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National Synchrotron Light Source II, Brookhaven National Laboratory			
Doc No. <b>PS-C-XFD-PRC-062</b>	Author: <b>T. McDonald</b>	Effective Date: <b>27Jun2016</b> Review Frequency: <b>3 yrs</b>	Version <b>1</b>
Title: <b>Beamline 11-BM Radiological Interlock Test</b>			<b>Technical</b>

### Attachment A

### NSLS-II Beamline 11-BM Radiological Interlock Test Checklist

Test Reason: <b>Initial Test</b>	Test Result: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
Test Date: <b>7/16 - 7/13/2016</b>	Test Type: <input type="checkbox"/> Pre-Certification <input checked="" type="checkbox"/> Certification <input type="checkbox"/> Partial
Tester 1: <b>Thomas McDonald / Brian Heneveld</b>	Start Time: _____ Finish Time: _____
Tester 2: <b>Robert Chmiel / Gabrielle Sture</b>	Assistant 1: <b>Accelerator Operations Staff</b>
Tester 1 Signature: <i>Thomas McDonald</i>	Assistant 2: _____
*Reviewer 1:	Tester 2 Signature: <i>Robert Chmiel</i>
Reviewer 2:	Reviewer 1 sig.: _____
** Safety Signature 11-BM (Beamline HMI) A Chain: <b>7F07F68A</b> B Chain: <b>F91D9A3E</b>	Reviewer 2 sig.: _____
** Safety Signature Pentant 4 Beamline (SR HMI) A Chain: <b>F59D5BA3</b> B Chain: <b>A4FED138</b>	Previous 11-BM SS# _____ Date: / / A Chain: _____ B Chain: _____
	Previous Pentant 4 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 Mechanical Engineering for proper positioning	<input checked="" type="checkbox"/>
II. Inform Control Room Lead Operator that testing will be done	<input checked="" type="checkbox"/>
III. Obtain Beamline enable and PPS reset keys from Control Room	<input checked="" type="checkbox"/>
IV. Verify that beamline vacuum and water interlocks are satisfied	<input checked="" type="checkbox"/>
V. Place muffler on beam imminent sounder	<input checked="" type="checkbox"/>
VI. Request Lead Operator enable Master shutters	<input checked="" type="checkbox"/>

#### A1 **Verify System Lockouts**

- Gun HVPS output cable connector
- 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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	SB1 illuminates	<u>✓</u>	<u>✓</u>
	Close hutch door and press SBE	<u>✓</u>	<u>✓</u>
	Hutch does NOT secure	<u>✓</u>	<u>✓</u>
A4	<b>Search Timeout</b>		
	Repeat steps for each 11-BM hutch.	<b>A</b>	<b>B</b>
	Press first search button and <b>begin timing</b>	<u>✓</u>	<u>✓</u>
	Complete search <b>without pressing Final Search button</b>	<u>✓</u>	<u>✓</u>
	Search sounders off in 2 minutes	<u>✓</u>	<u>✓</u>
	Press Final Search button	<u>✓</u>	<u>✓</u>
	Search does not complete	<u>✓</u>	<u>✓</u>
A5	<b>Shutter Enable</b>		
	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 ( <b>green</b> )		<u>✓</u>
	Search the FOE		
	FE Shutter Permits A and B ON <b>after</b> Beam		
	Imminent Warning		<u>✓</u>
	Open FE shutters		<u>✓</u>
	FE Shutters A and B indicate open ( <b>green</b> )		<u>✓</u>
	"Beam On" sign is ON		<u>✓</u>
	Close FE shutters		<u>✓</u>
	FE Shutters A and B indicate closed ( <b>red</b> )		<u>✓</u>
A6	<b>Emergency Stops (ES) FOE (A Hutch)</b>		
	For each ES search hutch	<b>ES1</b>	<b>ES2</b>
	Open FE shutters	<u>✓</u>	<u>✓</u>
	FE Shutters A and B open ( <b>green</b> )	<u>✓</u>	<u>✓</u>
	FOE Interlocked A and B ON ( <b>green</b> )	<u>✓</u>	<u>✓</u>
	FE Shutter Permit A and B ON ( <b>green</b> )	<u>✓</u>	<u>✓</u>
	FE Critical Device Permits A and B ON	<u>✓</u>	<u>✓</u>
	Right Maglock A ON ( <b>green</b> )	<u>✓</u>	<u>✓</u>
	Left Maglock A ON ( <b>green</b> )	<u>✓</u>	<u>✓</u>
	Swing Maglock A ON ( <b>green</b> )	<u>✓</u>	<u>✓</u>
	Press ES	<u>✓</u>	<u>✓</u>
	FE Shutters A and B closed ( <b>red</b> )	<u>✓</u>	<u>✓</u>
	FOE Interlocked A and B OFF	<u>✓</u>	<u>✓</u>

