Addendum to 19-ID Initial Radiological Interlock test Certification October 18, 2016

Meter Reading	Meter Reading	Current STA A	Current STA B
A1= 1.91	B1= 1.91	A STA1= 1.91	B STA1= 1.91

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: 1.32 GPM	1.12 GPM	A STA1= 1.32	B STA1= 1.32

PPS 2 remained at the original configuration/trip point (0.53GPM); tested on 10/18/2016

Repeat each step for all water flow meters	**PPS1**
Water Permits A and B ON (**green**), HMI	✓
Using the valve, turn water flow to trip point	✓
Water Permits A and B OFF, HMI	✓
Recorded STA A and B levels within 15%	✓
Return water flow to pretest values	✓
Water Permits A and B remain OFF, HMI	✓
Reset fault at PPS cabinet	✓
Water Permits ON (**green**), HMI	✓

Test Result:	☑ Passed	☐ Failed

Tested By: Thomas P. McDonald Date: 11/4/16

Tested By: Glenn Milley Date: 11/4/16

NSLS-II Beamline 19-ID Radiological Interlock Test Checklist

Test Reason: Initial Test	Test Result: ☑ Passed		☐ Failed
	Test Type: ☐ Pre-Certification	☑ Certification	☐ Partial
Test Date: 10/18/2016	Start Time:	Finish Time:	
Tester 1: Thomas McDonald ; Brian Hereveld	Assistant 1: Accelerator Division Operations Staff		
Tester 2: Robert Chmiel ; Gabrielle Stuve	Assistant 2:		
Tester 1 Signature: Thomas P. McDonald	Tester 2 Signature: Rd Chmiel		
*Reviewer 1:	Reviewer 1 Signature:		
Reviewer 2:	Reviewer 2 Signature:		
** Safety Signature 19-ID (Beamline HMI) A Chain: E1BD A297 B Chain: 5AAC 9E58	Previous 19-ID SS# Date: / / A Chain: B Chain:		
** Safety Signature Pentant 5 Beamline (SR HMI) A Chain: CD804572 B Chain: 07677409	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 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. Place muffler on beam imminent sounder	✓
VI. 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***

Repeat steps for each 19-ID Hutch

	A	C	D
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*	✓	✓	✓
Close all hutch secondary doors	✓	✓	✓
"Entry Permitted" signs ON (2 signs on A and D)	✓	✓	✓
Using the keypad, lock the closed doors	✓	✓	✓
Press SB1	✓	✓	✓
SB1 illuminates	✓	✓	✓
Search sounder sounds	✓	✓	✓
Search yellow beacon flashing	✓	✓	✓
Press SB2		✓	✓
SB2 illuminates		✓	✓
Exit hutch and close main door	✓	✓	✓
Press SBE and ***begin timing***	✓	✓	✓
Beam imminent alarm sounds for 30 seconds	✓	✓	✓
After warning, (FOE, C, D) Interlocked A and B ON (**green**), HMI	✓	✓	✓
"Interlocked" signs ON	✓	✓	✓
Maglock A and B ON (**green**), all doors, HMI	✓	✓	✓
Press the SBE/Access Button	✓	✓	✓
"Interlocked" signs OFF, "Entry Permitted" signs are ON	✓	✓	✓
FOE, C, D Interlocked A and B OFF, HMI	✓	✓	✓
Maglock A OFF (may require opening Maglock on key pad)	✓	✓	✓
Open door	✓	✓	✓
Door opens, Maglock B OFF	✓	✓	✓

A3 ***Out of Sequence Search***

Repeat steps for each 19-ID hutch (A hutch has only one interior SB)	C	D
Press SB2	✓	✓
SB2 does not illuminate	✓	✓
Press SB1	✓	✓
SB1 illuminates	✓	✓
Close hutch door and press SBE	✓	✓
Hutch does NOT secure	✓	✓

