>
FE Shutters A and B indicate open (green)	<u>✓</u>
2 "Beam On" signs are ON	<u>✓</u>
Close FE Shutters	<u>✓</u>
FE Shutters A and B indicate closed (red)	<u>✓</u>
2 "Beam On" signs are OFF	<u>✓</u>

National Synchrotron Light Source II, Brookhaven National Laboratory				
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist			
Number:	NSLSII-2ID-CHK-001	Revision:	1	Effective: 23DEC2016
				Page: 4 of 19

A6 **Emergency Stops (ES) FOE (A Hutch)**

For each ES search FOE hutch

Open FE Shutters from keypad

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

Right Maglock A ON (green)

Left Maglock A ON (green)

Press ES

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

Right Maglock A OFF

Left Maglock A OFF

Pull out ES

ES Sum Latch OFF

Reset fault

ES Sum Latch ON (green)

<u>ES1</u>	<u>ES2</u>	<u>ES3</u>
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓

A7 **FOE Right Door Switches**

Place actuators on the door switches and Maglock.

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

Search hutch

Open FE Shutters from keypad

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

<u>A</u>	<u>B</u>	<u>Reed</u>
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓
✓	✓	✓

National Synchrotron Light Source II, Brookhaven National Laboratory							
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist						
Number:	NSLSII-2ID-CHK-001	Revision:	1	Effective:	23DEC2016	Page:	6 of 19

A9 **Magnetic Lock Test (FOE)**

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: Right (R) and Left (L)

	<u>R</u>	<u>L</u>
<i>Search hutch</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Interlocked A and B ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutter Permits A and B ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Door Maglock A and B ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Open FE Shutters</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutters open (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Using FOE test box, turn OFF Maglock</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Door Maglock A OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutters closed (red)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Interlocked A OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutter Permit A OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Turn On Maglock and reset fault</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Search hutch</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Using FE Shutter test fixture, Open FE Shutters</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Critical Device Permits A and B ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Using FOE test box, turn OFF Maglock</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Within 3 seconds: FE Critical Device Permit A Chain OFF</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Close FE Shutters and reset fault</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Disconnect FOE test box</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

A10 **Vacuum Sensors Beamline SW-5**

Qualified Beamline Staff will perform vacuum venting.

	<u>SW5</u>
Vacuum sensor SW A and B ON (green)	<input checked="" type="checkbox"/>
L1S3 Shutter A and B Permits ON (green)	<input checked="" type="checkbox"/>
<i>Open Beamline Photon Shutter L1S3</i>	<input checked="" type="checkbox"/>
L1S3 Shutter open (green)	<input checked="" type="checkbox"/>

The only official copy of this document is the one online in the NSLS-II SharePoint Document 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 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision:	1
Effective:	23DEC2016	Page:	8 of 19

Reset fault

L1S1 Shutter A and B Permits ON (green)

Open Beamline Photon Shutter

L1S1 Shutter open (green)

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

A12 **Water Interlock**

Water flow meters for the PPS 1, 2 and 3 are located on top of the hutch (Figure 1).



Figure 1: Water Flow Meters (PPS 1, 2, and 3)

The PPS Water Safety Test Amplifiers (STA) are located in the cabinet to the upper right of the meters on top of the hutch (Figure 2).



Figure 2: PPS Water STAs

Record the pretest water flows for the PPS meters in GPM.

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision: 1	Effective: 23DEC2016
			Page: 9 of 19

Meter Reading	Meter Reading	Current STA A	Current STA B
A1= <u>1.37</u>	B1= <u>1.29</u>	A STA1= <u>1.37</u>	B STA1= <u>1.29</u>
A2= <u>0.98</u>	B2= <u>0.89</u>	A STA2= <u>0.98</u>	B STA2= <u>0.89</u>
A3= <u>1.0</u>	B3= <u>1.0</u>	A STA3= <u>1.0</u>	B STA3= <u>1.0</u>

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: 0.9 GPM	0.77 GPM	A STA1= <u>0.9</u>	B STA1= <u>0.9</u>
PPS 2: 0.7 GPM	0.6 GPM	A STA2= <u>0.7</u>	B STA2= <u>0.7</u>
PPS 3: 0.85 GPM	0.72 GPM	A STA3= <u>0.85</u>	B STA3= <u>0.85</u>

Repeat each step for all water flow meters

Open FE Shutters

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

Water Permits A and B ON (**green**), HMI

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

Using the valve, lower water flow to trip point

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

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%

Return water flow to pretest values

Water Permits A and B remain OFF, HMI

Reset fault at PPS cabinet

Water Permits A and B ON (**green**), HMI

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

PPS1 **PPS2** **PPS3**

<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision:	1
Effective:	23DEC2016	Page:	10 of 19

A13 **Water Safety Test Amplifier Faults**

Repeat each step for all water flow meters

	<u>PPS1</u>	<u>PPS2</u>	<u>PPS3</u>
<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>	✓	✓	✓

A14 **Auxiliary Water Interlock**

Water flow meters for the Auxiliary PPS 4, 5 and 6 are located along the beamline (Figures 3, 4 and 5).

