

National Synchrotron Light Source II, Brookhaven National Laboratory			
Doc No. PS-C-XFD-PRC-041	Author: T. McDonald	Effective Date: 29Jan2016 Review Frequency: 3 yrs	Version 1
Title: Beamline 17-ID Radiological Interlock Test			Technical

Attachment A

NSLS-II Beamline 17-ID Radiological Interlock Test Checklist

Test Reason: <i>Initial Test</i>	Test Result: <input checked="" type="checkbox"/> Passed <input type="checkbox"/> Failed
	Test Type: <input type="checkbox"/> Pre-Certification <input checked="" type="checkbox"/> Certification <input type="checkbox"/> Partial
Test Date: <i>12/21/15 - 1/8/16</i>	Start Time: _____ Finish Time: _____
Tester 1: <i>Tom McDonald / Brian Heneveld</i>	Assistant 1: <i>Accelerator Division Staff</i>
Tester 2: <i>Robert Chmiel / Gabrielle Stuve</i>	Assistant 2: _____
Tester 1 Signature: <i>Thomas P. McDonald</i>	Tester 2 Signature: <i>Robert Chmiel</i>
*Reviewer 1:	Reviewer 1 sig.: _____
Reviewer 2:	Reviewer 2 sig.: _____
** Safety Signature 17-ID (Beamline HMI) A Chain: <i>0B2FG12A</i> B Chain: <i>8550BE8D</i>	Previous 17-ID SS# _____ Date: / / A Chain: _____ B Chain: _____
** Safety Signature Pentant 5 Beamline (SR HMI) A Chain: <i>043690BB</i> B Chain: <i>4A642325</i>	Previous Pentant 5 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 PS line cords (3) OR Booster Dipole F PS 480V

Booster RF HVPS 480V 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**

Repeat steps for each 17-ID Hutch

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	<u>A</u>	<u>B</u>	<u>C</u>
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, <i>Beamline Enclosure Search and Secure and Breaking Security Procedure</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Close all hutch secondary doors</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
"Entry Permitted" signs ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Using the keypad, lock the closed doors</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Press SB1</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SB1 illuminates	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Search sounder sounds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Search yellow beacon flashing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Press SB2</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
SB2 illuminates; in hutch B the inner area "Interlocked" sign turns ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>For the "C" hutch close gate and press SB3 and SB4</i>			<input checked="" type="checkbox"/>
Inner area "Interlocked" sign turns ON; SB3 illuminates			<input checked="" type="checkbox"/>
SB4 illuminates			<input checked="" type="checkbox"/>
<i>Exit hutch and close main door</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Press SBE and begin timing</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Beam imminent alarm sounds for 30 seconds	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
After warning, (FOE, B, C) Interlocked A and B ON (green), HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
"Interlocked" signs ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Maglock A and B ON (green), all doors, HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Press the SBE/Access Button</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Interlocked signs OFF, "Entry Permitted" signs are ON	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE, B, C Interlocked A and B OFF, HMI	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Maglock A OFF (may require opening Maglock on key pad)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Open door</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Door opens, Maglock B OFF door	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

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

Press SB2

SB2 does not illuminate

Press SB1

SB1 illuminates

Close hutch door and press SBE

Hutch does NOT secure

<u>A</u>	<u>B</u>
<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"/>

A4 **Out of Sequence Search C Hutch Inner Area**

Press SB2

SB2 does not illuminate

Press SB1

SB1 illuminates

Close Gate and press SB3

Inner Area does not secure

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

A5 **Out of Sequence Search C Hutch Outer Area**

Press SB1, SB2, Close Gate and Press SB3

Inner Area "Interlocked" Sign is ON

Close hutch door and press SBE

Hutch does NOT secure

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

A6 **Search Timeout**

Repeat steps for each 17-ID Hutch (I = inner, o = outer)

