

<b>Brookhaven National Laboratory National Synchrotron Light Source</b>		<b>Number:</b> LS-PPS-0028	<b>Revision:</b> B
		<b>Effective:</b> 6/17/02	<b>Page</b> 1 of 6
<b>Subject: <u>X3B1/B2</u> Radiological Interlock Test</b>			
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\*Approval signatures on file with master copy.

[Revision/Periodic Review Log](#)

Test Reason:	Test Result:	<input type="checkbox"/> Passed	<input type="checkbox"/> Failed
	Test Type:	<input type="checkbox"/> Full	<input type="checkbox"/> Partial
Test Date:	Start Time:	Finish Time:	
Tester 1:	Assistant 1:		
Tester 2:	Assistant 2:		

**PREPARATION:**

Inform control room operator that test will be done. \_\_\_\_\_  
 Turn off 'Red Tag' switch on x-ray ring interlock, and apply LOTO to X-Ray Security system. \_\_\_\_\_  
 Verify that vacuum valves and water interlocks are OK on the beam lines that will be checked for Phase I beamlines or connect user interlock test jumper. \_\_\_\_\_

**X3B1**

1. Search the hutch
  - The red interior light comes on \_\_\_\_\_
  - The audible alarm sounds for 13 to 15 seconds minimum \_\_\_\_\_
  - The hutch interlock indicator turns ON \_\_\_\_\_  
(On the X3B1 control panel)
2. Open hutch door
  - The hutch interlock indicator turns OFF \_\_\_\_\_
3. Press CS-1, close hutch door and wait.
  - Hutch interior lights come on in not more than 20 seconds \_\_\_\_\_
  - Press CS-E.
    - Interlock does not activate \_\_\_\_\_
4. Press interior search buttons in order, close door, press CS-E, note that alarm comes on, open and close door, press CS-E again. (This must all be done in less than the timeout interval noted in step 3)
  - Interlock does not activate \_\_\_\_\_
5. Place latch device on door lock so key can be removed. Place switch holders on door switches. Interlock hutch and Open photon shutter. Put hutch key in SRU and turn.
  - The Safety Shutter "enable" light does not come on until \_\_\_\_\_  
the end of the warning interval.

6. Press an Emergency Stop Button.

The shutter "enable" light goes out	_____
The ES indicator comes on	_____
The ES latch cannot be reset unless the SOR key is turned	_____

7. Search hutch, open safety shutter, and photon shutter.

<b>X3B1 Hutch Switches</b>	
<b>Upstream</b>	<b>Downstream</b>

Remove holder from switch 2.

RIB latch light comes on	_____	_____
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Replace holder on switch 2.

RIB cannot be reset unless SOR key is turned.	_____	_____
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8. Remove holder on switch 1.

Safety shutter closes	_____	_____
Photon shutter closes	_____	_____
RIA latch light comes on	_____	_____
Hutch interlock drops out	_____	_____
RIA can't be reset w/o SOR	_____	_____

Replace holder on switch 1

9. Search hutch, leave shutter closed.

Hutch Kirk key (KKH) cannot be removed from SRU unless button is pushed	_____
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10. Open safety shutter and photon shutter.

KKH cannot be removed even if button is pushed	_____
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11. Close shutters. Turn KKH and note where solenoid unit stops rotation. Push the button and turn key just beyond this point, but not far enough to actuate "key removed" switch. Release the button and leave key in this position. Open shutter(s), remove KKH, and replace.

RIA latch light comes on	_____
RIB latch light comes on	_____
The safety shutter closes	_____
The photon shutter closes	_____

12. With hutch interlocked, leave shutter(s) closed.  
     Beam line transfer key can be removed only if button on SRU is pushed \_\_\_\_\_  
 Open safety shutter. (Photon shutter remains closed)  
     Beam line transfer key can't be removed even if button is pushed \_\_\_\_\_
13. Close safety shutter. "Cheat" SRU as described in step 11. Open safety shutter, remove the key and replace.  
     RIA latch light comes on \_\_\_\_\_  
     RIB latch light comes on \_\_\_\_\_  
     The safety shutter closes \_\_\_\_\_  
     SPA comes on \_\_\_\_\_  
     SPA can't be reset w/o SOR \_\_\_\_\_  
 Reset RIA and RIB
14. Open photon and safety shutter. Press an emergency stop button.  
     RIA latch light comes on \_\_\_\_\_  
     RIB latch light comes on \_\_\_\_\_  
     Hutch interlock drops out \_\_\_\_\_  
     ES indicator comes on \_\_\_\_\_  
     Safety Shutter Closes \_\_\_\_\_  
     Photon Shutter Closes \_\_\_\_\_
15. Observe the **X3B1** photon shutter while it is opened and closed.  
     The mechanism moves freely and without hesitation \_\_\_\_\_

