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National Synchrotron Light Source II, Brookhaven National Laboratory			
Subject:	NSLS-II Beamline 7-ID Radiological Interlock Test Checklist		
Number:	NSLSII-7ID-CHK-001	Revision:	1
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NSLS-II Beamline 7-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>1/6/2018</i>	Test Type: <input type="checkbox"/> Pre-Certification <input checked="" type="checkbox"/> Certification <input type="checkbox"/> Partial
Tester 1: <i>Thomas McDonald, Gabrielle Stave</i>	Start Time: _____ Finish Time: _____
Tester 2: <i>Robert Chmiel, Brian Heneveld</i>	Assistant 1: <i>Accelerator Operations Staff</i>
Tester 1 Signature: <i>Thomas McDonald</i>	Assistant 2: _____
*Reviewer 1:	Tester 2 Signature: <i>R Chmiel</i>
Reviewer 2:	Reviewer 1 Signature: _____
** Safety Signature 7-ID (Beamline HMI) A Chain: <i>774D 4489B</i> B Chain: <i>46E7 6981</i>	Previous 7-ID SS# _____ Date: / / A Chain: _____ B Chain: _____
** Safety Signature Pentant 3 Beamline (SR HMI) A Chain: <i>E39A 2A1Z</i> B Chain: <i>D9B1 829E</i>	Previous Pentant 3 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. 7-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* ✓

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

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

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

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<i>Remove one switch actuator</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutter A and B closed (red)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Interlocked OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutter Permit OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Cable Lab 1 Switch/Latch Permit OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Critical Device Permits A and B OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Replace switch actuator and reset fault</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Remove labyrinth actuators and close labyrinth door	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

A8 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).



	A	B	Reed
<i>Search hutch</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Open FE Shutters from keypad</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutters A and B open (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Interlocked A and B ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutter Permits A and B ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Door Switch Sum A and B ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Critical Device Permits A and B ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Remove one switch actuator</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutters A and B closed (red)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Interlocked OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutter Permit OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Door Switch Sum OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Critical Device Permits A and B OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Replace switch actuator and reset fault</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Remove actuators and close door	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

A9 FOE Left 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).



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	A	B	Reed
<i>Search hutch</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Open FE Shutters from keypad</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutters A and B open (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Interlocked A and B ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutter Permits A and B ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Door Switch Sum A and B ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Critical Device Permits A and B ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Remove one switch actuator</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutters A and B closed (red)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Interlocked OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutter Permit OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Door Switch Sum OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Critical Device Permits A and B OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Replace switch actuator and reset fault</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Remove actuators and close door			<input checked="" type="checkbox"/>

A10 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).

	R	L
<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"/>

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Turn On Maglock and reset fault

✓ ✓

Search hutch

✓ ✓

Using FE Shutter test fixture, Open FE Shutters

✓ ✓

FE Critical Device Permits A and B ON

✓ ✓

Using FOE test box, turn OFF Maglock

✓ ✓

Within 3 seconds: FE Critical Device Permit A Chain OFF

✓ ✓

Close FE Shutters and reset fault

✓ ✓

Disconnect FOE test box

✓

A11 **Vacuum Sensors Beamline SW3**

Qualified Beamline Staff will perform vacuum venting.

Note: Shutter 6 to be installed in 2018.*

Vacuum sensor SW A and B ON (green)

SW3

✓

Shutter 3 Permits A and B ON (green)

✓

*Shutter 6 Permits A and B ON (green)

✓

*Open Beamline Photon Shutters 3 and 6

✓ * SEE NOTE 7.22 1/5/18

Shutter 3 open (green)

✓

*Shutter 6 open (green)

* SEE NOTE 7.22 1/6/18

Beamline Staff vents up section

✓

Vacuum sensor SW A and B OFF

✓

Shutter 3 closed

✓

*Shutter 6 closed

* SEE NOTE 7.22 1/6/18

Shutter 3 Permits A and B OFF

✓

*Shutter 6 Permits A and B OFF

✓

FE Critical Device Permits A and B ON

✓

Open All upstream Shutters from Shutter 3 with test devices

✓

All upstream Shutters open

✓

FE Critical Device Permits A and B OFF

✓

Close All Shutters and reset FE Critical Devices Fault

✓

FE Critical Device Permits A and B ON

✓

*Open All upstream Shutters from Shutter 6 with test devices

* } SEE NOTE 7.22 1/6/18

*All upstream Shutters open

*

*FE Critical Device Permits A and B OFF

*

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- All upstream Shutters open ✓
- FE Critical Device Permits A and B OFF ✓
- Close All Shutters and reset FE Critical Devices Fault* ✓
- FE Critical Device Permits A and B ON ✓
- Beamline Staff returns vacuum* ✓
- Vacuum sensor SW A and B ON (green) ✓
- Shutter 2 Permits A and B OFF ✓
- Shutter 5 Permits A and B OFF ✓
- Reset fault* ✓
- Shutter 2 Permits A and B ON (green) ✓
- Shutter 5 Permits A and B ON (green) ✓