Press first search button and **begin timing**

Complete search **without pressing Final Search button**

Search sounders off in the FOE (A hutch) in 2 minute

Search sounders off in B inner (Bi) area in 2 minutes

Search sounders off in B outer (Bo) area in 2 minutes

<u>A</u>	<u>Bi</u>	<u>Bo</u>	<u>Ci</u>	<u>Co</u>
<input checked="" type="checkbox"/>				
<input checked="" type="checkbox"/>				
<input checked="" type="checkbox"/>				
	<input checked="" type="checkbox"/>			
		<input checked="" type="checkbox"/>		

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Search sounders off in C inner (Ci) area in 2 minutee

Search sounders off in C outer (Co) area in 2 minutes

Press Final Search button

Search does not complete

A7 Shutter Enable

Place actuators on downstream left 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**)

“Beam On” sign is ON

Close FE shutters

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

A8 Emergency Stops (ES) FOE (A Hutch)

For each ES search hutch

ES1 **ES2** **ES3** **ES4**

Open FE shutters from keypad

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

FOE Secure A and B ON (**green**)

FE Shutter Permit 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 Secure A and B OFF

FE Shutter Permit 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**)

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A9 Emergency Stops (ES) B Hutch

	<u>ES1</u>	<u>ES2</u>	<u>ES3</u>
For each ES search hutch			
<i>Open FE and LIS1 Shutters from keypad</i>	✓	✓	✓
FE Shutters A and B open (green)	✓	✓	✓
LIS1 Shutter A and B open (green)	✓	✓	✓
B Secure A and B ON (green)	✓	✓	✓
Internal Area Interlocked A and B ON (green)	✓	✓	✓
FE Shutter Permit A and B ON (green)	✓	✓	✓
FE Critical Device Permits A and B ON	✓	✓	✓
Front Maglock ON A and B (green)	✓	✓	✓
Rear Maglock ON A and B (green)	✓	✓	✓
<i>Press ES</i>	✓	✓	✓
FE Shutters A and B closed (red)	✓	✓	✓
LIS1 Photon Shutter A and B closed (red)	✓	✓	✓
B Secure A and B OFF	✓	✓	✓
Internal Area Interlocked A and B OFF	✓	✓	✓
LIS1 Shutter Permit A and B OFF	✓	✓	✓
FE Critical Device Permits A and B OFF	✓	✓	✓
Front Maglock A OFF	✓	✓	✓
Rear Maglock A OFF	✓	✓	✓
<i>Pull out ES</i>	✓	✓	✓
ES Sum Latch OFF	✓	✓	✓
<i>Reset fault</i>	✓	✓	✓
ES Sum Latch ON (green)	✓	✓	✓

A10 Emergency Stops (ES) C Hutch

	<u>ES1</u>	<u>ES2</u>	<u>ES3</u>	<u>ES4</u>
For each ES search hutch				
<i>Open FE and LIS2 Shutters from keypad</i>	✓	✓	✓	✓
FE Shutters A and B open (green)	✓	✓	✓	✓
LIS2 Shutter A and B open (green)	✓	✓	✓	✓
C Secure A and B ON (green)	✓	✓	✓	✓

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Internal Area Interlocked A and B ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1S2 Shutter Permit A and B ON (green)	<input checked="" type="checkbox"/>	<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"/>	<input checked="" type="checkbox"/>
Front Right Maglock ON A and B (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Front Left Maglock ON A and B (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Press ES</i>	<input checked="" type="checkbox"/>	<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"/>	<input checked="" type="checkbox"/>
L1S2 Photon Shutter A and B closed (red)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C Secure A and B OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Area Interlocked A and B OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1S2 Shutter Permit A and B OFF	<input checked="" type="checkbox"/>	<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"/>	<input checked="" type="checkbox"/>
Front Right Maglock A OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Front Left Maglock A OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Pull out ES</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
ES Sum Latch OFF	<input checked="" type="checkbox"/>	<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"/>	<input checked="" type="checkbox"/>
ES Sum Latch ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

A11 FOE Labyrinth 1 Switches and Latches

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

Check the corresponding Permits for each switch tested (e.g., A Permit for switch A1). Latch trips on both A and B Permits. **Note:** B chain reed and push button switches must be cycled together for reset.