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision:	1
Effective:	23DEC2016	Page:	11 of 19

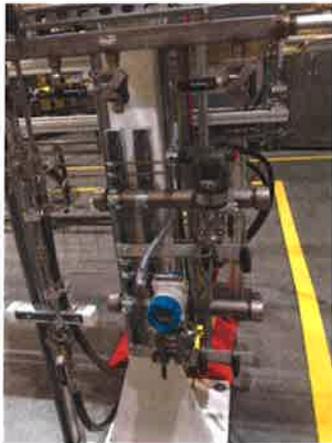


Figure 3: PPS 4 Water Meters Figure 4: PPS 5 Water Meters Figure 5: PPS 6 Water Meters

The Auxiliary PPS Water Safety Test Amplifiers (STA) are located in the cabinet on the left front side of the FOE (Figure 6).



Figure 6: Auxiliary PPS STAs

Record the pretest water flows for the PPS meters in GPM.

Meter Reading	Meter Reading	Current STA A	Current STA B
A4= <u>1.18</u>	B4= <u>1.17</u>	A STA4= <u>1.18</u>	B STA4= <u>1.17</u>
A5= <u>0.89</u>	B5= <u>0.88</u>	A STA5= <u>0.89</u>	B STA5= <u>0.88</u>
A6= <u>0.65</u>	B6= <u>0.66</u>	A STA6= <u>0.65</u>	B STA6= <u>0.66</u>

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 4: 0.9 GPM	0.77 GPM	A STA4= <u>0.9</u>	B STA4= <u>0.9</u>
PPS 5: 0.7 GPM	0.6 GPM	A STA5= <u>0.7</u>	B STA5= <u>0.7</u>
PPS 6: 0.4 GPM	0.34 GPM	A STA6= <u>0.4</u>	B STA6= <u>0.4</u>

Repeat each step for all water flow meters

PPS4 PPS5 PPS6

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision:	1
Effective:	23DEC2016	Page:	13 of 19

AUX Water Permit A OFF, HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1S1 Shutter Permit A OFF, HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Reset fault</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Open FE Shutters with keypad</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1S1 Shutters A and B open (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AUX Water Permits A and B ON (green), HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1S1 Shutter Permits A and B ON (green), HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Press B chain fault/reset button</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1S1 Shutters A and B closed (red)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
AUX Water Permit B OFF, HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1S1 Shutter Permit B OFF, HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Reset fault</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

A16 Observe Beamline Photon Shutter Operation

	<u>FOE</u>	<u>L1S1</u>
<i>Close Beamline Photon Shutter</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Shutter indicates closed A and B (red), HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Open Beamline Photon Shutter</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Shutter opens smoothly without hesitation	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Shutter indicates open A and B (green), HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Close Beamline Photon Shutter</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Shutter indicates closed A and B (red), HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

A17 Observe FE Safety Shutter(s) Operation

With Maintenance Door open, connect FE Shutter test fixture	<input checked="" type="checkbox"/>
Shutters are in the closed (down) position	<input checked="" type="checkbox"/>
FE Shutters A and B closed (red), HMI	<input checked="" type="checkbox"/>
<i>Turn the "Air" switch ON</i>	<input checked="" type="checkbox"/>
<i>Open FE Photon Shutter and SSs A and B</i>	<input checked="" type="checkbox"/>
Shutters open freely without hesitation	<input checked="" type="checkbox"/>

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision:	1
Effective:	23DEC2016	Page:	14 of 19

	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	✓
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)	✓
Live Testing		
A20 Reach Back FOE Door Switches		
<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	✓

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision:	1
Effective:	23DEC2016	Page:	15 of 19

	FE Critical Device Permits A and B ON (green), HMI	✓
<i>Check Control Room SR HMI (MCR beamline 1)</i>	FE Critical Device Permit A and B ON (green), SR HMI	✓
<i>Check I/O Box 2 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 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 OFF, HMI	✓
<i>Check I/O Box 2 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 (MCR beamline 1)</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	✓
<i>Replace "A chain" door switch actuator and reset fault(s)</i>		✓

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision:	1
Effective:	23DEC2016	Page:	16 of 19

Search hutch

	FOE Interlocked A and B ON (green), HMI	✓
	FE Critical Device Permits A and B ON (green), HMI	✓
<i>Check Control Room SR HMI (MCR beamline 1)</i>	FE Critical Device Permit A and B ON (green), SR HMI	✓
<i>Check I/O Box 2 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 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 "B chain" switch actuator</i>	FOE Interlocked B OFF, HMI	✓
	FE Critical Device Permit B OFF, HMI	✓
<i>Check I/O Box 2 Beamline Enable Panel</i>	FE Critical Device Permit B LED OFF	✓
<i>Check Control Room SR HMI (MCR beamline 1)</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>		✓

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision:	1
Effective:	23DEC2016	Page:	17 of 19