A4 ***Search Timeout***

Repeat steps for each 19-ID hutch	A	C	D
Press first search button and ***begin timing***	✓	✓	✓
Complete search ***without pressing Final Search button***	✓	✓	✓
Search sounders off in 2 minutes	✓	✓	✓
Press Final Search button	✓	✓	✓
Search does not complete	✓	✓	✓

A5 ***Shutter Enable***

Place actuators on FOE door switches and attach Maglock devices		✓
	Beamline Online A and B OFF	✓
Enable beamline with key and perform a reset	Beamline Online A and B ON (**green**)	✓
Search the FOE	FE Shutter Permits A and B ON ***after*** Beam Imminent Warning	✓
Open FE Shutters	FE Shutters A and B indicate open (**green**)	✓
	2 "Beam On" signs are ON (A-1, C-1) T.M. 10/18/16	✓
Close FE Shutters	FE Shutters A and B indicate closed (**red**)	✓

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

Search the C hutch	C Interlocked A and B ON (**green**)	✓

For each ES search FOE hutch	ES1	ES2	ES3
Open FE Shutters from keypad	✓	✓	
FE Shutters A and B open (**green**)	✓	✓	
FOE Interlocked A and B ON (**green**)	✓	✓	
FE Shutter Permit A and B ON (**green**)	✓	✓	
FE Critical Device Permits A and B ON	✓	✓	

Only 2 emergency stops in the FOE T.M. 10/18/16

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Right Maglock A ON (**green**)	✓	✓		
Press ES	✓	✓		
FE Shutters A and B closed (**red**)	✓	✓		
FOE Interlocked A and B OFF	✓	✓		
FE Shutter Permit A and B OFF	✓	✓		
FE Critical Device Permits A and B OFF	✓	✓		
Right Maglock A OFF	✓	✓		
Pull out ES	✓	✓		
ES Sum Latch OFF	✓	✓		
Reset fault	✓	✓		
ES Sum Latch ON (**green**)	✓	✓		

Only 2 emergency stops in the FOE
T.M.
10/18/16

A7 ***Emergency Stops (ES) C Hutch***

For each ES search hutch. FOE is Interlocked.	ES1	ES2	ES3	ES4
Open FE Shutters from keypad	✓	✓	✓	
FE Shutters A and B open (**green**)	✓	✓	✓	
FE Shutter Permit A and B ON (**green**)	✓	✓	✓	
C Interlocked A and B ON (**green**)	✓	✓	✓	
FE Critical Device Permits A and B ON	✓	✓	✓	
Right Maglock A and B ON (**green**)	✓	✓	✓	
Left Maglock A and B ON (**green**)	✓	✓	✓	
Press ES	✓	✓	✓	
FE Shutters A and B closed (**red**)	✓	✓	✓	
C Interlocked 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**)	✓	✓	✓	

Only 3 Emergency Stops in the C hutch
T.M.
10/18/16

A8 ***Emergency Stops (ES) D Hutch***

For each ES search hutch. FOE and C hutch Interlocked.	ES1	ES2	ES3	ES4
Open FE and L1S1 Shutters from keypad	✓	✓	✓	
FE Shutters A and B open (**green**)	✓	✓	✓	
L1S1 Shutter A and B open (**green**)	✓	✓	✓	
D Interlocked A and B ON (**green**)	✓	✓	✓	
L1S1 Shutter Permit A and B ON (**green**)	✓	✓	✓	
FE Critical Device Permits A and B ON	✓	✓	✓	
Swing Door Maglock A and B ON (**green**)	✓	✓	✓	
Press ES	✓	✓	✓	
FE Shutters A and B closed (**red**)	✓	✓	✓	
L1S1 Shutter A and B closed (**red**)	✓	✓	✓	
D Interlocked A and B OFF	✓	✓	✓	
L1S1 Shutter Permit A and B OFF	✓	✓	✓	
FE Critical Device Permits A and B OFF	✓	✓	✓	
Swing Door Maglock A OFF	✓	✓	✓	
Pull out ES	✓	✓	✓	
ES Sum Latch OFF	✓	✓	✓	
Reset fault	✓	✓	✓	
ES Sum Latch ON (**green**)	✓	✓	✓	

ONLY 3 Emergency Stops in "D" T.M. 10/18/16

A9 ***FOE Upstream 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).