	<u>A1</u>	<u>A2</u>	<u>B1</u>	<u>B2</u>	<u>Latch</u>
<i>Search hutch</i>	<input checked="" type="checkbox"/>				
<i>Open FE Shutters from keypad</i>	<input checked="" type="checkbox"/>				
FE Shutters A and B open (green)	<input checked="" type="checkbox"/>				
FOE Secure A and B Permit ON (green)	<input checked="" type="checkbox"/>				
FE Shutter Permit A and B ON (green)	<input checked="" type="checkbox"/>				
Cable Lab Switches/Latch A and B ON (green)	<input checked="" type="checkbox"/>				
FE Critical Device Permits A and B ON	<input checked="" type="checkbox"/>				

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

A12 Hutch C Labyrinth 1 Switches and Latches

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

Check the corresponding Permits for each switch tested (e.g., A Permit for switch A1). Latch trips on both A and B Permits. **Note:** B chain reed and push button switches must be cycled together for reset.

	<u>A1</u>	<u>A2</u>	<u>B1</u>	<u>B2</u>	<u>Latch</u>
<i>Search hutch</i>	<input checked="" type="checkbox"/>				
<i>Open FE and LIS2 Shutters from keypad</i>	<input checked="" type="checkbox"/>				
LIS2 Shutter A and B open (green)	<input checked="" type="checkbox"/>				
C Secure A and B Permit ON (green)	<input checked="" type="checkbox"/>				
LIS2 Shutter Permit A and B ON (green)	<input checked="" type="checkbox"/>				
Cable Lab 1 Switches/Latch A and B ON (green)	<input checked="" type="checkbox"/>				
FE Critical Device Permits A and B ON	<input checked="" type="checkbox"/>				
<i>Remove one switch actuator</i>	<input checked="" type="checkbox"/>				
Cable Lab 1 Switch/Latch Permit OFF	<input checked="" type="checkbox"/>				
C Secure Permit OFF	<input checked="" type="checkbox"/>				
LIS2 Shutter Permit OFF	<input checked="" type="checkbox"/>				
LIS2 Shutter A and B closed (red)	<input checked="" type="checkbox"/>				
FE Critical Device Permits A and B OFF	<input checked="" type="checkbox"/>				
<i>Replace switch actuator and reset fault</i>	<input checked="" type="checkbox"/>				
Remove labyrinth actuators and close labyrinth door					<input checked="" type="checkbox"/>

A13 Hutch C Labyrinth 2 Switches and Latches

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

Check the corresponding Permits for each switch tested (e.g., A Permit for switch A1). Latch trips on both A and B Permits. **Note:** B chain reed and push button switches must be cycled together for reset.

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	<u>A1</u>	<u>A2</u>	<u>B1</u>	<u>B2</u>	<u>Latch</u>
<i>Search hutch</i>	✓	✓	✓	✓	✓
<i>Open FE and LIS2 Shutters from keypad</i>	✓	✓	✓	✓	✓
LIS2 Shutter A and B open (green)	✓	✓	✓	✓	✓
C Secure A and B Permit ON (green)	✓	✓	✓	✓	✓
LIS2 Shutter Permit A and B ON (green)	✓	✓	✓	✓	✓
Cable Lab 2 Switches/Latch A and B ON (green)	✓	✓	✓	✓	✓
FE Critical Device Permits A and B ON	✓	✓	✓	✓	✓
<i>Remove one switch actuator</i>	✓	✓	✓	✓	✓
Cable Lab 2 Switch/Latch Permit OFF	✓	✓	✓	✓	✓
C Secure Permit OFF	✓	✓	✓	✓	✓
LIS2 Shutter Permit OFF	✓	✓	✓	✓	✓
LIS2 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					✓

A14 **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).

