

Safety Systems Section	LCLS Hutch 1 Initial Acceptance Test				
	DCO No. 0061	Released By: Reference Only	Effective Date 29 Jul 09	Document No. CD-SS-PPS-06-12-13	Rev. 01

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LCLS Hutch 1 Initial Acceptance Test

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1.0 Introduction

1.1 Purpose

To verify that the LCLS Hutch 1 Hutch Protection Systems (HPS) has been properly implemented and that the requisite and approved functionality is delivered. Intended and unintended functions of the HPS are tested in addition to tests to uncover errors in design, implementation, and component failures.

1.2 Scope

This procedure verifies the implementation of the Hutch 1 HPS Zone. This includes tests designed to check the correct function of the access modes, security fault response, security and entry loops, audio and visual warnings, and stoppers.

1.3 Test Requirements Overview

Sections 4-11 utilize the FEE Stopper Enable Keyswitch to hold the FEE stoppers in: this allows electron beam operation to the Dump Enclosure. Because of the shared PLC infrastructure, placing Hutch 1 into 'test mode' also places the FEE into 'test mode.' Because of this, no beam operations to the FEE can take place during the Hutch 1 IAT. This action also provides a proven safety token for testers.

Sections 4-9 are conducted in Test Mode. Section 10 switches back in forth between Test Mode and Run Mode, leaving the system in Run Mode at the conclusion of the section. The final Section (Section 11) is conducted in Run Mode.

Section 11 requires the LCLS Secure Loop to be complete, and therefore requires the Undulator Complex to be Search SET and in No Access. However, the BTH stoppers should be IN for this test: Section 11 in and end-to-end security fault with Hutch 1 stoppers out. The FEE stopper 'IN' status does not protect the LCLS Secure Loop, and therefore the LINAC, from this security fault (BTH stoppers IN protects the LINAC from this security violation).

Hutches 2 and 3 are closed with Search Complete for Sections 9-11. This is necessary to obtain the stopper permits at stoppers 'S2' and 'SH1' and to then test the Hutch 1 contribution to their logic.

All searches in this procedure are artificial searches performed by Safety Systems Section personnel. Other means of rendering the facility safe are utilized throughout. Since this Initial Acceptance Test demonstrates proper operation of the system as specified, we are not to rely on system interlocks until tested and validated. The system will be handed to Operations in a not secured state.

Table 1 below summarizes the testing configuration.

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Table 1: Test Requirements Overview

Section	NEH Stoppers	H2/H3 Status	LCLS Loop	Hutch1 S/R	Beam To:	Safety Token	Mode
1.0 Introduction					FEE		Normal
2.0 Applicability							
3.0 Prerequisite Actions							
4.0 Initial Set-up	Disabled	Open	Any	Artificial	Dump	FEE Stopper Enable Key	Test
5.0 Search Preset Checks							
6.0 Interlock and Security Fault Checks							
7.0 Emergency Off Button Checks							
8.0 Access State Checks	Enabled	Closed	Cmplt		BSY		Mix
9.0 Chain A/B Crash Tests							
10.0 NEH Stopper Enable Keyswitch and Permit A/B Tests							
11.0 Security Fault Tests	Disabled				FEE		Normal
12.0 Records and Reports							
13.0 Revision History							

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2.0 Applicability

- 2.1.1 The Controls Department, Personnel Protection Systems (PPS) Group is responsible for the completion of the certification. Only qualified personnel trained by this Group are permitted to perform these tests.
- 2.1.2 This procedure is executed to commission new or modified systems, or on an annual basis if a Safety Assurance Test is not available, per Guideline 27 in the *SLAC Guidelines for Operations*.

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		Initial Items Verified
3.0	Prerequisite Actions	
3.1	RSWCF Assessment	
3.1.1	Verify there are no open SLAC Radiation Safety Work Control Forms (RSWCF) for this area. Check with the XFD Safety Officer. Also check in the console area of MCC, Building 005, in case any forms have been mis-filed.	
3.1.2	If there are open RSWCFs relevant to this procedure with Work Completion in Section 3 not signed and dated (indicating that the work has not been finished), this certification procedure cannot be completed at this time. Contact the Person Responsible in Section 1 of the RSWCF for resolution.	
3.1.3	If there are open RSWCFs relevant to this procedure with Work Completion in Section 3 signed and dated (indicating that the work has been finished), note down the Form No., and continue with this procedure:	
	Work Control Form No.: _____	
Note:	When this procedure has been completed, you must update the PPS line in Section 3 of the RSWCF.	

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Initial Items Verified

3.2 Equipment and Personnel

3.2.1 Three people are required for this test at the following locations:

- Test Leader at the Hutch 1 User's Panel to coordinate the efforts of all others and to initiate telephone calls and record results.
- One tester in Hutch 1, or at PPS Rack 950-02, depending on the test.
- One tester to manually manipulate the Roll-up Door switches for Sections 9.0 and 11.0.
- *Optional*: a fourth tester at MCC to check status in Sections 10 and 11 (this could be a test team member, or an MCC operator who has agreed to assist); *or*, a local EPICS display can be called up at the NEH near the Hutch Users Panel.

Note: Useful phone numbers:

- MCC 2151
- MCC PPS Console 5920

3.2.2 Required keys and hardware to execute this procedure:

- Personal LOTO locks for field testers
- Group lock box
- PPS Group Lock Key
- Hutch 1 Search Preset Key
- NEH Hutch Online/Offline Key
- 'S1' Stopper Enable Key
- 'S2' Stopper Enable Key
- 'SH1' Stopper Enable Key
- NEH Normal/Test Mode Key
- PPS Rack B950-02 Key
- Magnets to manually actuate the Hutch equipment Rollup Door
- A laptop computer to check the software version numbers. Also, it may be used to call up EPICS displays at NEH.

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		Initial Tested Items	
		EPICS	Local
4.0	Initial Set-up		
4.1	Facility Configuration		
4.1.1	Have the NEH facility management unlock the Hutch 1 equipment Rollup Door for the duration of this test. Leave the Rollup Door closed.		
4.1.2	Verify that the sliding Hutch Door key is present at the facility, either in the Hutch Users Panel, or in the sliding Hutch Door.		
4.1.3	Verify that all of the Hutch Emergency Off buttons are pulled out (not actuated). Pull out any actuated button if necessary.		
4.1.4	Insert the NEH Hutch Online/Offline Key into the Online/Offline Keyswitch on the Hutch Users Panel and turn to the ONLINE position. Retain possession of the key.		
4.1.5	If any special buggers or jumper switches need to be installed to perform this test, note the location and reason for such measures in Table 3 at the end of this IAT.		
4.2	Secure NEH Radiation Hazards		
4.2.1	Transfer/verify the FEE is in No Access.		
4.2.2	Insert/verify that the FEE stoppers are IN.		
4.2.3	Set the FEE Stopper Enable Keyswitch (ST1, ST2, aka 'S0') to the DISABLED position (B950-02(27)).		
4.2.4	Attempt to remove the FEE Stoppers; verify that they remain IN.		

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		Initial Tested Items	
		EPICS	Local
4.2.5	Place the FEE Stopper Enable Key in a lock box.		
4.2.6	Have the lead tester apply an administrative group lock to this lock box.		
4.2.7	Have all field testers that will enter Hutch 1 during this procedure apply personal LOTO locks to this lock box.		
4.2.8	Ensure that NEH Stoppers 'S1,' 'S2,' and 'SH1' are available for this IAT. If these stoppers are mechanically locked IN, perform the necessary administrative actions to have them released for testing.		
4.2.9	The FEE can be set to any access state desired by Operations for the remainder of this test.		
4.3	PLC Configuration Check		
4.3.1	Verify that there are not forces in the Allen-Bradley PLC (LED display on processor).		
4.3.2	Download the Pilz PLC 'A' program to a PC and verify:		
4.3.3	The checksum for the program is: 67D0		
4.3.4	The program is Finalized.		
4.3.5	Download the Pilz PLC 'B' program to a PC and verify:		
4.3.6	The checksum for the program is: F1B8		
4.3.7	The program is Finalized.		
4.3.8	Download the software version number of the Allen-Bradley program; the version number should be. SD38427106C1_0_0		

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		Initial Tested Items	
		EPICS	Local
4.3.9	The NEH Run/Test keyswitch is in the TEST position (B950-02-(29)).		