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	FE Shutter Permit A and B OFF	✓	✓	✓
	FE Critical Device Permits A and B OFF	✓	✓	✓
	Right Maglock A OFF	✓	✓	✓
	Left Maglock A OFF	✓	✓	✓
	Swing Maglock A OFF	✓	✓	✓
	<i>Pull out ES</i>	✓	✓	✓
	ES Sum Latch OFF	✓	✓	✓
	<i>Reset fault</i>	✓	✓	✓
	ES Sum Latch ON ( <b>green</b> )	✓	✓	✓
<b>A7</b>	<b><i>Emergency Stops (ES) B Hutch</i></b>			
	For each ES search hutch	<b><u>ES1</u></b>	<b><u>ES2</u></b>	<b><u>ES3</u></b>
	<i>Open FE and LIS1 Shutters from keypad</i>	✓	✓	✓
	FE Shutters A and B open ( <b>green</b> )	✓	✓	✓
	LIS1 Shutter A and B open ( <b>green</b> )	✓	✓	✓
	B Interlocked A and B ON ( <b>green</b> )	✓	✓	✓
	LIS1 Shutter Permit A and B ON ( <b>green</b> )	✓	✓	✓
	FE Critical Device Permits A and B ON	✓	✓	✓
	Right Maglock A ON ( <b>green</b> )	✓	✓	✓
	Left Maglock A ON ( <b>green</b> )	✓	✓	✓
	<i>Press ES</i>	✓	✓	✓
	LIS1 Shutters A and B closed ( <b>red</b> )	✓	✓	✓
	B Interlocked A and B OFF	✓	✓	✓
	LIS1 Shutter Permit A and B OFF	✓	✓	✓
	FE Critical Device Permits A and B OFF	✓	✓	✓
	Right Maglock OFF	✓	✓	✓
	Left Maglock A OFF	✓	✓	✓
	<i>Pull out ES</i>	✓	✓	✓
	ES Sum Latch OFF	✓	✓	✓
	<i>Reset fault</i>	✓	✓	✓
	ES Sum Latch ON ( <b>green</b> )	✓	✓	✓



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<i>Remove one switch actuator</i>	✓	✓	✓	
L1S1 Shutters A and B closed ( <b>red</b> )	✓	✓	✓	
B Interlocked OFF	✓	✓	✓	
L1S1 Shutter Permit OFF	✓	✓	✓	
Cable Lab 1 Switch/Latch Permit OFF	✓	✓	✓	
FE Critical Device Permits A and B OFF	✓	✓	✓	
<i>Replace switch actuator and reset fault</i>	✓	✓	✓	
Remove labyrinth actuators and close labyrinth door				✓

**A10** **FOE Upstream Swing 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).

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

**A11** **FOE Downstream 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).

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	<b><u>A</u></b>	<b><u>B</u></b>	<b><u>Reed</u></b>	
<i>Search hutch</i>	<u>✓</u>	<u>✓</u>	<u>✓</u>	
<i>Open FE Shutters from keypad</i>	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FE Shutters A and B open ( <b>green</b> )	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FOE Interlocked A and B ON ( <b>green</b> )	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FE Shutter Permit A and B ON ( <b>green</b> )	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FOE Door Switch Sum A and B ON ( <b>green</b> )	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FE Critical Device Permits A and B ON	<u>✓</u>	<u>✓</u>	<u>✓</u>	
<i>Remove one switch actuator</i>	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FE Shutters A and B closed ( <b>red</b> )	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FOE Interlocked OFF	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FE Shutter Permit OFF	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FOE Door Switch Sum OFF	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FE Critical Device Permits A and B OFF	<u>✓</u>	<u>✓</u>	<u>✓</u>	
<i>Replace switch actuator and reset fault</i>	<u>✓</u>	<u>✓</u>	<u>✓</u>	
Remove actuators and close door				<u>✓</u>
<b>A12</b> <b>FOE Downstream Left Door Switches</b>				<u>✓</u>
Place actuators on the door switches and Maglock.				
Check the corresponding Permits for each switch tested (e.g., A Permit for switch A).				
	<b><u>A</u></b>	<b><u>B</u></b>	<b><u>Reed</u></b>	
<i>Search hutch</i>	<u>✓</u>	<u>✓</u>	<u>✓</u>	
<i>Open FE Shutters from keypad</i>	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FE Shutters A and B open ( <b>green</b> )	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FOE Interlocked A and B ON ( <b>green</b> )	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FE Shutter Permit A and B ON ( <b>green</b> )	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FOE Door Switch Sum A and B ON ( <b>green</b> )	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FE Critical Device Permits A and B ON	<u>✓</u>	<u>✓</u>	<u>✓</u>	
<i>Remove one switch actuator</i>	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FE Shutters A and B closed ( <b>red</b> )	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FOE Interlocked OFF	<u>✓</u>	<u>✓</u>	<u>✓</u>	
FE Shutter Permit OFF	<u>✓</u>	<u>✓</u>	<u>✓</u>	