	<u>A1</u>	<u>A2</u>	<u>B1</u>	<u>B2</u>	<u>Reed</u>
<i>Search hutch</i>	✓	✓	✓	✓	✓
<i>Open FE Shutters from keypad</i>	✓	✓	✓	✓	✓
FE Shutters A and B open (green)	✓	✓	✓	✓	✓
FOE Secure A and B Permit ON (green)	✓	✓	✓	✓	✓
FE Shutter Permit 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 Secure Permit OFF	✓	✓	✓	✓	✓

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FE Shutter Permit OFF	<input checked="" type="checkbox"/>				
FOE Door Switch Sum OFF	<input checked="" type="checkbox"/>				
FE Critical Device Permits A and B OFF	<input checked="" type="checkbox"/>				
<i>Replace switch actuator and reset fault</i>	<input checked="" type="checkbox"/>				
Remove actuators and close door					<input checked="" type="checkbox"/>

A15 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).

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

A16 B Hutch Front 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>A1</u>	<u>A2</u>	<u>B1</u>	<u>B2</u>	<u>Reed</u>
<i>Search hutch</i>	<input checked="" type="checkbox"/>				
<i>Open FE and LIS1 Shutters from keypad</i>	<input checked="" type="checkbox"/>				
FE Shutters A and B open (green)	<input checked="" type="checkbox"/>				

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L1S1 Shutter A and B open (green)	<input checked="" type="checkbox"/>				
B Secure A and B Permit ON (green)	<input checked="" type="checkbox"/>				
L1S1 Shutter Permit A and B ON (green)	<input checked="" type="checkbox"/>				
B Door Switch Sum A and B ON (green)	<input checked="" type="checkbox"/>				
FE Critical Device Permits A and B ON	<input checked="" type="checkbox"/>				
<i>Remove one switch actuator</i>	<input checked="" type="checkbox"/>				
L1S1 Shutter A and B closed (red)	<input checked="" type="checkbox"/>				
B Secure Permit OFF	<input checked="" type="checkbox"/>				
L1S1 Shutter Permit OFF	<input checked="" type="checkbox"/>				
B Door Switch Sum Permit OFF	<input checked="" type="checkbox"/>				
FE Critical Device Permits A and B OFF	<input checked="" type="checkbox"/>				
<i>Replace switch actuator and reset fault</i>	<input checked="" type="checkbox"/>				
Remove actuators and close door					<input checked="" type="checkbox"/>
A17 B Hutch Light Curtain (Closes Shutter)					
Place actuators on the door switches and Maglock.					<input checked="" type="checkbox"/>
<i>Search hutch</i>					<input checked="" type="checkbox"/>
<i>Open FE and L1S1 Shutters from keypad</i>					<input checked="" type="checkbox"/>
FE Shutters A and B open (green)					<input checked="" type="checkbox"/>
L1S1 Shutter A and B open (green)					<input checked="" type="checkbox"/>
Internal Area Interlocked A and B (green)					<input checked="" type="checkbox"/>
B Secure A and B Permit ON (green)					<input checked="" type="checkbox"/>
L1S1 Shutter Permit A and B ON (green)					<input checked="" type="checkbox"/>
Light Curtain A and B ON (green)					<input checked="" type="checkbox"/>
<i>Break Path of the Light Curtain</i>					<input checked="" type="checkbox"/>
L1S1 Shutter A and B closed (red)					<input checked="" type="checkbox"/>
L1S Shutter A and B Permit OFF					<input checked="" type="checkbox"/>
Internal Area Interlocked OFF. A and B					<input checked="" type="checkbox"/>
B Secure A and B Permit ON (green)					<input checked="" type="checkbox"/>
Light Curtain A and B OFF (while broken)					<input checked="" type="checkbox"/>
Remove actuators and close door					<input checked="" type="checkbox"/>

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A18 C 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 A1).

	<u>A1</u>	<u>A2</u>	<u>B1</u>	<u>B2</u>	<u>Reed</u>
<i>Search hutch</i>	✓	✓	✓	✓	✓
<i>Open FE and LIS2 Shutters from keypad</i>	✓	✓	✓	✓	✓
FE Shutters A and B open (green)	✓	✓	✓	✓	✓
LIS2 Shutter A and B open (green)	✓	✓	✓	✓	✓
C Secure A and B Permit ON (green)	✓	✓	✓	✓	✓
LIS2 Shutter Permit A and B ON (green)	✓	✓	✓	✓	✓
C Door Switch Sum A and B ON (green)	✓	✓	✓	✓	✓
FE Critical Device Permits A and B ON	✓	✓	✓	✓	✓
<i>Remove one switch actuator</i>	✓	✓	✓	✓	✓
LIS2 Shutter A and B closed (red)	✓	✓	✓	✓	✓
C Secure Permit OFF	✓	✓	✓	✓	✓
LIS2 Shutter Permit OFF	✓	✓	✓	✓	✓
C 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					✓

A19 C 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 A1).