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Initial Tested Items	
EPICS	Local

5.0 Search Presets Checks

Test Objective:

The following test verifies proper operation of the Hutch 1 presets. This includes preset sequencing, length of search timer, and interruption of the A/V warning when an Emergency Off button is pushed.

Personnel Requirements:

Two persons: PPS Test Leader at the Hutch 1 Users Panel, a second tester is needed to actuate the Presets inside Hutch 1.

Note: CoHE conditions set in Section 4.2 should remain in place for this test.

5.1 Preset 1 Check

5.1.1 Have a tester with a personal LOTO lock on the FEE Stopper Enable Key lock box (Section 4.2) enter Hutch 1. Remove the Door Key from the Hutch Users Panel and open the door if necessary.

5.1.2 Ensure that the Emergency Off circuit is reset, push the Interlock Reset button on the Hutch Users Panel if necessary:

a. The Emergency Off Summary Chain A indicator LED on the Hutch Users Panel is lit.

--	--

b. The Emergency Off Summary Chain B indicator LED on the Hutch Users Panel is lit.

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5.1.3 Actuate the Preset 4 mechanism; confirm that the preset is not obtained by verifying the following:

a. Hutch 1 Preset 4 indicator LED on the preset box is not lit.

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b. The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.

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		Initial Tested Items	
		EPICS	Local
5.1.4	Actuate the Preset 3 mechanism; confirm that the preset is not obtained by verifying the following:		
	a. Hutch 1 Preset 3 indicator LED on the preset box is not lit.		
	b. The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.		
5.1.5	Actuate the Preset 2 mechanism; confirm that the preset is not obtained by verifying the following:		
	a. Hutch 1 Preset 2 indicator LED on the preset box is not lit.		
	b. The Search Presets 2 indicator LED on the Hutch Users Panel is not lit.		
5.1.6	Actuate the Preset 1 mechanism; confirm that the preset is obtained by verifying the following (note the time so that the Search Timer can be checked later).		
	a. Hutch 1 Preset 1 indicator LED on the preset box is lit.		
	b. The Search Presets 1 indicator LED on the Hutch Users Panel is lit.		
5.2	Preset 2 Check		
5.2.1	Actuate the Preset 4 mechanism; confirm that the preset is not obtained by verifying the following:		
	a. Hutch 1 Preset 4 indicator LED on the preset box is not lit.		

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		Initial Tested Items	
		EPICS	Local
	b.	The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.	
5.2.2	Actuate the Preset 3 mechanism; confirm that the preset is not obtained by verifying the following:		
	a.	Hutch 1 Preset 3 indicator LED on the preset box is not lit.	
	b.	The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.	
5.2.3	Actuate the Preset 2 mechanism; confirm that the preset is obtained by verifying the following:		
	a.	Hutch 1 Preset 2 indicator LED on the preset box is lit.	
	b.	The Search Presets 2 indicator LED on the Hutch Users Panel is lit.	
5.3	Preset 3 Check		
5.3.1	Actuate the Preset 4 mechanism; confirm that the preset is not obtained by verifying the following:		
	a.	Hutch 1 Preset 4 indicator LED on the preset box is not lit.	
	b.	The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.	

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		Initial Tested Items	
		EPICS	Local
5.3.2	Actuate the Preset 3 mechanism; confirm that the preset is obtained by verifying the following:		
	a. Hutch 1 Preset 3 indicator LED on the preset box is lit.		
	b. The Search Presets 3 indicator LED on the Hutch Users Panel is lit.		
5.4	Preset 4 Check		
5.4.1	Actuate the Preset 4 mechanism; confirm that the preset is obtained by verifying the following:		
	a. Hutch 1 Preset 4 indicator LED on the preset box is lit.		
	b. The Search Presets 4 indicator LED on the Hutch Users Panel is lit.		
5.4.2	Verify that the A/V warning begins when obtaining Preset 4 by verifying the following:		
	a. The Sonalert® warning begins to sound.		
	b. The strobe light begins to flash.		
	c. The “Radiation Warning” sign inside the hutch becomes lit.		
	d. The Emergency Off Button H1-1 illumination is flashing.		
	e. The Emergency Off Button H1-2 illumination is flashing.		

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		EPICS	Local
	f. The Emergency Off Button H1-3 illumination is flashing.		
	g. The Emergency Off Button H1-4 illumination is flashing.		
5.5	Preset Search Timer Expiration Check		
5.5.1	Wait for the A/V warning to cease and verify the following:		
	a. The A/V warning expired approximately 2 minutes (± 15 seconds) after Preset 1 was successfully obtained.		
	b. Hutch 1 Preset 4 indicator LED on the preset box is not lit.		
	c. The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.		
	d. Hutch 1 Preset 3 indicator LED on the preset box is not lit.		
	e. The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.		
	f. Hutch 1 Preset 2 indicator LED on the preset box is not lit.		
	g. The Search Presets 2 indicator LED on the Hutch Users Panel is not lit.		
	h. Hutch 1 Preset 1 indicator LED on the preset box is not lit.		

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		Initial Tested Items	
		EPICS	Local
i.	The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		
5.6 Preset and E/O Interaction Check			
5.6.1	Actuate the Preset 1 mechanism; confirm that the preset is obtained by verifying the following:		
a.	The Search Presets 1 indicator LED on the Hutch Users Panel is lit.		
5.6.2	Actuate the Preset 2 mechanism; confirm that the preset is obtained by verifying the following:		
a.	The Search Presets 2 indicator LED on the Hutch Users Panel is lit.		
5.6.3	Actuate the Preset 3 mechanism; confirm that the preset is obtained by verifying the following:		
a.	The Search Presets 3 indicator LED on the Hutch Users Panel is lit.		
5.6.4	Actuate the Preset 4 mechanism; confirm that the preset is obtained by verifying the following:		
a.	The Search Presets 4 indicator LED on the Hutch Users Panel is lit.		
5.6.5	Verify that the A/V warning begins when obtaining Preset 4.		
5.6.6	Press any Emergency Off button in Hutch 1 and verify the following:		
a.	The A/V warning in Hutch 1 immediately ceases.		

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		Initial Tested Items	
		EPICS	Local
	b. The Emergency Off Summary Chain A indicator LED on the Hutch Users Panel is not lit.		
	c. The Emergency Off Summary Chain B indicator LED on the Hutch Users Panel is not lit.		
	d. The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		
	e. The Search Presets 2 indicator LED on the Hutch Users Panel is not lit.		
	f. The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.		
	g. The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.		
5.6.7	Actuate the Preset 1 mechanism; confirm that the preset cannot be obtained by verifying the following:		
	a. The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		
5.6.8	Pull out the actuated Emergency Off button.		
5.6.9	Push the Interlock Reset button on the Hutch Users Panel and verify:		
	a. The Emergency Off Summary Chain A indicator LED on the Hutch Users Panel is lit.		
	b. The Emergency Off Summary Chain B indicator LED on the Hutch Users Panel is lit.		

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		Initial Tested Items	
		EPICS	Local
5.7	No Search Complete without All Presets		
5.7.1	Actuate Presets 1-3 and verify the following:		
	a. The Search Presets 1 indicator LED on the Hutch Users Panel is lit.		
	b. The Search Presets 2 indicator LED on the Hutch Users Panel is lit.		
	c. The Search Presets 3 indicator LED on the Hutch Users Panel is lit.		
5.7.2	Exit the Hutch, close the sliding Hutch Door and remove the Door Key from the door.		
5.7.3	Insert the Door Key into the Door Key Switch on the Hutch Users Panel, turn clockwise and push the Interlock Reset Button. Verify that the Search Complete status cannot be obtained:		
	a. The Search Complete indicator LED on the Hutch Users Panel is not lit.		

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Initial Tested Items	
EPICS	Local

6.0 Interlock and Security Fault Checks

Test Objective:

The following test verifies that both doors (sliding personnel door and rollup equipment door), the Door Key, and the Online/Offline key properly fault the Search Presets and Search Reset, as specified. Redundant status checks are also performed. Presets are also shown not to expire when the 2-minute preset search timer expires.

Personnel Requirements:

Two persons: PPS Test Leader at the Hutch 1 Users Panel, a second tester is needed to actuate the field devices inside Hutch 1.

Note: CoHE conditions set in Section 4.2 should remain in place for this test.