A13 Vacuum Sensors Beamline SW1 and SW8

Qualified Beamline Staff will perform vacuum venting.

- | | <u>SW1</u> | <u>SW8</u> |
|---|------------|------------|
| Repeat steps for each vacuum switch. | | |
| Vacuum sensor SW A and B ON (green) | ✓ | ✓ |
| Shutter 1 Permits A and B ON (green) | ✓ | ✓ |
| <i>Open Beamline Photon Shutter 1</i> | ✓ | ✓ |
| Shutter 1 open (green) | ✓ | ✓ |
| <i>Beamline Staff vents up section</i> | ✓ | ✓ |
| Vacuum sensor SW A and B OFF | ✓ | ✓ |
| Shutter 1 closed | ✓ | ✓ |
| Shutter 1 Permits A and B OFF | ✓ | ✓ |
| FE Critical Device Permits A and B ON | ✓ | ✓ |
| <i>Open Shutter 1 and FE Shutters with test devices</i> | ✓ | ✓ |
| Shutter 1 and FE Shutters open | ✓ | ✓ |
| FE Critical Device Permits A and B OFF | ✓ | ✓ |
| <i>Close All Shutters and reset FE Critical Devices Fault</i> | ✓ | ✓ |
| FE Critical Device Permits A and B ON | ✓ | ✓ |
| <i>Beamline Staff returns vacuum</i> | ✓ | ✓ |
| Vacuum sensor SW A and B ON (green) | ✓ | ✓ |
| Shutter 1 Permits A and B OFF | ✓ | ✓ |

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AUX Water Permit B OFF, HMI

Shutter Permit B OFF, HMI

Reset fault

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

A22 PPS Aperture

The PPS Aperture Transmitter meters are located inside the FOE. The STAs are located in the PPS cabinet outside of the FOE. *NOTE: PPS Aperture device not yet installed T.M 1/6/18*

Record the Transmitter meter readings (absolute pressure).

Meter Reading	Meter Reading	Current STA A	Current STA B
A1= <u>19.0</u>	B1= <u>19.0</u>	A STA1= <u>19.0</u>	B STA1= <u>19.0</u>

Qualified Beamline Staff will adjust the valve to lower the absolute pressure (trip point at 18 psia).

Open FE Shutters

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

Aperture Low Press. A and B ON (**green**), HMI

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

Using the valve, lower pressure to below trip point at 18 psia

Both A and B chains trip within 5% of 18 psia (>17.1)

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

FE Critical Device Permits A and B OFF, HMI

Aperture Low Press. A and B OFF, HMI

Qualified Beamline Staff return pressure to pretest values

Aperture Low Press. A and B ON (**green**), HMI

Reset fault at I/O Box

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

<input checked="" type="checkbox"/>		
<input checked="" type="checkbox"/>	A= <u>18.0</u>	B= <u>18.0</u>
<input checked="" type="checkbox"/>		

A23 PPS Aperture (Module Fault)

Repeat for A and B chain STAs.

Open FE Shutters

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

Aperture Module Fault A and B ON (**green**), HMI

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

Generate a trip amplifier fault

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

A1	B1
<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"/>

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FE Critical Device Permits A and B OFF, HMI	✓	✓
Aperture Module Fault OFF (red), HMI	✓	✓
<i>Return trip amplifier to operating condition</i>	✓	✓
Aperture Module Fault A and B ON (green), HMI	✓	✓
<i>Reset fault at I/O box</i>	✓	✓
FE Critical Device Permits A and B ON (green), HMI	✓	✓