	<u>A1</u>	<u>A2</u>	<u>B1</u>	<u>B2</u>	<u>Reed</u>
<i>Search hutch</i>	✓	✓	✓	✓	✓
<i>Open FE and LIS2 Shutters from keypad</i>	✓	✓	✓	✓	✓
FE Shutters A and B open (green)	✓	✓	✓	✓	✓
LIS2 Shutter A and B open (green)	✓	✓	✓	✓	✓
C Secure A and B Permit ON (green)	✓	✓	✓	✓	✓
LIS2 Shutter Permit A and B ON (green)	✓	✓	✓	✓	✓
C Door Switch Sum A and B ON (green)	✓	✓	✓	✓	✓

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FE Critical Device Permits A and B ON	<input checked="" type="checkbox"/>				
<i>Remove one switch actuator</i>	<input checked="" type="checkbox"/>				
L1S2 Shutter A and B closed (red)	<input checked="" type="checkbox"/>				
C Secure Permit OFF	<input checked="" type="checkbox"/>				
L1S2 Shutter Permit OFF	<input checked="" type="checkbox"/>				
C Door Switch Sum OFF	<input checked="" type="checkbox"/>				
FE Critical Device Permits A and B OFF	<input checked="" type="checkbox"/>				
<i>Replace switch actuator and reset fault</i>	<input checked="" type="checkbox"/>				
Remove actuators and close door					<input checked="" type="checkbox"/>

A20 C Hutch Gate Switches

Place actuators on the door switches and Maglock.	<input checked="" type="checkbox"/>
Check the corresponding Permits for each switch tested (e.g., A Permit for switch A1).	

	<u>A1</u>	<u>B1</u>
<i>Search hutch</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Open FE and L1S2 Shutter from keypad</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutters A and B open (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1S2 Shutter A and B open (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Area Interlocked A and B (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
CB Secure A and B Permit ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1S2 Shutter Permit A and B ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Remove one actuator</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1S2 A and B closed (red)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
L1S2 Shutter Permit OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Internal Area Interlocked Permit OFF	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C Secure A and B Permit ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Replace switch actuator and reset fault</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Remove actuators and close gate		<input checked="" type="checkbox"/>

A21 Magnetic Lock Test (FOE)

Connect the FOE test box (Attachment B Figure B5) to the PPS cabinet (Attachment B Figure B8). Use the box to turn ON the Maglocks (set switches to "Normal").

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

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	R	L
<i>Search Hutch</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Secure A and B Permit ON (green)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FE Shutter Permit 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"/>
FOE Shutters Closed (red)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
FOE Secure A Permit 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 FOE Shutters</i>	<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 Devices Permits A Chain OFF</i>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

A22 Magnetic Lock Test (B Hutch)

Connect the FOE test box (Attachment B Figure B5) to the PPS cabinet (Attachment B Figure B8). Use the box to turn ON the Maglocks (set switches to "Normal").

	F
<i>Search Hutch</i>	<input checked="" type="checkbox"/>
B Secure A and B Permit ON (green)	<input checked="" type="checkbox"/>
L2S1 Shutter Permit A and B ON (green)	<input checked="" type="checkbox"/>
Door Maglock A and B ON (green)	<input checked="" type="checkbox"/>
<i>Open FE and L2S1 Shutters</i>	<input checked="" type="checkbox"/>
Shutters Open (green)	<input checked="" type="checkbox"/>
<i>Using FOE test box, turn OFF Maglock</i>	<input checked="" type="checkbox"/>
Door Maglock A OFF	<input checked="" type="checkbox"/>
Shutters Closed (red)	<input checked="" type="checkbox"/>
B Secure A Permit OFF	<input checked="" type="checkbox"/>