Note: Successful completion of this test requires the NEH PPS to be in Test Mode, as set in Initial Set-up.

6.1 Preset Search Timer Expiration Maintains Search Check

6.1.1 Have a tester with a personal LOTO lock on the FEE Stopper Enable Key lock box (Section 4.2) enter Hutch 1.

6.1.2 Push the Interlock Reset button on the Hutch Users Panel and verify:

a. The Emergency Off Summary Chain A indicator LED on the Hutch Users Panel is lit.

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b. The Emergency Off Summary Chain B indicator LED on the Hutch Users Panel is lit.

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6.1.3 Actuate the Preset 1 mechanism; confirm that the preset is obtained by verifying the following:

a. The Search Presets 1 indicator LED on the Hutch Users Panel is lit.

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		Initial Tested Items	
		EPICS	Local
6.1.4	Actuate the Preset 2 mechanism; confirm that the preset is obtained by verifying the following:		
	a. The Search Presets 2 indicator LED on the Hutch Users Panel is lit.		
6.1.5	Actuate the Preset 3 mechanism; confirm that the preset is obtained by verifying the following:		
	a. The Search Presets 3 indicator LED on the Hutch Users Panel is lit.		
6.1.6	Actuate the Preset 4 mechanism; confirm that the preset is obtained by verifying the following:		
	a. The Search Presets 4 indicator LED on the Hutch Users Panel is lit.		
6.1.7	Exit the Hutch and close the sliding Hutch Door. Do not turn the Door Key and verify:		
	a. The Door Closed indicator LED on the Hutch Users Panel is not lit.		
6.1.8	Turn and remove the Door Key from the door and verify:		
	a. The Door Closed indicator LED on the Hutch Users Panel is lit.		
6.1.9	Insert the Door Key into the Door Key Switch on the Hutch Users Panel and turn clockwise; do not push the Interlock Reset button. Verify that the Search is not obtained:		
	a. The Search Complete indicator LED on the Hutch Users Panel is not lit.		

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		EPICS	Local
6.1.10	Push the Interlock Reset Button and verify:		
	a. The Search Complete indicator LED on the Hutch Users Panel is lit.		
	b. The RAD Warning Not Complete indicator LED on the Hutch Users Panel is lit.		
	c. The RAD Warning Complete indicator LED on the Hutch Users Panel is not lit.		
6.1.11	Fifteen seconds (± 5 Seconds) after the acquisition of the Search Complete Status, verify:		
	a. The RAD Warning Not Complete indicator LED on the Hutch Users Panel is not lit.		
	b. The RAD Warning Complete indicator LED on the Hutch Users Panel is lit.		
	c. The Permit Chain A indicator LED on the Hutch Users Panel is lit.		
	d. The Permit Chain B indicator LED on the Hutch Users Panel is lit.		
6.1.12	Wait until at least 2 minutes have passed since Preset 1 was obtained and verify that the Hutch presets are retained following expiration of the preset search timer by verifying the following:		
	a. The Search Presets 1 indicator LED on the Hutch Users Panel is lit.		
	b. The Search Presets 2 indicator LED on the Hutch Users Panel is lit.		

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c.	The Search Presets 3 indicator LED on the Hutch Users Panel is lit.		
d.	The Search Presets 4 indicator LED on the Hutch Users Panel is lit.		
6.2 Sliding Hutch Door Checks			
6.2.1	Actuate the Emergency Entry mechanism while leaving the sliding Hutch Door closed and verify:		
a.	The Door Closed indicator LED on the Hutch Users Panel is not lit.		
b.	The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		
c.	The Search Presets 2 indicator LED on the Hutch Users Panel is not lit.		
d.	The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.		
e.	The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.		
f.	The Search Complete indicator LED on the Hutch Users Panel is not lit.		
g.	The RAD Warning Not Complete indicator LED on the Hutch Users Panel is lit.		
h.	The RAD Warning Complete indicator LED on the Hutch Users Panel is not lit.		

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		Initial Tested Items	
		EPICS	Local
	i. The Permit Chain A indicator LED on the Hutch Users Panel is not lit.		
	j. The Permit Chain B indicator LED on the Hutch Users Panel is not lit.		
	k. The Security Fault Sonalert at the Hutch Users Panel is sounding.		
6.2.2	Turn the Hutch OFFLINE, and then back ONLINE, to silence the Security Fault Sonalert.		
6.2.3	Open the sliding Hutch Door and reset the Emergency Entry mechanism.		
6.2.4	Open the sliding Hutch Door microswitch protective cover and hold both door microswitches closed and verify the following:		
	a. The Door Closed indicator LED on the Hutch Users Panel is lit.		
6.2.5	Release sliding Hutch Door microswitch 'A' while continuing to hold microswitch 'B' closed and verify the following:		
	a. The Door Closed indicator LED on the Hutch Users Panel is not lit.		
6.2.6	Release sliding Hutch Door microswitch 'B' and hold microswitch 'A' closed and verify the following:		
	a. The Door Closed indicator LED on the Hutch Users Panel is not lit.		

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		Initial Tested Items	
		EPICS	Local
6.2.7	Close the sliding Hutch Door and verify the following:		
	a. The Door Closed indicator LED on the Hutch Users Panel is lit.		
6.2.8	Close and lock the sliding Hutch Door microswitch protective cover.		
6.3 Rollup Door Checks			
6.3.1	Have a tester with a personal LOTO lock on the FEE Stopper Enable Key lock box (Section 4.2) enter Hutch 1.		
6.3.2	Push the Interlock Reset button on the Hutch Users Panel and verify:		
	a. The Emergency Off Summary Chain A indicator LED on the Hutch Users Panel is lit.		
	b. The Emergency Off Summary Chain B indicator LED on the Hutch Users Panel is lit.		
6.3.3	Acquire the Hutch 1 Search Complete Status by actuating all of the hutch presets, <i>exiting the hutch</i> , closing the hutch door, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:		
	a. The Search Complete indicator LED on the Hutch Users Panel is lit.		
	b. The Permit Chain A indicator LED on the Hutch Users Panel is lit.		
	c. The Permit Chain B indicator LED on the Hutch Users Panel is lit.		

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		Initial Tested Items	
		EPICS	Local
	d. The Rollup Door Closed indicator LED on the Hutch Users Panel is lit.		
6.3.4	Open the Rollup Door and verify:		
	a. The Rollup Door Closed indicator LED on the Hutch Users Panel is not lit.		
	b. The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		
	c. The Search Presets 2 indicator LED on the Hutch Users Panel is not lit.		
	d. The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.		
	e. The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.		
	f. The Search Complete indicator LED on the Hutch Users Panel is not lit.		
	g. The RAD Warning Not Complete indicator LED on the Hutch Users Panel is lit.		
	h. The RAD Warning Complete indicator LED on the Hutch Users Panel is not lit.		
	i. The Permit Chain A indicator LED on the Hutch Users Panel is not lit.		
	j. The Permit Chain B indicator LED on the Hutch Users Panel is not lit.		

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		Initial Tested Items	
		EPICS	Local
	k. The Security Fault Sonalert at the Hutch Users Panel is sounding.		
6.3.5	Turn the Hutch OFFLINE, and then back ONLINE, to silence the Security Fault Sonalert.		
6.3.6	Hold both Rollup Door switches closed with magnets and verify the following:		
	a. The Rollup Door Closed indicator LED on the Hutch Users Panel is lit.		
6.3.7	Release Rollup Door switch 'A' while continuing to hold switch 'B' closed with a magnet and verify the following:		
	a. The Rollup Door Closed indicator LED on the Hutch Users Panel is not lit.		
6.3.8	Release Rollup Door switch 'B' and hold switch 'A' closed with a magnet and verify the following:		
	a. The Rollup Door Closed indicator LED on the Hutch Users Panel is not lit.		
6.3.9	Close the Rollup Door and verify the following:		
	a. The Rollup Door Closed indicator LED on the Hutch Users Panel is lit.		