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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				✓

**A13 B Hutch 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 A).

	<u>A</u>	<u>B</u>	<u>Reed</u>	
<i>Search hutch</i>	✓	✓	✓	
<i>Open FE and LIS1 Shutters from keypad</i>	✓	✓	✓	
LIS1 Shutters A and B open (green)	✓	✓	✓	
B Interlocked A and B ON (green)	✓	✓	✓	
LIS1 Shutter Permit A and B ON (green)	✓	✓	✓	
B Door Switch Sum A and B ON (green)	✓	✓	✓	
FE Critical Device Permits A and B ON	✓	✓	✓	
<i>Remove one switch actuator</i>	✓	✓	✓	
LIS1 Shutters A and B closed (red)	✓	✓	✓	
B Interlocked OFF	✓	✓	✓	
LIS1 Shutter Permit OFF	✓	✓	✓	
B 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				✓

**A14 B Hutch 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 A).

	<u>A</u>	<u>B</u>	<u>Reed</u>	
<i>Search hutch</i>	✓	✓	✓	
<i>Open FE and LIS1 Shutters from keypad</i>	✓	✓	✓	
LIS1 Shutters A and B open (green)	✓	✓	✓	
B Interlocked A and B ON (green)	✓	✓	✓	

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L1S1 Shutter Permit A and B ON ( <b>green</b> )	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B Door Switch Sum A and B ON ( <b>green</b> )	<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"/>
L1S1 Shutters A and B closed ( <b>red</b> )	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B Interlocked OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1S1 Shutter Permit OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
B 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"/>

A15 **Magnetic Lock Test (FOE)**

Connect the FOE test box (Attachment B Figure B4) to the PPS cabinet (Attachment B Figure B7). Use the box to turn ON the Maglocks (set switches to "Normal").

Repeat steps for each door: Upstream Swing (US), Downstream Right (DR), Downstream Left (DL)

	<b>US</b>	<b>DR</b>	<b>DL</b>
<i>Search hutch</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Interlocked A and B ON ( <b>green</b> )	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutter Permit A and B ON ( <b>green</b> )	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Door Maglock A and B ON ( <b>green</b> )	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Open FE Shutters</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutters open ( <b>green</b> )	<input checked="" type="checkbox"/>	<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"/>	<input checked="" type="checkbox"/>
Door Maglock A OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutters closed ( <b>red</b> )	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Interlocked A OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutter Permit A OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Turn On Maglock and reset fault</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Search hutch</i>	<input checked="" type="checkbox"/>	<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"/>	<input checked="" type="checkbox"/>

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FE Critical Device Permits A and B ON

✓      ✓      ✓  
✓      ✓      ✓

Using FOE test box, turn OFF Maglock

Within 3 seconds:

FE Critical Devices Permits A Chain OFF

✓      ✓      ✓

Disconnect the FOE test box and reset fault

✓

**A16 Magnetic Lock Test (B Hutch)**

Connect the FOE test box (Attachment B Figure B4) to the PPS cabinet (Attachment B Figure B7). Use the box to turn ON the Maglocks (set switches to "Normal").