A24 **Observe Beamline Photon Shutter Operation**

	<u>S1</u>	<u>S2</u>	<u>S3</u>	<u>S4</u>
<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	✓	✓	✓	✓
Note: Shutter 6 to be installed in 2018.*	<u>S5</u>	<u>S6*</u>	<u>S7</u>	<u>S8</u>
<i>Close Beamline Photon Shutter</i>	✓	* 1/21/18	✓	✓
Shutter indicates closed A and B (red), HMI	✓	* 1/21/18	✓	✓
<i>Open Beamline Photon Shutter</i>	✓	* 1/21/18	✓	✓
Shutter opens smoothly without hesitation	✓	* 1/21/18	✓	✓
Shutter indicates open A and B (green), HMI	✓	* 1/21/18	✓	✓
<i>Close Beamline Photon Shutter</i>	✓	* 1/21/18	✓	✓
Shutter indicates closed A and B (red), HMI	✓	* 1/21/18	✓	✓
	<u>S9</u>	1/21/18		
<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	✓			

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A25 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

Turn the "Air" switch ON

Open FE Photon Shutter and SSs A and B

Shutters open freely without hesitation

Shutters are in the open (up) position

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

Actuate Shutters closed

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

✓
✓
✓
✓
✓
✓
✓
✓

A26 FE Safety Shutters can only be Closed if FE Photon Shutter is Closed

Search hutch

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

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

Open FE SSA

SSA Open

Open FE Photon Shutter

FE Critical Device Permits A and B OFF, HMI

Close Shutters

Reset fault

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

Open FE SSB

SSB Open

Open FE Photon Shutter

FE Critical Device Permits A and B OFF, HMI

Close Shutters

Reset fault

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

✓
✓
✓
✓
✓
✓
✓
✓
✓
✓

A27 Beamline Enable Key (Opening Shutter Without Key Trips SR RF and Dipole PS)

Remove beamline enable key

Beamline Online A and B OFF

Search FOE

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

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

Using FE Shutter test fixture, Open FE Shutters

FE Critical Device Permits A and B OFF

Using FE Shutter test fixture, Close FE Shutters

Replace beamline enable key and reset faults

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

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

✓
✓
✓
✓
✓
✓
✓
✓

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Live Testing

A28 Reach Back FOE Door Switches

Secure P1 through P5	SR Secure, A and B chain, SR HMI	✓
Place actuators on FOE hutch door switches and Maglock.		
Search hutch	FOE Interlocked A and B ON (green), HMI	✓
	FE Critical Device Permits A and B ON (green), HMI	✓
Check Control Room SR HMI (MCR beamline 1)	FE Critical Device Permit A and B ON (green), SR HMI	✓
Check I/O Box 7 Beamline Enable Panel	FE Critical Device Permits A and B LEDs ON	✓
Check I/O Box 28 Beamline Enable Panel	FE Critical Device Permit Sum A and B LEDs ON	✓
Check Dipole PS (positive) Beamline Interface	A and B Permits ON, Dipole PS Pos. Interface	✓
Check Dipole PS (negative) Beamline Interface	A and B Permits ON, Dipole PS Neg. Interface	✓
Check SR RF System C HVPS Beamline Interface	A and B Permits ON, SR RF System C HVPS Interface	✓
Check SR RF System D HVPS Beamline Interface	A and B Permits ON, SR RF System D HVPS Interface	✓
Operator enables SR Dipole PS	SR Dipole PS is ON	✓
Operator enables SR RF System C HVPS	SR RF System C HVPS is ON	✓
Operator enables SR RF System D HVPS	SR RF System D HVPS is ON	✓
Using FE Shutter test fixture, open the FE Shutters (SSA, SSB and Photon)	FE Shutters open	✓
Remove an "A chain" door switch actuator from beamline hutch door	FOE Interlocked A OFF, HMI	✓
	FE Critical Device Permit A chain OFF, HMI	✓
Check I/O Box 7 Beamline Enable Panel	FE Critical Device Permit A LED OFF	✓
Check I/O Box 28 Beamline Enable Panel	FE Critical Device Permit Sum A LED OFF	✓
Check Control Room SR HMI (MCR beamline 1)	FE Critical Device Permit A OFF (red), SR HMI	✓
Check SR RF System C HVPS Beamline Interface	A Permit OFF, SR RF System C HVPS Interface	✓
Check SR RF System D HVPS Beamline Interface	A Permit OFF, SR RF System D HVPS Interface	✓
Check Dipole PS (positive) Beamline Interface	A Permit OFF, Dipole PS Pos. Interface	✓
Check Dipole PS (negative) Beamline Interface	A Permit OFF, Dipole PS Neg. Interface	✓
	SR RF System C HVPS is OFF	✓
	SR RF System D HVPS is OFF	✓