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		Initial Tested Items	
		EPICS	Local
6.4	Door Key Checks		
6.4.1	Have a tester with a personal LOTO lock on the FEE Stopper Enable Key lock box (Section 4.2) enter Hutch 1.		
6.4.2	Push the Interlock Reset button on the Hutch Users Panel and verify:		
	a. The Emergency Off Summary Chain A indicator LED on the Hutch Users Panel is lit.		
	b. The Emergency Off Summary Chain B indicator LED on the Hutch Users Panel is lit.		
6.4.3	Acquire the Hutch 1 Search Complete Status by actuating all of the hutch presets, <i>exiting the hutch</i> , closing the hutch door, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:		
	a. The Search Complete indicator LED on the Hutch Users Panel is lit.		
	b. The Permit Chain A indicator LED on the Hutch Users Panel is lit.		
	c. The Permit Chain B indicator LED on the Hutch Users Panel is lit.		
6.4.4	Press the Door Key Release button on the Hutch Users Panel, remove the Door Key, and verify:		
	a. The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		
	b. The Search Presets 2 indicator LED on the Hutch Users Panel is not lit.		

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		Initial Tested Items	
		EPICS	Local
c.	The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.		
d.	The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.		
e.	The Search Complete indicator LED on the Hutch Users Panel is not lit.		
f.	The RAD Warning Not Complete indicator LED on the Hutch Users Panel is lit.		
g.	The RAD Warning Complete indicator LED on the Hutch Users Panel is not lit.		
h.	The Permit Chain A indicator LED on the Hutch Users Panel is not lit.		
i.	The Permit Chain B indicator LED on the Hutch Users Panel is not lit.		
6.5 Hutch Online/Offline Key Checks			
6.5.1	Have a tester with a personal LOTO lock on the FEE Stopper Enable Key lock box (Section 4.2) enter Hutch 1.		
6.5.2	Push the Interlock Reset button on the Hutch Users Panel and verify:		
a.	The Emergency Off Summary Chain A indicator LED on the Hutch Users Panel is lit.		
b.	The Emergency Off Summary Chain B indicator LED on the Hutch Users Panel is lit.		

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		Initial Tested Items	
		EPICS	Local
6.5.3	Acquire the Hutch 1 Search Complete Status by actuating all of the hutch presets, <i>exiting the hutch</i> , closing the hutch door, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:		
	a. The Search Complete indicator LED on the Hutch Users Panel is lit.		
	b. The Permit Chain A indicator LED on the Hutch Users Panel is lit.		
	c. The Permit Chain B indicator LED on the Hutch Users Panel is lit.		
6.5.4	Insert the NEH Hutch Online/Offline Key into the Online/Offline Keyswitch on the Hutch Users Panel and turn to the OFFLINE position and verify:		
	a. The Offline indicator LED on the Hutch Users Panel is lit.		
	b. The Online indicator LED on the Hutch Users Panel is not lit.		
	c. The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		
	d. The Search Presets 2 indicator LED on the Hutch Users Panel is not lit.		
	e. The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.		
	f. The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.		
	g. The Search Complete indicator LED on the Hutch Users Panel is not lit.		

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		Initial Tested Items	
		EPICS	Local
	h. The RAD Warning Not Complete indicator LED on the Hutch Users Panel is lit.		
	i. The RAD Warning Complete indicator LED on the Hutch Users Panel is not lit.		
	j. The Permit Chain A indicator LED on the Hutch Users Panel is not lit.		
	k. The Permit Chain B indicator LED on the Hutch Users Panel is not lit.		
6.5.5	Actuate the Preset 1 mechanism; confirm that the preset is not obtained by verifying the following:		
	a. The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		
6.5.6	Turn the Online/Offline Keyswitch back to the ONLINE position, retain possession of the key, and verify:		
	a. The Offline indicator LED on the Hutch Users Panel is not lit.		
	b. The Online indicator LED on the Hutch Users Panel is lit.		

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Initial Tested Items	
EPICS	Local

7.0 Emergency Off Button Checks

Test Objective:

The following test verifies that all Emergency Off buttons properly fault the Search Presets and Search Reset, as specified. The Audio Visual warning is also witnessed.

Personnel Requirements:

Two persons: PPS Test Leader at the Hutch 1 Users Panel, a second tester is needed to actuate the field devices inside Hutch 1.

Note: CoHE conditions set in Section 4.2 should remain in place for this test.

Note: Successful completion of this test requires the NEH PPS to be in Test Mode, as set in Initial Set-up.

7.1 Hutch 1 Emergency Off Button Checks

7.1.1 Have a tester with a personal LOTO lock on the FEE Stopper Enable Key lock box (Section 4.2) enter Hutch 1.

7.1.2 Push the Interlock Reset button on the Hutch Users Panel and verify:

- a. The Emergency Off Summary Chain A indicator LED on the Hutch Users Panel is lit.
- b. The Emergency Off Summary Chain B indicator LED on the Hutch Users Panel is lit.
- c. The Emergency Off Button H1-1 illumination is steady.
- d. The Emergency Off Button H1-2 illumination is steady.
- e. The Emergency Off Button H1-3 illumination is steady.

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f. The Emergency Off Button H1-4 illumination is steady.	Initial Tested Items	
	EPICS	Local
7.1.3 Complete Table 2 below by pushing the indicated Emergency Off buttons (EO):		

Table 2

	Emergency Off Summary Chain A (Hutch Users Panel)	Emergency Off Summary Chain B (Hutch Users Panel)	Tester Initial
Push EO Button H1-1	LED not lit	LED not lit	
Pull out EO Button H1-1 Push Interlock Reset on the Hutch Users Panel	LED lit	LED lit	
Push EO Button H1-2	LED not lit	LED not lit	
Pull out EO Button H1-2 Push Interlock Reset on the Hutch Users Panel	LED lit	LED lit	
Push EO Button H1-3	LED not lit	LED not lit	
Pull out EO Button H1-3 Push Interlock Reset on the Hutch Users Panel	LED lit	LED lit	
Push EO Button H1-4	LED not lit	LED not lit	
Pull out EO Button H1-4 Push Interlock Reset on the Hutch Users Panel	LED lit	LED lit	

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		Initial Tested Items	
		EPICS	Local
7.2	Time-Out In-Progress EO Actuation Test		
7.2.1	<p>Have a tester with a personal LOTO lock on the FEE Stopper Enable Key lock box (Section 4.2) <i>remain</i> in Hutch 1. Acquire the Hutch 1 Search Complete Status by actuating all of the hutch presets, closing the hutch door <i>with a tester remaining inside</i>, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and verify (note the time that Preset 1 was acquired, step 7.2.3 must be completed within 2 minutes):</p>		
	a. The Search Complete indicator LED on the Hutch Users Panel is lit.		
	b. The Permit Chain A indicator LED on the Hutch Users Panel is not lit.		
	c. The Permit Chain B indicator LED on the Hutch Users Panel is not lit.		
7.2.2	Press one of the Emergency Off buttons before the timeout completes and verify:		
	a. The Emergency Off Summary Chain A indicator LED on the Hutch Users Panel is not lit.		
	b. The Emergency Off Summary Chain B indicator LED on the Hutch Users Panel is not lit.		
	c. The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		
	d. The Search Presets 2 indicator LED on the Hutch Users Panel is not lit.		
	e. The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.		

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		Initial Tested Items	
		EPICS	Local
f.	The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.		
g.	The Search Complete indicator LED on the Hutch Users Panel is not lit.		
h.	The Permit Chain A indicator LED on the Hutch Users Panel is not lit.		
i.	The Permit Chain B indicator LED on the Hutch Users Panel is not lit.		
j.	The Security Fault Sonalert at the Hutch Users Panel is sounding.		
7.2.3	Attempt to obtain the Search Complete status by pressing the Interlock Reset Button within 2 minutes of acquiring Preset 1 in step 7.2.1 above; confirm that the Search Complete is not obtained by verifying the following:		
a.	The Search Complete indicator LED on the Hutch Users Panel is not lit.		
7.2.4	Turn the Hutch OFFLINE, and then back ONLINE, to silence the Security Fault Sonalert.		
7.2.5	Push the Interlock Reset button on the Hutch Users Panel and verify:		
a.	The Emergency Off Summary Chain A indicator LED on the Hutch Users Panel is lit.		
b.	The Emergency Off Summary Chain B indicator LED on the Hutch Users Panel is lit.		