A21 **Water Interlock (Live)**

<i>Search FOE</i>	FOE Interlocked A and B ON (green), HMI	<input checked="" type="checkbox"/>
	FE Shutter Permits A and B ON (green), HMI	<input checked="" type="checkbox"/>
	FE Critical Device Permits A and B ON (green), HMI	<input checked="" type="checkbox"/>
<i>Check I/O Box 2 Beamline Enable Panel</i>	FE Critical Device Permits A and B LEDs ON	<input checked="" type="checkbox"/>
<i>Check I/O Box 28 Beamline Enable Panel</i>	FE Critical Device Permit Sum A and B LEDs ON	<input checked="" type="checkbox"/>
<i>Check Control Room SR HMI (MCR beamline 1)</i>	FE Critical Device Permit A and B ON (green), SR HMI	<input checked="" type="checkbox"/>
<i>Check Dipole PS (positive) Beamline Interface</i>	A and B Permits ON, Dipole PS Pos. Interface	<input checked="" type="checkbox"/>
<i>Check Dipole PS (negative) Beamline Interface</i>	A and B Permits ON, Dipole PS Neg. Interface	<input checked="" type="checkbox"/>
<i>Check SR RF System C HVPS Beamline Interface</i>	A and B Permits ON, SR RF System C HVPS Interface	<input checked="" type="checkbox"/>
<i>Check SR RF System D HVPS Beamline Interface</i>	A and B Permits ON, SR RF System D HVPS Interface	<input checked="" type="checkbox"/>
<i>Operator enables SR Dipole PS</i>	SR Dipole PS is ON	<input checked="" type="checkbox"/>
<i>Operator enables SR RF System C HVPS</i>	SR RF System C HVPS is ON	<input checked="" type="checkbox"/>
<i>Operator enables SR RF System D HVPS</i>	SR RF System D HVPS is ON	<input checked="" type="checkbox"/>
<i>Using FE Shutter test fixture, turn on air and open Photon then SSS</i>		
	FE Shutters indicate open (green), HMI	<input checked="" type="checkbox"/>
<i>Using water trip points in Step A12, lower flow to one meter</i>		<input checked="" type="checkbox"/>
	Water Permits A and B OFF, HMI	<input checked="" type="checkbox"/>
	FE Shutter Permits A and B OFF, HMI	<input checked="" type="checkbox"/>
<i>Within 5 seconds</i>	FE Critical Device Permits A and B OFF, HMI	<input checked="" type="checkbox"/>
<i>Check I/O Box 2 Beamline Enable Panel</i>	FE Critical Device Permits A and B OFF	<input checked="" type="checkbox"/>
<i>Check I/O Box 28 Beamline Enable Panel ,</i>	FE Critical Device Permit Sum A and B LEDs OFF	<input checked="" type="checkbox"/>
<i>Check Control Room SR HMI (MCR beamline 1)</i>	FE Critical Device Permit A and B OFF, SR HMI	<input checked="" type="checkbox"/>
<i>Check SR RF System C HVPS Beamline Interface</i>	A and B Permits OFF, SR RF System C HVPS Interface	<input checked="" type="checkbox"/>
<i>Check SR RF System D HVPS Beamline Interface</i>	A and B Permits OFF, SR RF System D HVPS Interface	<input checked="" type="checkbox"/>
<i>Check Dipole PS (positive) Beamline Interface</i>	A and B Permits OFF, Dipole PS Pos. Interface	<input checked="" type="checkbox"/>
<i>Check Dipole PS (negative) Beamline Interface</i>	A and B Permits OFF, Dipole PS Neg. Interface	<input checked="" type="checkbox"/>
	SR RF System C HVPS is OFF	<input checked="" type="checkbox"/>
	SR RF System D HVPS is OFF	<input checked="" type="checkbox"/>

National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 2-ID Radiological Interlock Test Checklist		
Number:	NSLSII-2ID-CHK-001	Revision:	1
Effective:	23DEC2016	Page:	18 of 19

- SR Dipole PS is OFF ✓
- Close FE Shutters with FE Shutter test fixture ✓
- Return water flow to recorded level ✓
- Reset fault(s) ✓

- A22 Observe All Shutters Closed Sum**
- 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 PS-C-ASD-PRC-008, NSLS-II Area Radiation Monitor PPS Test and complete Attachment D, NSLS-II Beamline (FOE) Area Radiation Monitor Checklist.**
- FRM 2-ID Test Checklist Completed ✓

- A24 Test Completion**
- 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 ✓

-END-

The only official copy of this document is the one online in the NSLS-II SharePoint Document 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 2-ID Radiological Interlock Test Checklist			
Number:	NSLSII-2ID-CHK-001	Revision:	1	Effective: 23DEC2016
				Page: 19 of 19

Reviewed by:

1/5/2017

X Scott Buda

Scott Buda
 Accelerator Safety Systems Group Leader
 Signed by: Buda, Scott

12/22/2016

X Robert Chmiel

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

Approved by:

12/22/2016

X



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

Revision History

Revision	Description	Date
1	First Issue.	23DEC2016