OK
1/28/16

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L2S1 Shutter Permit A OFF

Turn On Maglock and reset fault

Search Hutch

Using FE Shutter test fixture, Open Shutters

Using FOE test box, turn OFF Maglock

Within 3 seconds: FE Critical Devices Permits A Chain OFF

✓
✓
✓
✓
✓
✓

A23 Magnetic Lock Test (C Hutch)

Connect the FOE test box (Attachment B Figure B5) to the PPS cabinet (Attachment B Figure B8). Use the box to turn ON the Maglocks (set switches to "Normal").

✓

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

Search Hutch

C Secure A and B Permit ON (green)

L2S2 Shutter Permit A and B ON (green)

Door Maglock A and B ON (green)

Open FE and L2S2 Shutters

FE Shutters Open (green)

Using FOE test box, turn OFF Maglock

Door Maglock A OFF

Shutters Closed (red)

C Secure A Permit OFF

L2S2 Shutter Permit A OFF

Turn On Maglock and reset fault

Search Hutch

Using FE Shutter test fixture, Open Shutters

Using FOE test box, turn OFF Maglock

Within 3 seconds:

FE Critical Devices Permits A Chain OFF

R	L
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓
✓	✓

Disconnect FOE test box from PPS cabinet

✓

A24 Water Interlock

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

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Figure 1: Water Meters

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 4 PPS meters in GPM. Water Circuit numbers are in ().

Meter Reading	Meter Reading	Current STA A	Current STA B
A1(1)= <u>1.71</u>	B1= <u>1.72</u>	A STA1= <u>1.71</u>	B STA1= <u>1.72</u>
A2(4)= <u>1.56</u>	B2= <u>1.56</u>	A STA2= <u>1.56</u>	B STA2= <u>1.56</u>
A3(7)= <u>1.56</u>	B3= <u>1.54</u>	A STA3= <u>1.56</u>	B STA3= <u>1.54</u>
A4(8)= <u>2.25</u>	B4= <u>2.28</u>	A STA4= <u>2.25</u>	B STA4= <u>2.27</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: 1.3 GPM	1.11 GPM	A STA1= <u>1.25</u>	B STA1= <u>1.25</u>
PPS 2: 0.6 GPM	0.51 GPM	A STA2= <u>0.59</u>	B STA2= <u>0.59</u>

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Open FE Shutters with keypad

- FE Shutters A and B open (**green**)
- Water Permits A and B ON (**green**), HMI
- FE Shutter Permits A and B ON (**green**), HMI

✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓
✓	✓	✓	✓

Press B chain fault/reset button

- FE Shutters A and B closed (**red**)
- Water Permit B OFF, HMI
- In 5 seconds FE Shutter Permits B OFF, HMI

Reset fault

A26 PPS Aperture

The PPS Aperture Transmitter meters are located inside the FOE (Figure 3). The STAs are located in the PPS cabinet outside of the FOE (Figure 4).



Figure 3: Transmitter Meters

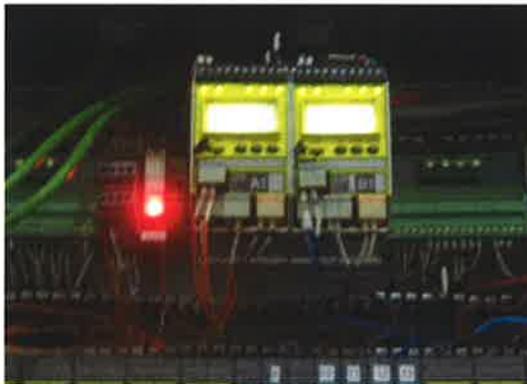


Figure 4: Aperture STA

Record the Transmitter meter readings (absolute pressure):

Meter Reading	Meter Reading	Current STA A	Current STA B
A1= <u>22.23</u>	B1= <u>22.15</u>	A STA1= <u>22.24</u>	B STA1= <u>22.19</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, turn to below trip point at 18 psia