✓

Repeat steps for each door: Right (R), Left (L)

	<b><u>R</u></b>	<b><u>L</u></b>
Search hutch	<u>✓</u>	<u>✓</u>
B Interlocked A and B ON (green)	<u>✓</u>	<u>✓</u>
L1S1 Shutter Permit A and B ON (green)	<u>✓</u>	<u>✓</u>
Door Maglock A and B ON (green)	<u>✓</u>	<u>✓</u>
Open FE and L1S1 Shutters	<u>✓</u>	<u>✓</u>
Shutters open (green)	<u>✓</u>	<u>✓</u>
Using FOE test box, turn OFF Maglock	<u>✓</u>	<u>✓</u>
Door Maglock A OFF	<u>✓</u>	<u>✓</u>
L1S1 Shutters closed (red)	<u>✓</u>	<u>✓</u>
B Interlocked A OFF	<u>✓</u>	<u>✓</u>
L1S1 Shutter Permit A OFF	<u>✓</u>	<u>✓</u>
Turn On Maglock and reset fault	<u>✓</u>	<u>✓</u>
Search hutch	<u>✓</u>	<u>✓</u>
Using Shutter test fixture, Open FE and L1S1 Shutters	<u>✓</u>	<u>✓</u>
FE Critical Device Permits A and B ON	<u>✓</u>	<u>✓</u>
Using FOE test box, turn OFF Maglock	<u>✓</u>	<u>✓</u>
Within 3 seconds:		
FE Critical Devices Permits A Chain OFF	<u>✓</u>	<u>✓</u>
Disconnect the FOE test box and reset fault		<u>✓</u>

**A17 Observe FE Safety Shutter(s) Operation**

With Maintenance Door open, connect FE Shutter test fixture (Attachment B Figure B5).

✓

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	Shutters are in the closed (down) position	✓
	FE Shutter Closed A and B ( <b>red</b> ), HMI	✓
<i>Turn the "Air" switch ON</i>		✓
<i>Open FE Photon Shutter and SSs A and B</i>	Shutters open freely without hesitation	✓
	Shutters are in the open (up) position	✓
	FE Shutter Open A and B ( <b>green</b> ), HMI	✓
<i>Actuate Shutters closed</i>	FE Shutter Closed A and B ( <b>red</b> ), HMI	✓
<b>A18</b>	<b>FE Safety Shutters can only be Closed if FE Photon Shutter is Closed</b>	
<i>Search hutch</i>	FOE Interlocked A and B ON ( <b>green</b> ), HMI	✓
	FE Critical Devices Permits A and B ON ( <b>green</b> ), HMI	✓
<i>Open FE SSA</i>	SSA Open	✓
<i>Open FE Photon Shutter</i>	FE Critical Devices Permits A and B OFF, HMI	✓
<i>Close Shutters</i>		✓
<i>Reset fault</i>	FE Critical Devices Permits A and B ON ( <b>green</b> ), HMI	✓
<i>Open FE SSB</i>	SSB Open	✓
<i>Open FE Photon Shutter</i>	FE Critical Devices Permits A and B OFF, HMI	✓
<i>Close Shutters</i>		✓
<i>Reset fault</i>	FE Critical Devices Permits A and B ON ( <b>green</b> ), HMI	✓
<b>A19</b>	<b>Beamline Enable Key (Opening shutter without key trips SR RF and Dipole PS)</b>	
<i>Remove beamline enable key</i>	Beamline Online A and B OFF	✓
<i>Search FOE</i>	FOE Interlocked A and B ON ( <b>green</b> ), HMI	✓
	FE Critical Devices Permits A and B ON ( <b>green</b> ), HMI	✓
<i>Using FE Shutter test fixture, Open FE Shutters</i>	FE Critical Devices Permits A and B OFF	✓
<i>Replace beamline enable key and reset faults</i>	Beamline Online A and B ON ( <b>green</b> )	✓
	<b>Live Testing</b>	
<b>A20</b>	<b>Reach Back FOE Door Switches</b>	
<i>Secure P1 through P5</i>	SR Secure, A and B chain, SR HMI	✓
<i>Place actuators on FOE hutch downstream left door switches and Maglock</i>		✓
<i>Search hutch</i>	FOE Interlocked A and B ON ( <b>green</b> ), HMI	✓