C hutch is Interlocked	A	B	Reed
Search hutch	✓	✓	✓
Open FE Shutters from keypad	✓	✓	✓
FE Shutters A and B open (**green**)	✓	✓	✓
FOE Interlocked A and B 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	✓	✓	✓

			A	B	REED
Remove one switch actuator			✓	✓	✓
FE Shutters A and B closed (**red**)	1.M 10/18/16		✓	✓	✓
FOE Interlocked OFF			✓	✓	✓
FE Shutter Permit OFF			✓	✓	✓
FOE Door Switch Sum OFF			✓	✓	✓
FE Critical Device Permits A and B OFF			✓	✓	✓
Replace switch actuator and reset fault			✓	✓	✓
Remove actuators and close door					✓

1.M 10/18/16

A10 ***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).

	A	B	Reed
FOE is Interlocked	✓	✓	✓
Search hutch	✓	✓	✓
Open FE Shutters from keypad	✓	✓	✓
FE Shutters A and B open (**green**)	✓	✓	✓
C Interlocked A and B ON (**green**)	✓	✓	✓
FE Shutter Permit A and B ON (**green**)	✓	✓	✓
C Door Switch Sum A and B ON (**green**)	✓	✓	✓
FE Critical Device Permits A and B ON	✓	✓	✓
Remove one switch actuator	✓	✓	✓
FE Shutters A and B closed (**red**)	✓	✓	✓
C Interlocked OFF	✓	✓	✓
FE Shutter Permit OFF	✓	✓	✓
C Door Switch Sum OFF	✓	✓	✓
FE Critical Device Permits A and B OFF	✓	✓	✓
Replace switch actuator and reset fault	✓	✓	✓
Remove actuators and close door			✓

A11 ***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).

	A	B	Reed
FOE is Interlocked	✓	✓	✓
Search hutch	✓	✓	✓
Open FE Shutters from keypad	✓	✓	✓
FE Shutters A and B open (**green**)	✓	✓	✓
C Interlocked A and B ON (**green**)	✓	✓	✓
FE Shutter Permit A and B ON (**green**)	✓	✓	✓
C Door Switch Sum A and B ON (**green**)	✓	✓	✓
FE Critical Device Permits A and B ON	✓	✓	✓
Remove one switch actuator	✓	✓	✓
FE Shutters A and B closed (**red**)	✓	✓	✓
C Interlocked OFF	✓	✓	✓
FE Shutter Permit OFF	✓	✓	✓
C Door Switch Sum OFF	✓	✓	✓
FE Critical Device Permits A and B OFF	✓	✓	✓
Replace switch actuator and reset fault	✓	✓	✓
Remove actuators and close door			✓

A12 ***D Hutch 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).

	A	B	Reed
FOE and C hutch Interlocked	✓	✓	✓
Search hutch	✓	✓	✓
Open FE and L1S1 Shutters from keypad	✓	✓	✓
FE Shutters A and B open (**green**)	✓	✓	✓
L1S1 Shutter A and B open (**green**)	✓	✓	✓
D Interlocked A and B ON (**green**)	✓	✓	✓
L1S1 Shutter Permit A and B ON (**green**)	✓	✓	✓
D Door Switch Sum A and B ON (**green**)	✓	✓	✓
FE Critical Device Permits A and B ON	✓	✓	✓
Remove one switch actuator	✓	✓	✓

L1S1 Shutter A and B closed (**red**)			✓	✓	✓
D Interlocked OFF			✓	✓	✓
L1S1 Shutter Permit OFF			✓	✓	✓
D Door Switch Sum OFF			✓	✓	✓
FE Critical Device Permits A and B OFF			✓	✓	✓
Replace switch actuator and reset fault			✓	✓	✓
Remove actuators and close door					✓