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		Initial Tested Items	
		EPICS	Local
7.3	Time-Out Complete EO Actuation Test		
7.3.1	<p>Have a tester with a personal LOTO lock on the FEE Stopper Enable Key lock box (Section 4.2) remain in Hutch 1. Acquire the Hutch 1 Search Complete Status by actuating all of the hutch presets, closing the hutch door <i>with a tester remaining inside</i>, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:</p>		
	a. The Search Complete indicator LED on the Hutch Users Panel is lit.		
	b. The Permit Chain A indicator LED on the Hutch Users Panel is lit.		
	c. The Permit Chain B indicator LED on the Hutch Users Panel is lit.		
7.3.2	<p>Press one of the Emergency Off buttons and verify:</p>		
	a. The Emergency Off Summary Chain A indicator LED on the Hutch Users Panel is not lit.		
	b. The Emergency Off Summary Chain B indicator LED on the Hutch Users Panel is not lit.		
	c. The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		
	d. The Search Presets 2 indicator LED on the Hutch Users Panel is not lit.		
	e. The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.		
	f. The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.		

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		Initial Tested Items	
		EPICS	Local
	g. The Search Complete indicator LED on the Hutch Users Panel is not lit.		
	h. The Permit Chain A indicator LED on the Hutch Users Panel is not lit.		
	i. The Permit Chain B indicator LED on the Hutch Users Panel is not lit.		
	j. The Security Fault Sonalert at the Hutch Users Panel is sounding.		
7.3.3	Turn the Hutch OFFLINE, and then back ONLINE, to silence the Security Fault Sonalert.		
7.3.4	Push the Interlock Reset button on the Hutch Users Panel and verify:		
	a. The Emergency Off Summary Chain A indicator LED on the Hutch Users Panel is lit.		
	b. The Emergency Off Summary Chain B indicator LED on the Hutch Users Panel is lit.		

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		Initial Tested Items	
		EPICS	Local
8.0	<p>Access State Checks</p> <p><i>Test Objective:</i></p> <p>The following tests verify that all stoppers must report IN for the Hutch 1 Door Key to be released.</p> <p><i>Personnel Requirements:</i></p> <p>Two persons: PPS Test Leader at the Hutch 1 Users Panel, a second tester is needed to actuate the test buttons in rack B950-02.</p> <p>Note: CoHE conditions set in Section 4.2 should remain in place for this test.</p> <p>Note: Successful completion of this test requires the NEH PPS to be in Test Mode, as set in Initial Set-up.</p>		
8.1	Test Set-up		
8.1.1	Verify that the Hutch 1 radiation warning light outside the hutch, above the door, is steady yellow.		
8.1.2	Acquire the Hutch 1 Search Complete Status by actuating all of the hutch presets, <i>exiting the hutch</i> , closing the hutch door, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:		
	a. The Search Complete indicator LED on the Hutch Users Panel is lit.		
	b. The Permit Chain A indicator LED on the Hutch Users Panel is lit.		
	c. The Permit Chain B indicator LED on the Hutch Users Panel is lit.		
	d. The Hutch 1 radiation warning light outside the hutch, above the door, is steady magenta.		

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		Initial Tested Items	
		EPICS	Local
8.2	No Bail-Down with 'S1' Stopper Out Test		
8.2.1	Press and hold the IN SUM TEST CHA button on the back of the 'S1' Stopper Chassis (B950-02(23)) and verify the following:		
	a. The Stoppers In Status indicator LED on the Hutch Users Panel is not lit.		
	b. The Hutch 1 radiation warning light outside the hutch, above the door, is flashing magenta.		
8.2.2	Press the Door Key Release button on the Hutch Users Panel and attempt remove the Door Key; verify it remains captive.		
8.2.3	Release the IN SUM TEST CHA button. Press and hold the IN SUM TEST CHB button on the back of the 'S1' Stopper Chassis (B950-02(23)) and verify the following:		
	a. The Stoppers In Status indicator LED on the Hutch Users Panel is not lit.		
	b. The Hutch 1 radiation warning light outside the hutch, above the door, is flashing magenta.		
8.2.4	Press the Door Key Release button on the Hutch Users Panel and attempt remove the Door Key; verify it remains captive.		
8.2.5	Release the IN SUM TEST CHB button and verify:		
	a. The Stoppers In Status indicator LED on the Hutch Users Panel is lit.		
	b. The Hutch 1 radiation warning light outside the hutch, above the door, is steady magenta.		

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		Initial Tested Items	
		EPICS	Local
8.3	No Bail-Down with 'S2' Stopper Out Test		
8.3.1	Press and hold the IN SUM TEST CHA button on the back of the 'S2' Stopper Chassis (B950-02(21)) and verify the following:		
	a. The Stoppers In Status indicator LED on the Hutch Users Panel is not lit.		
	b. The Hutch 1 radiation warning light outside the hutch, above the door, is flashing magenta.		
8.3.2	Press the Door Key Release button on the Hutch Users Panel and attempt remove the Door Key; verify it remains captive.		
8.3.3	Release the IN SUM TEST CHA button. Press and hold the IN SUM TEST CHB button on the back of the 'S2' Stopper Chassis (B950-02(21)) and verify the following:		
	a. The Stoppers In Status indicator LED on the Hutch Users Panel is not lit.		
	b. The Hutch 1 radiation warning light outside the hutch, above the door, is flashing magenta.		
8.3.4	Press the Door Key Release button on the Hutch Users Panel and attempt remove the Door Key; verify it remains captive.		
8.3.5	Release the IN SUM TEST CHB button and verify:		
	a. The Stoppers In Status indicator LED on the Hutch Users Panel is lit.		
	b. The Hutch 1 radiation warning light outside the hutch, above the door, is steady magenta.		

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		Initial Tested Items	
		EPICS	Local
8.4	No Bail-Down with 'SH1' Stopper Out Test		
8.4.1	Press and hold the IN SUM TEST CHA button on the back of the 'SH1' Stopper Chassis (B950-02(25)) and verify the following:		
	a. The Stoppers In Status indicator LED on the Hutch Users Panel is not lit.		
	b. The Hutch 1 radiation warning light outside the hutch, above the door, is flashing magenta.		
8.4.2	Press the Door Key Release button on the Hutch Users Panel and attempt remove the Door Key; verify it remains captive.		
8.4.3	Release the IN SUM TEST CHA button. Press and hold the IN SUM TEST CHB button on the back of the 'SH1' Stopper Chassis (B950-02(25)) and verify the following:		
	a. The Stoppers In Status indicator LED on the Hutch Users Panel is not lit.		
	b. The Hutch 1 radiation warning light outside the hutch, above the door, is flashing magenta.		
8.4.4	Press the Door Key Release button on the Hutch Users Panel and attempt remove the Door Key; verify it remains captive.		
8.4.5	Release the IN SUM TEST CHB button and verify:		
	a. The Stoppers In Status indicator LED on the Hutch Users Panel is lit.		
	b. The Hutch 1 radiation warning light outside the hutch, above the door, is steady magenta.		

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		Initial Tested Items	
		EPICS	Local
8.5	Normal Bail-Down Test		
8.5.1	The Stoppers In Status indicator LED on the Hutch Users Panel is lit.		
8.5.2	Attempt to acquire the Door Key from the Hutch Users Panel without pressing the Door Key Release button; verify it is not released.		
8.5.3	Press the Door Key Release button on the Hutch Users Panel and remove the Door Key; verify it is released.		

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Initial Tested Items	
EPICS	Local

<p>9.0 Chain A/B Crash Tests</p> <p><i>Test Objective:</i></p> <p>The following test demonstrates that, while in Test Mode, each PPS Chain acts independently for the purposes of testing. Single chain security faults are shown to fault only the corresponding stopper permit.</p> <p><i>Personnel Requirements:</i></p> <p>Three persons: PPS Test Leader at the Hutch 1 Users Panel, a second tester is needed to secure the hutch, a third tested in needed to hold the roll-up door microswitches closed. Phone contact to MCC or a local NEH EPICS display is needed to observe some control system status.</p> <p>Note: CoHE conditions set in Section 4.2 should remain in place for this test.</p> <p>Note: Successful completion of this test requires the NEH PPS to be in Test Mode, as set in Initial Set-up.</p> <p>9.1 Chain A Test Mode Crash Test</p> <p>9.1.1 Set the 'S1' Stopper Enable Keyswitch (B950-02(23)) to the ENABLE position.</p> <p>9.1.2 Set the 'S2' Stopper Enable Keyswitch (B950-02(21)) to the ENABLE position.</p> <p>9.1.3 Set the 'SH1' Stopper Enable Keyswitch (B950-02(25)) to the ENABLE position.</p> <p>9.1.4 Observe that the Hutch 2 Search Complete status is not preset on EPICS.</p>	<table border="1"> <tr> <td style="width: 50px;"></td> <td style="width: 50px;"></td> </tr> <tr> <td style="width: 50px;"></td> <td style="width: 50px;"></td> </tr> <tr> <td style="width: 50px;"></td> <td style="width: 50px;"></td> </tr> <tr> <td style="width: 50px;"></td> <td style="width: 50px;"></td> </tr> </table>								