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	FE Critical Devices Permits A and B ON ( <b>green</b> ), HMI	<input checked="" type="checkbox"/>
<i>Check Control Room SR HMI (MCR beamline 1)</i>	FE Critical Device Permit A and B ON ( <b>green</b> ), SR HMI	<input checked="" type="checkbox"/>
<i>Check I/O Box 11BM Beamline Enable Panel</i>	FE Critical Devices 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"/>
	FE Shutters Closed A and B LEDs ON	<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, open the FE Shutters (SSA, SSB and Photon)</i>		<input checked="" type="checkbox"/>
	FE Shutters Open	<input checked="" type="checkbox"/>
<i>Remove an "A chain" door switch actuator from beamline hutch door</i>		<input checked="" type="checkbox"/>
	FOE Interlocked A OFF, HMI	<input checked="" type="checkbox"/>
	FE Critical Devices Permits A chain OFF, HMI	<input checked="" type="checkbox"/>
<i>Check I/O Box 11BM Beamline Enable Panel</i>	FE Critical Devices Permit A LED OFF	<input checked="" type="checkbox"/>
<i>Check I/O Box 28 Beamline Enable Panel</i>	FE Critical Device Permit Sum A LED OFF	<input checked="" type="checkbox"/>
<i>Check Control Room SR HMI (MCR beamline 1)</i>	FE Critical Device Permit A OFF ( <b>red</b> ), SR HMI	<input checked="" type="checkbox"/>
<i>Check SR RF System C HVPS Beamline Interface</i>	A Permits OFF, SR RF System C HVPS Interface	<input checked="" type="checkbox"/>
<i>Check SR RF System D HVPS Beamline Interface</i>	A Permits OFF, SR RF System D HVPS Interface	<input checked="" type="checkbox"/>
<i>Check Dipole PS (positive) Beamline Interface</i>	A Permits OFF, Dipole PS Pos. Interface	<input checked="" type="checkbox"/>
<i>Check Dipole PS (negative) Beamline Interface</i>	A 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"/>
	SR Dipole PS is OFF	<input checked="" type="checkbox"/>
<i>Close Shutters</i>	Shutters closed	<input checked="" type="checkbox"/>

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Replace "**A chain**" door switch actuator and reset fault(s)

*Search hutch*

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

FE Critical Devices 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 11BM Beamline Enable Panel*

FE Critical Device Permit Sum A and B LEDs ON

*Check I/O Box 28 Beamline Enable Panel*

FE Critical Device Permit Sum A and B LEDs ON

FE Shutters Closed 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 "**B chain**" switch actuator

FOE Interlocked B OFF, HMI

FE Critical Devices Permit B OFF, HMI

*Check I/O Box 11BM Beamline Enable Panel*

FE Critical Devices Permit B LED OFF

*Check Control Room SR HMI (MCR beamline 1)*

FE Critical Device Permit B OFF (**red**), SR HMI

*Check I/O Box 28 Beamline Enable Panel*

FE Critical Device Permit Sum B LED OFF

*Check SR RF System C HVPS Beamline Interface*

B Permits OFF, SR RF System C HVPS Interface

*Check SR RF System D HVPS Beamline Interface*

B Permits OFF, SR RF System D HVPS Interface

*Check Dipole PS (positive) Beamline Interface*

B Permits OFF, Dipole PS Pos. Interface

*Check Dipole PS (negative) Beamline Interface*

B Permits OFF, Dipole PS Neg. Interface

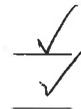
SR Dipole PS is OFF

SR RF System C HVPS is OFF

SR RF System D HVPS is OFF

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*Close FE Shutters with test fixture*



*Remove hutch switch and Maglock actuators*



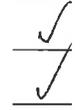
**A21** **Observe All Shutters Closed Sum**

*Check I/O Box 28 Beamline Enable Panel*

FE Shutters closed A chain light ON

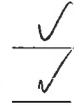


FE Shutters closed B chain light ON



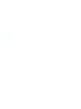
*Using FE Shutter test fixture open both FE SSs and then Photon Shutter*

FE Shutters open (**green**), HMI



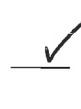
*Check I/O Box 28 Beamline Enable Panel*

FE Shutters closed A chain light OFF



FE Shutters closed B chain light OFF

*Close FE Shutters and remove FE shutter test fixture*



**A22** **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 11-BM Test Checklist Completed

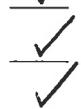


**A23** **Test Completion**

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 mufflers from beam imminent sounders



Ensure PPS cabinets are secure and locked; challenge locks



Remove all LOTO



Inform Lead Operator that testing is complete



**- END ATTACHMENT A -**