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A13 ***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"). Complete each step for Upstream Right (UR) Door ✓

	UR
C Hutch Interlocked	
Search hutch	✓
FOE Interlocked A and B ON (**green**)	✓
FE Shutter Permit A and B ON (**green**)	✓
Door Maglock A and B ON (**green**)	✓
Open FE Shutters	✓
FE Shutters open (**green**)	✓
Using FOE test box, turn OFF Maglock	✓
Door Maglock A OFF	✓
FOE Shutters closed (**red**)	✓
FOE Interlocked A OFF	✓
FE Shutter Permit A OFF	✓
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	✓

A14 ***Magnetic Lock Test (C Hutch)***

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

Complete steps for Right (R) and Left (L) doors

	R	L
FOE Interlocked		
Search hutch	✓	✓
C Interlocked A and B ON (**green**)	✓	✓
FE Shutter Permit A and B ON (**green**)	✓	✓
Door Maglock A and B ON (**green**)	✓	✓
Open FE Shutters	✓	✓
FE Shutters open (**green**)	✓	✓
Using FOE test box, turn OFF Maglock	✓	✓
Door Maglock A OFF	✓	✓
FE Shutters closed (**red**)	✓	✓
C Interlocked A OFF	✓	✓
FE Shutter Permit A OFF	✓	✓
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		✓

A15 ***Magnetic Lock Test (D Hutch)***

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

Complete each step for Swing (S) door

	S
FOE and C hutches Interlocked	
Search hutch	✓
D Interlocked A and B ON (**green**)	✓
L1S1 Shutter Permit A and B ON (**green**)	✓
Door Maglock A and B ON (**green**)	✓

Open FE and L1S1 Shutters ✓

Shutters open (**green**) ✓

Using FOE test box, turn OFF Maglock ✓

Door Maglock A OFF ✓

Shutters Closed (**red**) ✓

D Interlocked A OFF ✓

L1S1 Shutter Permit A OFF ✓

Turn On Maglock and reset fault ✓

Search hutch ✓

Using FE Shutter test fixture, Open FE Shutters ✓

Using FOE test box, Open LISI Shutter ✓

FE Critical Device Permits A and B ON ✓

Using FOE test box, turn OFF Maglock ✓

Within 3 seconds:

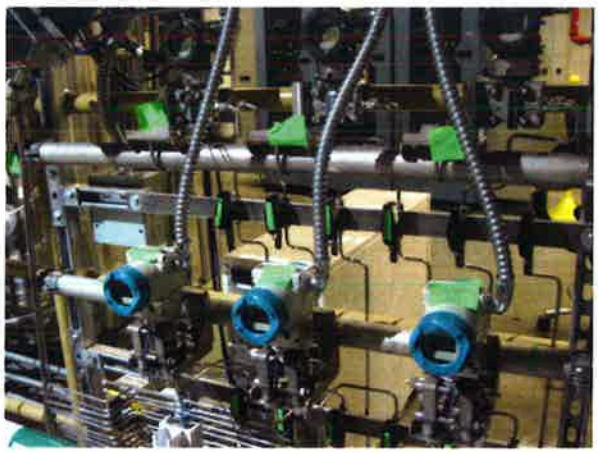
FE Critical Device Permit A Chain OFF ✓

Close All Shutters and reset fault ✓

Disconnect FOE test box ✓

A16 ***Water Interlock***

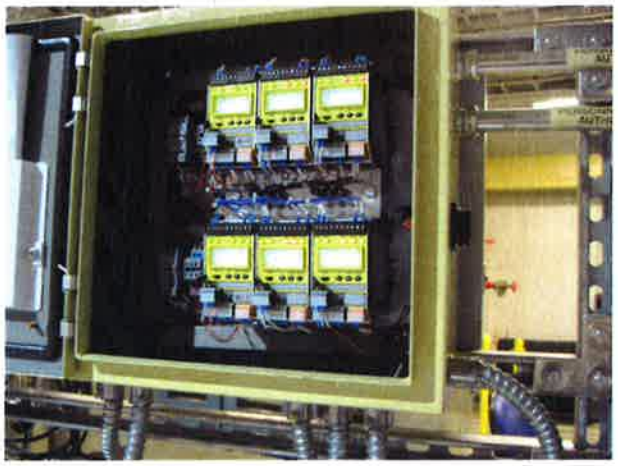
Water flow meters are located on top of the hutch (Figure 1).