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	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 (MCR beamline 1)</i>	FE Critical Device Permit A and B ON (green), SR HMI	✓
<i>Check I/O Box 7 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	✓
Remove " B chain " switch actuator	FOE Interlocked B OFF, HMI	✓
	FE Critical Device Permit B chain OFF, HMI	✓
<i>Check I/O Box 7 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	✓

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 7-ID Radiological Interlock Test Checklist		
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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)

✓

A30 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

✓

A31 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 7-ID Test Checklist Completed

✓

A32 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-

National Synchrotron Light Source II, Brookhaven National Laboratory			
Doc No. PS-C-ASD-PRC-008	Author: T. McDonald	Effective Date: 17 April 2015 Review Frequency: 3 yrs	Version 4
Title: NSLS-II Area Radiation Monitor PPS Test			Technical

Attachment D

NSLS-II Beamline (FOE) Area Radiation Monitor Checklist

Note: Signatures below indicate that the test has been completed.

DET # **INO7649**

Monitor # FRM ID 7	ID # INO7650	Beamline: 7-ID
Test Reason: <input checked="" type="checkbox"/> Beamline Certification <input type="checkbox"/> Replacement/Repair		
Test Date: 1/6/18	Test Result	<input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
Tester: Thomas McDonald	RCD:	SHAWN BUCKLEW?
Tester Signature: <i>Thomas McDonald</i>	RCD Signature:	<i>Shawn Bucklew</i>

Fail Alarm: Place checkmark (✓) in checkbox (☐) for each correct response.

	Local Expected Observation	HMI/CR Expected Observation	Linac HMI	CR HMI
Operator turns on Gun	Gun HVPS is ON <input checked="" type="checkbox"/>	Gun Contactor ON A Chain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
RCD Disables Monitor		Alarm sounds in Control Room		<input checked="" type="checkbox"/>
	Fail alarm ON HMI (yellow border around ARM icon)		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Silence CR Alarm		Alarm silences		<input checked="" type="checkbox"/>
Gun turns OFF	Gun HVPS is OFF <input checked="" type="checkbox"/>	Gun Contactor OFF A Chain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Return monitor to normal	Gun HVPS remains OFF <input checked="" type="checkbox"/>	Fail alarm remains ON HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Reset fault in Control Room		Monitor normal HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
RCD ensures ARM is locked	ARM is locked <input checked="" type="checkbox"/>			

Low Alarm: Place checkmark (✓) in checkbox (☐) for each correct response.

	Local Expected Observation	HMI/CR Expected Observation	Beamline HMI	CR HMI/EPICS
Opens FE shutter (w/keypad)	FE Shutters open <input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Apply source until low alarm	Yellow light on Monitor <input checked="" type="checkbox"/>	Radiation level increases on EPICS		<input checked="" type="checkbox"/>
	FE Shutters Closed <input checked="" type="checkbox"/>	Alarm sounds in Control Room		<input checked="" type="checkbox"/>
		Low level alarm ON, HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Return monitor to normal		Monitor normal, HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	FE Critical Device Permit A chain ON		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Apply source until low alarm	Yellow light on Monitor <input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>
	FE Critical Device Permit A chain OFF		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Return monitor to normal		Monitor normal, HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

High Alarm: Place checkmark (✓) in checkbox (☐) for each correct response.

	Local Expected Observation	HMI/CR Expected Observation	Linac HMI	CR HMI/EPICS
Operator turns on Gun	Gun HVPS is ON <input checked="" type="checkbox"/>	Gun Contactor ON A Chain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Apply source until high alarm	Red light on Monitor <input checked="" type="checkbox"/>	Radiation level increases on EPICS		<input checked="" type="checkbox"/>
	Monitor alarm sounds	Alarm sounds in Control Room		<input checked="" type="checkbox"/>
		High level alarm ON, HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Silence Alarm		Alarm silences		<input checked="" type="checkbox"/>
Gun turns OFF	Gun HVPS is OFF <input checked="" type="checkbox"/>	Gun Contactor OFF A Chain	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Return monitor to normal	Gun HVPS remains OFF <input checked="" type="checkbox"/>	High level alarm remains ON, HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Reset fault in Control Room		Monitor normal, HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Description of Test Failures (if any): _____