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

A 17.9 B 17.9

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

A27 **PPS Aperture (Module Fault)**

Repeat for A and B chain STAs

A1 **B1**

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**)

FE Critical Device Permits A and B OFF, HMI

Aperture Module Fault OFF (**red**), HMI

Return trip amplifier to operating condition

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

Reset fault at I/O box

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

A28 **Observe Beamline Photon Shutter Operation**

Repeat for both Beamline Photon Shutters

L1S1 **L1S2**

Close Beamline Photon Shutter

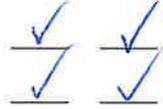
Shutter indicates closed A and B (**red**), HMI

Open Beamline Photon Shutter

Shutter opens smoothly without hesitation

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Shutter indicates open A and B (**green**), HMI



Close Beamline Photon Shutter

A29 Observe FE Safety Shutter(s) Operation

With Maintenance Door open, connect FE Shutter test fixture (Attachment B Figure B6).

Shutters are in the closed (down) position



FE Shutter Closed A and B (**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 Shutter Open A and B (**green**), HMI



Actuate Shutters closed

FE Shutter Closed A and B (**red**), HMI



A30 FE Safety Shutters Can Only Be Closed If FE Photon Shutter is Closed

Search Hutch

FOE Secure A and B chain (**green**), HMI



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



Open FE SSA

SSA Open



Open FE Photon Shutter

FE Critical Devices Permits A and B OFF, HMI



Close Shutters

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



Reset fault

SSB Open



Open FE SSB

FE Critical Devices Permits A and B OFF, HMI



Open FE Photon Shutter

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



Reset fault



A31 Beamline Enable Key (Opening shutter without key trips SR RF and Dipole PS)

Remove beamline enable key

FOE Enabled OFF, HMI



Search FOE

FOE Secure A and B chain (**green**), HMI



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



Using FOE test box, Open FE Shutters

FE Critical Devices Permits A and B OFF



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Replace beamline enable key and reset faults



Live Testing

A32 **Reach Back FOE Door Switches**

Secure P1 through P5

SR Secure, A and B chain, SR HMI



Place actuators on FOE Hutch downstream left door switches and Maglock



Search hutch

FOE Secure A and B chain (**green**), HMI
FE Critical Devices Permits A and B ON (**green**),
HMI



FE Critical Device Permit A and B ON (**green**),
SRHMI



Check Control Room SR HMI (MCR beamline 1)



Check I/O Box 17 Beamline Enable Panel

FE Critical Devices Permits 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)

FOE Shutters Open



Remove an "A chain" door switch actuator from beamline hutch door



FOE secure OFF A chain, HMI



FE Critical Devices Permits A chain OFF, HMI



Check I/O Box 17 Beamline Enable Panel

FE Critical Devices 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 (**red**), SR HMI



Check SR RF System C HVPS Beamline Interface

A Permits OFF, SR RF System C HVPS Interface



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<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"/>
<i>Replace A chain door switch holder and reset fault(s)</i>		<input checked="" type="checkbox"/>
<i>Search hutch</i>		<input checked="" type="checkbox"/>
	FOE Secure A and B chains ON (green), HMI	<input checked="" type="checkbox"/>
	FE Critical Devices Permits A and B ON (green), HMI	<input checked="" type="checkbox"/>
<i>Check Control Room SR HMI (MCR beamline 1)</i>	FE Critical Device Permit A and B ON (green), SRHMI	<input checked="" type="checkbox"/>
<i>Check I/O Box 17 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 RF System C HVPS Beamline Interface</i>	A and B Permits ON, RF System C HVPS Interface	<input checked="" type="checkbox"/>
<i>Check RF System D HVPS Beamline Interface</i>	A and B Permits ON, 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"/>
	FOE Shutters Open	<input checked="" type="checkbox"/>
<i>Remove "B chain" switch actuator</i>	FOE Secure B chain OFF, HMI	<input checked="" type="checkbox"/>
	FE Critical Devices Permits B OFF, HMI	<input checked="" type="checkbox"/>
<i>Check I/O Box 17 Beamline Enable Panel</i>	FE Critical Devices Permit B LED OFF	<input checked="" type="checkbox"/>
<i>Check Control Room SR HMI (MCR beamline 1)</i>	FE Critical Device Permits B OFF (red), SR HMI	<input checked="" type="checkbox"/>
<i>Check I/O Box 28 Beamline Enable Panel</i>	FE Critical Device Permit Sum B LED OFF	<input checked="" type="checkbox"/>