NA - Picture to updated in version 2 10/18/16

Figure 1: Water Flow Meters

The PPS Water Safety Test Amplifiers (STA) are located in the cabinet to the upper right of the meters on top of the hutches (PPS 1 in the FOE, PPS 2 in the C hutch) (Figure 2).



NA - picture to be updated in Version 2
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Figure 2: PPS Water STAs

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

Meter Reading	Meter Reading	Current STA A	Current STA B
A1= 1.028	B1= 1.02	A STA1= 1.028	B STA1= 1.017
A2= 0.9	B2= 0.92	A STA2= 0.9	B STA2= 0.96

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: ~~1.32~~ 0.9 GPM	1.12 GPM	A STA1= 0.9	B STA1= 0.9
PPS 2: 0.53 GPM	0.45 GPM	A STA2= 0.53	B STA2= 0.53
PPS 3: TBD			

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PPS 1 in the FOE, PPS 2 in the C hutch- use corresponding HMI

Repeat each step for all water flow meters	PPS1	PPS2
Open FE Shutters	✓	✓
FE Shutters A and B open (**green**)	✓	✓
Water Permits A and B ON (**green**), HMI	✓	✓
FE Shutter Permits A and B ON (**green**), HMI	✓	✓
Using the valve, lower water flow to trip point	✓	✓
FE Shutters A and B closed (**red**)	✓	✓
In 5 seconds: FE Shutter Permits A and B OFF, HMI	✓	✓

Water Permits A and B OFF, HMI	✓	✓
Recorded STA A and B levels above; within 15%	✓	✓
Return water flow to pretest values	✓	✓
Water Permits A and B remain OFF, HMI	✓	✓
Reset fault at PPS cabinet	✓	✓
Water Permits A and B ON (**green**), HMI	✓	✓
FE Shutter Permits A and B ON (**green**), HMI	✓	✓

A17 ***Water Safety Test Amplifier Faults***

Repeat each step for all water flow meters

	PPS1	PPS2
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 A chain fault/reset button	✓	✓
FE Shutters A and B closed (**red**)	✓	✓
Water Permit A OFF, HMI	✓	✓
In 5 seconds: FE Shutter Permit A OFF, HMI	✓	✓
Reset fault	✓	✓
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 Permit B OFF, HMI	✓	✓
Reset fault	✓	✓

A18 ***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: PPS Aperture Transmitters

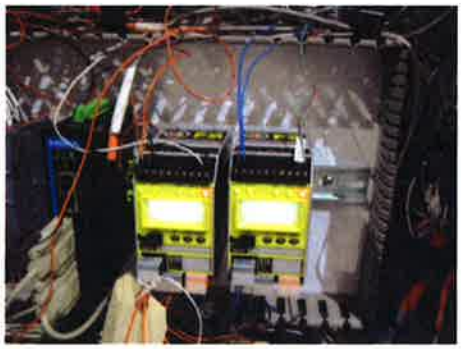

Figure 4: PPS Aperture STAs

Record the Transmitter meter readings (absolute pressure):

Meter Reading	Meter Reading	Current STA A	Current STA B
A1= 31.67	B1= 31.67	A STA1= 31.67	B STA1= 31.67

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) **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 ✓