**X3B2**

16. Place latch device on X3B2 hutch door lock so key can be removed. Place switch holders on door switches. Place hutch door key in hutch SRU and turn.  
 Remove holder from switch 2.  
     RIB latch light comes ON \_\_\_\_\_
- Replace holder on switch 2.  
     RIB cannot be reset unless SOR key is turned. \_\_\_\_\_
- Remove holder on switch 1.  
     Safety shutter closes \_\_\_\_\_  
     Photon shutter closes \_\_\_\_\_  
     RIA latch light comes ON \_\_\_\_\_  
     RIA can't be reset w/o SOR \_\_\_\_\_
- Replace holder on switch 1

17. Search hutch, leave shutter closed.

Hutch Kirk key (KKH) cannot be removed from SRU unless button is pushed

Open safety shutter and photon shutter.

KKH cannot be removed even if button is pushed

Close shutters. Turn KKH and note where solenoid unit stops rotation. Push the button and turn key just beyond this point, but not far enough to actuate "key removed" switch. Release the button and leave key in this position. Open shutter(s), remove KKH, and replace.

RIA latch light comes ON

RIB latch light comes ON

The safety shutter closes

The photon shutter closes

18. With hutch interlocked, leave shutter(s) closed.

Beam line transfer key can be removed only if button on SRU is pushed

Open safety shutter. (Photon shutter remains closed)

Beam line transfer key can't be removed even if button is pushed

Close safety shutter. "Cheat" SRU as described in step 18. Open safety shutter, remove the key and replace.

RIA latch light comes ON

RIB latch light comes ON

The safety shutter closes

SPA comes ON

SPA can't be reset w/o SOR

Reset RIA and RIB

19. Observe the X3B2 photon shutter while it is opened and closed.

The mechanism moves freely and without hesitation

20. Open the safety shutter. Remove the Control Room Shutter Enable Key for X3B, then replace the key.

The safety shutter closes

RIA latch light comes ON

The "Control Room Shutter Enable" light goes out

The SPA latch comes ON (after the key is back on)

The safety shutter cannot be opened

Reset RIA and SPA

21. Open the Safety Shutter.  
Turn "Auto Open" key to "ON".
- At the Control Room Operator's Console, switch the shutter master enable to "Inhibit" and back to "Enable" \_\_\_\_\_
- The safety shutter closes \_\_\_\_\_
- And then re-opens \_\_\_\_\_
- Turn "Auto Open" key to "OFF". Switch the master enable to "Inhibit" and back to "Enable"
- The safety shutter closes \_\_\_\_\_
- And does NOT re-open \_\_\_\_\_

**X3B1/X3B2**

22. One person goes to the x-ray equipment area and resets the indicators for RIAX and RIBX at SR100.  
Open the safety shutter and related photon shutter.  
Remove switch holder from door switch number 2.
- |   |             |             |
|---|-------------|-------------|
|   | <u>X3B1</u> | <u>X3B2</u> |
| RIB latch light comes on                              | _____       | _____       |
| RIBX "Loop Enabled" indicator goes out                | _____       | _____       |
| RIBX "Loop Disabled" indicator comes on               | _____       | _____       |
| Replace switch holder.                                |             |             |
| RIBX cannot be reset                                  | _____       | _____       |
| Reset RIB   |             |             |
| RIBX CAN be reset ("Loop Enabled" indicator comes on) | _____       | _____       |
23. Remove holder from door switch 1.
- |   |       |       |
|---|-------|-------|
|   | _____ | _____ |
| RIA latch light comes on                              | _____ | _____ |
| RIAX "Loop Enabled" indicator goes out                | _____ | _____ |
| RIAX "Loop Disabled" indicator comes on               | _____ | _____ |
| The safety shutter closes                             | _____ | _____ |
| The photon shutter closes (if equipped)               | _____ | _____ |
| RIAX cannot be reset                                  | _____ | _____ |
| Reset RIA   |       |       |
| RIAX CAN be reset ("Loop Enabled" indicator comes on) | _____ | _____ |

24. Remove the holders from the switches. Remove the latch device from the door lock(s). Open and close the door.

All door switches operate freely and each makes a "click" when door is opened

(Complete test for each set of door switches)

X3B1				X3B2	
SW1	SW2	SW3	SW4	SW1	SW2

<b>X3B1/B2 Radiological Interlock Test</b>			
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25. Secure the hutch. Locate the safety shutter associated with the beam line by tracing the beam pipe through the shield wall. Do not rely on labels on the shutter mechanism. Open the shutter.

The correct shutter opens \_\_\_\_\_

No other shutter at that saw tooth opens or attempts to open \_\_\_\_\_

Close the safety shutter.

The mechanism moves freely and without hesitation \_\_\_\_\_

26. Remove user interlock test jumper (if applicable). \_\_\_\_\_

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