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		Initial Tested Items																					
		EPICS	Local																				
9.1.5	<p>Acquire the Hutch 2 Search Complete Status by actuating all of the hutch presets (utilize presets in the PPS rack if necessary), <i>exiting the hutch</i>, closing the hutch door, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:</p> <p>a. The Search Complete indicator LED on the Hutch Users Panel is lit.</p> <p>b. The Hutch 2 Search Complete status is present on EPICS.</p> <p>c. The Permit Chain A indicator LED on the Hutch Users Panel is lit.</p> <p>d. The Permit Chain B indicator LED on the Hutch Users Panel is lit.</p>	<table border="1" style="width: 100%; height: 100%;"> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> </table>											<table border="1" style="width: 100%; height: 100%;"> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> </table>										
9.1.6	<p>Observe that the Hutch 3 Search Complete status is not preset on EPICS.</p>	<table border="1" style="width: 100%; height: 100%;"> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> </table>			<table border="1" style="width: 100%; height: 100%;"> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> </table>																		
9.1.7	<p>Acquire the Hutch 3 Search Complete Status by actuating all of the hutch presets (utilize presets in the PPS rack if necessary), <i>exiting the hutch</i>, closing the hutch door, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:</p> <p>a. The Search Complete indicator LED on the Hutch Users Panel is lit.</p> <p>b. The Hutch 3 Search Complete status is present on EPICS.</p> <p>c. The Permit Chain A indicator LED on the Hutch Users Panel is lit.</p> <p>d. The Permit Chain B indicator LED on the Hutch Users Panel is lit.</p>	<table border="1" style="width: 100%; height: 100%;"> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> </table>									<table border="1" style="width: 100%; height: 100%;"> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> <tr><td style="width: 50%;"></td><td style="width: 50%;"></td></tr> </table>												

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		Initial Tested Items	
		EPICS	Local
9.1.8	Observe that the Hutch 1 Search Complete status is not preset on EPICS.		
9.1.9	Open the Rollup Door. Have a tester hold both Rollup Door switches closed with magnets while another tester secures the Hutch.		
9.1.10	Acquire the Hutch 1 Search Complete Status by actuating all of the hutch presets, <i>exiting the hutch</i> , closing the hutch door, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:		
	a. The Search Complete indicator LED on the Hutch Users Panel is lit.		
	b. The Hutch 1 Search Complete status is present on EPICS.		
	c. The Permit Chain A indicator LED on the Hutch Users Panel is lit.		
	d. The Permit Chain B indicator LED on the Hutch Users Panel is lit.		
9.1.11	Release Rollup Door switch 'A' while continuing to hold switch 'B' closed with a magnet and verify the following:		
	a. The Rollup Door Closed indicator LED on the Hutch Users Panel is not lit.		
	b. The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		
	c. The Search Presets 2 indicator LED on the Hutch Users Panel is not lit.		

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	Initial Tested Items	
	EPICS	Local
d. The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.		
e. The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.		
f. The Search Complete indicator LED on the Hutch Users Panel is not lit.		
g. The RAD Warning Not Complete indicator LED on the Hutch Users Panel is lit.		
h. The RAD Warning Complete indicator LED on the Hutch Users Panel is not lit.		
i. The Permit Chain A indicator LED on the Hutch Users Panel is not lit.		
j. The Permit Chain B indicator LED on the Hutch Users Panel is lit.		
k. The Permit Chain A indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
l. The Permit Chain B indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
m. The Permit Chain A indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
n. The Permit Chain B indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
o. The Permit Chain A indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		

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		Initial Tested Items	
		EPICS	Local
9.1.12	p. The Permit Chain B indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
	q. The Security Fault Sonalert at the Hutch Users Panel is sounding.		
	Turn the Hutch OFFLINE, and then back ONLINE, to silence the Security Fault Sonalert.		
9.2	Chain B Test Mode Crash Test		
9.2.1	Have a tester hold both Rollup Door switches closed with magnets while another tester secures the Hutch.		
9.2.2	Acquire the Hutch 1 Search Complete Status by actuating all of the hutch presets, <i>exiting the hutch</i> , closing the hutch door, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:		
	a. The Search Complete indicator LED on the Hutch Users Panel is lit.		
	b. The Permit Chain A indicator LED on the Hutch Users Panel is lit.		
	c. The Permit Chain B indicator LED on the Hutch Users Panel is lit.		
9.2.3	Release Rollup Door switch 'B' and hold switch 'A' closed with a magnet and verify the following:		
	a. The Rollup Door Closed indicator LED on the Hutch Users Panel is not lit.		
	b. The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		

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	Initial Tested Items	
	EPICS	Local
c. The Search Presets 2 indicator LED on the Hutch Users Panel is not lit.		
d. The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.		
e. The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.		
f. The Search Complete indicator LED on the Hutch Users Panel is not lit.		
g. The RAD Warning Not Complete indicator LED on the Hutch Users Panel is lit.		
h. The RAD Warning Complete indicator LED on the Hutch Users Panel is not lit.		
i. The Permit Chain A indicator LED on the Hutch Users Panel is lit.		
j. The Permit Chain B indicator LED on the Hutch Users Panel is not lit.		
k. The Permit Chain A indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
l. The Permit Chain B indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
m. The Permit Chain A indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
n. The Permit Chain B indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		

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		Initial Tested Items	
		EPICS	Local
	o. The Permit Chain A indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
	p. The Permit Chain B indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
	q. The Security Fault Sonalert at the Hutch Users Panel is sounding.		
9.2.4	Turn the Hutch OFFLINE, and then back ONLINE, to silence the Security Fault Sonalert.		
9.2.5	Close the Hutch Rollup Door.		

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Initial Tested Items	
EPICS	Local

10.0 NEH Stopper Enable Keyswitch and Permit A/B Tests

Test Objective:

The following test verifies that the NEH Stoppers ('S1,' 'S2,' and 'SH1' stopper sets), are disabled 'in' by their corresponding Stopper Enable/Disable keyswitches located in rack B950-02. The stoppers are also shown to require both stopper permits to remain in the OUT position.

Personnel Requirements:

Two persons: PPS Test Leader at the Hutch 1 Users Panel, a second tester is needed to actuate the keyswitches and test buttons in rack B950-02. Phone contact to MCC or a local NEH EPICS display is needed to observe some control system status.

Note: CoHE conditions set in Section 4.2 should remain in place for this test.

10.1 Test Set-up

10.1.1 Acquire the Hutch 1 Search Complete Status by actuating all of the hutch presets, *exiting the hutch*, closing the hutch door, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:

- a. The Search Complete indicator LED on the Hutch Users Panel is lit.
- b. The Permit Chain A indicator LED on the Hutch Users Panel is lit.
- c. The Permit Chain B indicator LED on the Hutch Users Panel is lit.

10.1.2 Verify the following:

- a. The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is not lit.

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		Initial Tested Items	
		EPICS	Local
b.	The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is not lit.		
c.	The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is lit.		
d.	The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is lit.		
10.1.3 Push the Stoppers Out CMD button on the Hutch Users Panel and verify:			
a.	The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is lit.		
b.	The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is lit.		
c.	The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
d.	The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		
e.	The Stopper 1 Chain A In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
f.	The Stopper 1 Chain B In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
g.	The Stopper 2 Chain A In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
h.	The Stopper 2 Chain B In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		

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	Initial Tested Items	
	EPICS	Local
i. The Chain A Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
j. The Chain B Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
k. The Stopper 1 OUT indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
l. The Stopper 2 OUT indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
m. The Stopper 1 Chain A In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
n. The Stopper 1 Chain B In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
o. The Stopper 2 Chain A In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
p. The Stopper 2 Chain B In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
q. The Chain A Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
r. The Chain B Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
s. The Stopper 1 OUT indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
t. The Stopper 2 OUT indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		

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		Initial Tested Items	
		EPICS	Local
u.	The Stopper 1 Chain A In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
v.	The Stopper 1 Chain B In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
w.	The Stopper 2 Chain A In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
x.	The Stopper 2 Chain B In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
y.	The Chain A Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
z.	The Chain B Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
aa.	The Stopper 1 OUT indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
bb.	The Stopper 2 OUT indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
10.2	'S1' Stopper Enable Keyswitch Test		
10.2.1	Set the 'S1' Stopper Enable Keyswitch (B950-02(23)) to the DISABLE position and verify:		
a.	The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is not lit.		
b.	The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is not lit.		