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<i>Check RF System C HVPS Beamline Interface</i>	B Permits OFF, RF System C HVPS Interface	<input checked="" type="checkbox"/>
<i>Check RF System D HVPS Beamline Interface</i>	B Permits OFF, RF System D HVPS Interface	<input checked="" type="checkbox"/>
<i>Check Dipole PS (positive) Beamline Interface</i>	B Permits OFF, Dipole PS Pos. Interface	<input checked="" type="checkbox"/>
<i>Check Dipole PS (negative) Beamline Interface</i>	B Permits OFF, Dipole PS Neg. Interface	<input checked="" type="checkbox"/>
	SR Dipole is OFF	<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"/>
<i>Close FE Shutters with test fixture</i>		<input checked="" type="checkbox"/>
<i>Remove beamline hutch switch holders and Maglock actuator</i>		<input checked="" type="checkbox"/>
A33 Water Interlock (Live)		
<i>Search FOE</i>	FOE Secure A and B chains ON (green), HMI	<input checked="" type="checkbox"/>
	FE Shutter Permits A and B ON (green), HMI	<input checked="" type="checkbox"/>
	FE Critical Devices Permits A and B ON (green), HMI	<input checked="" type="checkbox"/>
<i>Check I/O Box 17 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"/>
<i>Check Control Room SR HMI (MCR beamline 1)</i>	FE Critical Device Permit A and B ON, (green) SRHMI	<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 A24, lower flow to one meter</i>		<input checked="" type="checkbox"/>
	Water Permits A and B OFF, HMI	<input checked="" type="checkbox"/>

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	FE Shutter Permits OFF A and B Permits, HMI	<input checked="" type="checkbox"/>
Within 3 seconds	FE Critical Devices Permit A and B OFF, HMI	<input checked="" type="checkbox"/>
<i>Check I/O Box 17 Beamline Enable Panel</i>	FE Critical Devices Permit 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 LED 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 RF System C HVPS Beamline Interface</i>	A and B Permits OFF, RF System C HVPS Interface	<input checked="" type="checkbox"/>
<i>Check RF System D HVPS Beamline Interface</i>	A and B Permits OFF, 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"/>
	SR Dipole PS is OFF	<input checked="" type="checkbox"/>
<i>Close Shutters</i>	Shutters closed	<input checked="" type="checkbox"/>
<i>Return water flow to recorded level</i>		<input checked="" type="checkbox"/>
<i>Reset fault(s)</i>		<input checked="" type="checkbox"/>
A34 Observe All Shutters Closed Sum		
<i>Check I/O Box 28 Beamline Enable Panel</i>	FE Shutters closed A chain light ON	<input checked="" type="checkbox"/>
	FE Shutters closed B chain light ON	<input checked="" type="checkbox"/>
<i>Using FE Shutter test fixture open both FE SSs and then Photon Shutter</i>		<input checked="" type="checkbox"/>
	FE Shutters open (green), HMI	<input checked="" type="checkbox"/>
<i>Check I/O Box 28 Beamline Enable Panel</i>	FE Shutters closed A chain light OFF	<input checked="" type="checkbox"/>
	FE Shutters closed B chain light OFF	<input checked="" type="checkbox"/>
<i>Close Shutters and remove test device</i>		<input checked="" type="checkbox"/>
A35 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 17-ID Test Checklist Completed	<input checked="" type="checkbox"/>

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National Synchrotron Light Source II, Brookhaven National Laboratory			
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Title: Beamline 17-ID Radiological Interlock Test			Technical

A36 **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 ATTACHMENT A