A19 ***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	✓	✓

A20 ***Observe Beamline Photon Shutter Operation***

	L1S1
Close Beamline Photon Shutter	✓
Shutter indicates closed A and B (**red**), HMI	✓
Open Beamline Photon Shutter	✓
Shutter opens smoothly without hesitation	✓
Shutter indicates open A and B (**green**), HMI	✓
Close Beamline Photon Shutter	✓
Shutter indicates closed A and B (**red**), HMI	✓

A21 ***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 Shutter A and B closed (**red**), HMI	✓
A22	***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	✓
A23	***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**)	✓
	Live Testing		
A24	***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 19 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 Ssytem 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 OFF A, HMI	✓
	FE Critical Device Permit A chain OFF, HMI	✓
Check I/O Box 19 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	✓
	SR Dipole PS is OFF	✓
Close FE Shutters with FE Shutter test fixture	FE Shutters closed	✓
Replace "*A **chain***" door switch actuator and reset fault(s)		✓
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 Permits A and B ON (**green**), SR HMI	✓
Check I/O Box 28 Beamline Enable Panel	FE Critical Device Permits Sum A and B LEDs ON	✓

Check I/O Box 19 Beamline Enable Panel	FE Critical Device Permits 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 Device Permit B chain OFF, HMI	✓
Check I/O Box 19 Beamline Enable Panel	FE Critical Device 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 Permit OFF, SR RF System C HVPS Interface	✓
Check SR RF System D HVPS Beamline Interface	B Permit OFF, SR RF System D HVPS Interface	✓
Check Dipole PS (positive) Beamline Interface	B Permit OFF, Dipole PS Pos. Interface	✓
Check Dipole PS (negative) Beamline Interface	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	✓
Close FE Shutters with FE Shutter test fixture	FE Shutters closed	✓
Remove beamline hutch switch actuators and Maglock actuator		✓

A25 ***Water Interlock (Live)***

Search FOE	FOE Interlocked A and B ON (**green**), HMI	✓
	FE Shutter Permits A and B ON (**green**), HMI	✓
	FE Critical Device Permits A and B ON (**green**), HMI	✓
Check I/O Box 19 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 Control Room SR HMI (MCR beamline 1)	FE Critical Device Permit A and B ON (**green**), SR HMI	✓
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, turn on air and open Photon then SSs		✓
	FE Shutters indicate open (**green**), HMI	✓
Using water trip points in Step A16, lower flow to one meter		✓
	Water Permits A and B OFF, HMI	✓
	FE Shutter Permits A and B OFF, HMI	✓
Within 5 seconds	FE Critical Device Permits A and B OFF, HMI	✓
Check I/O Box 19 Beamline Enable Panel	FE Critical Device Permits A and B OFF	✓
Check I/O Box 28 Beamline Enable Panel	FE Critical Device Permit Sum A and B LED OFF	✓
Check Control Room SR HMI (MCR beamline 1)	FE Critical Device Permit A and B OFF, SR HMI	✓
Check SR RF System C HVPS Beamline Interface	A and B Permits OFF, SR RF System C HVPS Interface	✓
Check SR RF System D HVPS Beamline Interface	A and B Permits OFF, SR RF System D HVPS Interface	✓
Check Dipole PS (positive) Beamline Interface	A and B Permits OFF, Dipole PS Pos. Interface	✓
Check Dipole PS (negative) Beamline Interface	A and B Permits OFF, Dipole PS Neg. Interface	✓
	SR RF System C HVPS is OFF	✓
	SR RF System D HVPS is OFF	✓
	SR Dipole PS is OFF	✓
Close FE Shutters with FE Shutter test fixture	FE Shutters closed	✓
Return water flow to recorded level		✓
Reset fault(s)		✓

Reviewed By:

10/17/2016

X Scott Buda

Scott Buda
Accelerator Safety Systems Group Leader
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10/14/2016

X Robert Chmiel

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10/17/2016

X

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Signed by: Lee, Robert J

Revision History

Revision	Description	Date
1	First Issue.	17OCT2016

A26 ***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		✓

A27 ***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 19-ID Test Checklist Completed	✓

A28 ***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 –