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	Initial Tested Items	
	EPICS	Local
c. The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
d. The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		
e. The Permit Chain A indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
f. The Permit Chain B indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
g. The Stopper 1 Chain A In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
h. The Stopper 1 Chain B In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
i. The Stopper 2 Chain A In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
j. The Stopper 2 Chain B In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
k. The Chain A Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
l. The Chain B Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
m. The Stopper 1 OUT indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
n. The Stopper 2 OUT indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		

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		Initial Tested Items	
		EPICS	Local
o.	The 'S1' Stopper 1 Chain A IN status on EPICS is IN.		
p.	The 'S1' Stopper 1 Chain B IN status on EPICS is IN.		
q.	The 'S1' Stopper 2 Chain A IN status on EPICS is IN.		
r.	The 'S1' Stopper 2 Chain B IN status on EPICS is IN.		
10.2.2	Attempt to remove the 'S1' Stoppers by pressing the Out Cmd button on the Hutch Users Panel and verify they all remain IN.		
10.2.3	Set the 'S1' Stopper Enable Keyswitch (B950-02(23)) to the ENABLE position and remove the 'S1' Stoppers by pressing the Out Cmd button on the Hutch Users Panel and verify:		
a.	The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is lit.		
b.	The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is lit.		
c.	The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
d.	The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		
e.	The Permit Chain A indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
f.	The Permit Chain B indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		

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	Initial Tested Items	
	EPICS	Local
g. The Stopper 1 Chain A In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
h. The Stopper 1 Chain B In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
i. The Stopper 2 Chain A In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
j. The Stopper 2 Chain B In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
k. The Chain A Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
l. The Chain B Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
m. The Stopper 1 OUT indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
n. The Stopper 2 OUT indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
o. The 'S1' Stopper 1 Chain A IN status on EPICS is NOT IN.		
p. The 'S1' Stopper 1 Chain B IN status on EPICS is NOT IN.		
q. The 'S1' Stopper 2 Chain A IN status on EPICS is NOT IN.		
r. The 'S1' Stopper 2 Chain B IN status on EPICS is NOT IN.		

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		Initial Tested Items	
		EPICS	Local
10.3	‘S1’ Stopper Permit A Test		
10.3.1	Press and hold the PERMIT TEST CHA Interrupt Button on the back of the ‘S1’ Stopper Chassis (B950-02(23)) and verify that the stoppers go in by checking the following:		
	a. The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is not lit.		
	b. The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is not lit.		
	c. The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
	d. The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		
	e. The Permit Chain A indicator LED on the ‘S1’ Stopper Chassis (B950-02(23)) is not lit.		
	f. The Permit Chain B indicator LED on the ‘S1’ Stopper Chassis (B950-02(23)) is lit.		
	g. The Stopper 1 Chain A In indicator LED on the ‘S1’ Stopper Chassis (B950-02(23)) is lit.		
	h. The Stopper 1 Chain B In indicator LED on the ‘S1’ Stopper Chassis (B950-02(23)) is lit.		
	i. The Stopper 2 Chain A In indicator LED on the ‘S1’ Stopper Chassis (B950-02(23)) is lit.		
	j. The Stopper 2 Chain B In indicator LED on the ‘S1’ Stopper Chassis (B950-02(23)) is lit.		

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		Initial Tested Items	
		EPICS	Local
k.	The Chain A Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
l.	The Chain B Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
m.	The Stopper 1 OUT indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
n.	The Stopper 2 OUT indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
10.3.2	Attempt to remove the 'S1' Stoppers by pressing the Out Cmd button on the Hutch Users Panel and verify they all remain IN.		
10.3.3	Release the PERMIT TEST CHA Interrupt Button and remove the 'S1' Stoppers by pressing the Out Cmd button on the Hutch Users Panel.		
10.4 'S1' Stopper Permit B Test			
10.4.1	Press and hold the PERMIT TEST CHB Interrupt Button on the back of the 'S1' Stopper Chassis (B950-02(23)) and verify that the stoppers go in by checking the following:		
a.	The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is not lit.		
b.	The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is not lit.		
c.	The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
d.	The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		

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		Initial Tested Items	
		EPICS	Local
e.	The Permit Chain A indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
f.	The Permit Chain B indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
g.	The Stopper 1 Chain A In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
h.	The Stopper 1 Chain B In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
i.	The Stopper 2 Chain A In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
j.	The Stopper 2 Chain B In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
k.	The Chain A Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
l.	The Chain B Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
m.	The Stopper 1 OUT indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
n.	The Stopper 2 OUT indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
10.4.2	Attempt to remove the 'S1' Stoppers by pressing the Out Cmd button on the Hutch Users Panel and verify they all remain IN.		
10.4.3	Release the PERMIT TEST CHB Interrupt Button and remove the 'S1' Stoppers by pressing the Out Cmd button on the Hutch Users Panel.		

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		Initial Tested Items	
		EPICS	Local
10.5	‘S2’ Stopper Enable Keyswitch Test		
10.5.1	Set the ‘S2’ Stopper Enable Keyswitch (B950-02(21)) to the DISABLE position and verify:		
	a. The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is not lit.		
	b. The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is not lit.		
	c. The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
	d. The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		
	e. The Permit Chain A indicator LED on the ‘S2’ Stopper Chassis (B950-02(21)) is not lit.		
	f. The Permit Chain B indicator LED on the ‘S2’ Stopper Chassis (B950-02(21)) is not lit.		
	g. The Stopper 1 Chain A In indicator LED on the ‘S2’ Stopper Chassis (B950-02(21)) is lit.		
	h. The Stopper 1 Chain B In indicator LED on the ‘S2’ Stopper Chassis (B950-02(21)) is lit.		
	i. The Stopper 2 Chain A In indicator LED on the ‘S2’ Stopper Chassis (B950-02(21)) is lit.		
	j. The Stopper 2 Chain B In indicator LED on the ‘S2’ Stopper Chassis (B950-02(21)) is lit.		

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		Initial Tested Items	
		EPICS	Local
k.	The Chain A Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
l.	The Chain B Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
m.	The Stopper 1 OUT indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
n.	The Stopper 2 OUT indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
o.	The 'S2' Stopper 1 Chain A IN status on EPICS is IN.		
p.	The 'S2' Stopper 1 Chain B IN status on EPICS is IN.		
q.	The 'S2' Stopper 2 Chain A IN status on EPICS is IN.		
r.	The 'S2' Stopper 2 Chain B IN status on EPICS is IN.		
10.5.2	Attempt to remove the 'S2' Stoppers by pressing the Out Cmd button on the Hutch Users Panel and verify they all remain IN.		
10.5.3	Set the 'S2' Stopper Enable Keyswitch (B950-02(21)) to the ENABLE position and remove the 'S2' Stoppers by pressing the Out Cmd button on the Hutch Users Panel and verify:		
a.	The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is lit.		
b.	The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is lit.		

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	Initial Tested Items	
	EPICS	Local
c. The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
d. The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		
e. The Permit Chain A indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
f. The Permit Chain B indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
g. The Stopper 1 Chain A In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
h. The Stopper 1 Chain B In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
i. The Stopper 2 Chain A In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
j. The Stopper 2 Chain B In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
k. The Chain A Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
l. The Chain B Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
m. The Stopper 1 OUT indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
n. The Stopper 2 OUT indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		

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		Initial Tested Items	
		EPICS	Local
o.	The 'S2' Stopper 1 Chain A IN status on EPICS is NOT IN.		
p.	The 'S2' Stopper 1 Chain B IN status on EPICS is NOT IN.		
q.	The 'S2' Stopper 2 Chain A IN status on EPICS is NOT IN.		
r.	The 'S2' Stopper 2 Chain B IN status on EPICS is NOT IN.		
10.6 'S2' Stopper Permit A Test			
10.6.1	Press and hold the PERMIT TEST CHA Interrupt Button on the back of the 'S2' Stopper Chassis (B950-02(21)) and verify that the stoppers go in by checking the following:		
a.	The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is not lit.		
b.	The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is not lit.		
c.	The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
d.	The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		
e.	The Permit Chain A indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
f.	The Permit Chain B indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		

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		Initial Tested Items	
		EPICS	Local
g.	The Stopper 1 Chain A In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
h.	The Stopper 1 Chain B In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
i.	The Stopper 2 Chain A In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
j.	The Stopper 2 Chain B In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
k.	The Chain A Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
l.	The Chain B Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
m.	The Stopper 1 OUT indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
n.	The Stopper 2 OUT indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
10.6.2	Attempt to remove the 'S2' Stoppers by pressing the Out Cmd button on the Hutch Users Panel and verify they all remain IN.		
10.6.3	Release the PERMIT TEST CHA Interrupt Button and remove the 'S2' Stoppers by pressing the Out Cmd button on the Hutch Users Panel.		

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		Initial Tested Items	
		EPICS	Local
10.7	‘S2’ Stopper Permit B Test		
10.7.1	<p>Press and hold the PERMIT TEST CHB Interrupt Button on the back of the ‘S2’ Stopper Chassis (B950-02(21)) and verify that the stoppers go in by checking the following:</p> <ul style="list-style-type: none"> a. The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is not lit. b. The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is not lit. c. The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit. d. The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit. e. The Permit Chain A indicator LED on the ‘S2’ Stopper Chassis (B950-02(21)) is lit. f. The Permit Chain B indicator LED on the ‘S2’ Stopper Chassis (B950-02(21)) is not lit. g. The Stopper 1 Chain A In indicator LED on the ‘S2’ Stopper Chassis (B950-02(21)) is lit. h. The Stopper 1 Chain B In indicator LED on the ‘S2’ Stopper Chassis (B950-02(21)) is lit. i. The Stopper 2 Chain A In indicator LED on the ‘S2’ Stopper Chassis (B950-02(21)) is lit. j. The Stopper 2 Chain B In indicator LED on the ‘S2’ Stopper Chassis (B950-02(21)) is lit. 		

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		Initial Tested Items	
		EPICS	Local
k.	The Chain A Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
l.	The Chain B Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
m.	The Stopper 1 OUT indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
n.	The Stopper 2 OUT indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
10.7.2	Attempt to remove the 'S2' Stoppers by pressing the Out Cmd button on the Hutch Users Panel and verify they all remain IN.		
10.7.3	Release the PERMIT TEST CHB Interrupt Button and remove the 'S2' Stoppers by pressing the Out Cmd button on the Hutch Users Panel.		
10.8 'SH1' Stopper Enable Keyswitch Test			
10.8.1	Set the 'SH1' Stopper Enable Keyswitch (B950-02(25)) to the DISABLE position and verify:		
a.	The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is not lit.		
b.	The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is not lit.		
c.	The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
d.	The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		

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	Initial Tested Items	
	EPICS	Local
e. The Permit Chain A indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
f. The Permit Chain B indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
g. The Stopper 1 Chain A In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
h. The Stopper 1 Chain B In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
i. The Stopper 2 Chain A In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
j. The Stopper 2 Chain B In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
k. The Chain A Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
l. The Chain B Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
m. The Stopper 1 OUT indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
n. The Stopper 2 OUT indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
o. The 'SH1' Stopper 1 Chain A IN status on EPICS is NOT IN.		
p. The 'SH1' Stopper 1 Chain B IN status on EPICS is NOT IN.		

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		Initial Tested Items	
		EPICS	Local
	q. The 'SH1' Stopper 2 Chain A IN status on EPICS is NOT IN.		
	r. The 'SH1' Stopper 2 Chain B IN status on EPICS is NOT IN.		
10.8.2	Attempt to remove the 'SH1' Stoppers by pressing the Out Cmd button on the Hutch Users Panel and verify they all remain IN.		
10.8.3	Set the 'SH1' Stopper Enable Keyswitch (B950-02(25)) to the ENABLE position and remove the 'SH1' Stoppers by pressing the Out Cmd button on the Hutch Users Panel and verify:		
	a. The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is lit.		
	b. The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is lit.		
	c. The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
	d. The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		
	e. The Permit Chain A indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
	f. The Permit Chain B indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
	g. The Stopper 1 Chain A In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
	h. The Stopper 1 Chain B In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		

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		Initial Tested Items	
		EPICS	Local
i.	The Stopper 2 Chain A In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
j.	The Stopper 2 Chain B In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
k.	The Chain A Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
l.	The Chain B Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
m.	The Stopper 1 OUT indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
n.	The Stopper 2 OUT indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
o.	The 'SH1' Stopper 1 Chain A IN status on EPICS is NOT IN.		
p.	The 'SH1' Stopper 1 Chain B IN status on EPICS is NOT IN.		
q.	The 'SH1' Stopper 2 Chain A IN status on EPICS is NOT IN.		
r.	The 'SH1' Stopper 2 Chain B IN status on EPICS is NOT IN.		
10.9 'SH1' Stopper Permit A Test			
10.9.1	Press and hold the PERMIT TEST CHA Interrupt Button on the back of the 'SH1' Stopper Chassis (B950-02(25)) and verify that the stoppers go in by checking the following:		

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	Initial Tested Items	
	EPICS	Local
a. The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is not lit.		
b. The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is not lit.		
c. The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
d. The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		
e. The Permit Chain A indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
f. The Permit Chain B indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
g. The Stopper 1 Chain A In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
h. The Stopper 1 Chain B In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
i. The Stopper 2 Chain A In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
j. The Stopper 2 Chain B In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
k. The Chain A Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
l. The Chain B Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		

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		Initial Tested Items	
		EPICS	Local
	m. The Stopper 1 OUT indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
	n. The Stopper 2 OUT indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
10.9.2	Attempt to remove the 'SH1' Stoppers by pressing the Out Cmd button on the Hutch Users Panel and verify they all remain IN.		
10.9.3	Release the PERMIT TEST CHA Interrupt Button and remove the 'SH1' Stoppers by pressing the Out Cmd button on the Hutch Users Panel.		
10.10	'SH1' Stopper Permit B Test		
10.10.1	Press and hold the PERMIT TEST CHB Interrupt Button on the back of the 'SH1' Stopper Chassis (B950-02(25)) and verify that the stoppers go in by checking the following:		
	a. The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is not lit.		
	b. The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is not lit.		
	c. The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
	d. The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		
	e. The Permit Chain A indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
	f. The Permit Chain B indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		

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		Initial Tested Items	
		EPICS	Local
g.	The Stopper 1 Chain A In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
h.	The Stopper 1 Chain B In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
i.	The Stopper 2 Chain A In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
j.	The Stopper 2 Chain B In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
k.	The Chain A Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
l.	The Chain B Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
m.	The Stopper 1 OUT indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
n.	The Stopper 2 OUT indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
10.10.2	Attempt to remove the 'SH1' Stoppers by pressing the Out Cmd button on the Hutch Users Panel and verify they all remain IN.		
10.10.3	Release the PERMIT TEST CHB Interrupt Button and remove the 'SH1' Stoppers by pressing the Out Cmd button on the Hutch Users Panel.		

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Initial Tested Items	
EPICS	Local

11.0 Security Fault Tests

Test Objective:

The following first test verifies that ‘cross-interlocking’ between Chains A and B is in effect while in Normal Mode (that is, a fault on Chain A will interrupt both stopper permits, etc.). Subsequently, an end-to-end security fault is conducted with FEE stoppers ‘out’ to demonstrate proper mitigation of the loss-of-security scenario.

Personnel Requirements:

Three persons: PPS Test Leader at the Hutch 1 Users Panel, a second tester is needed to secure the hutch, a third tested in needed to hold the roll-up door microswitches closed. In addition, either phone contact with MCC, or a local NEH control system interface, is necessary to check EPICS status in Section 11.3.

Note: CoHE conditions set in Section 4.2 should remain in place for this test.

Note: This test is *invasive* to upstream (Undulator Complex and LINAC) operations. In order to not affect LINAC operations, the BTH stoppers must remain IN during Section 11.3.

11.1 Chain A Normal Mode Crash Test

11.1.1 Turn the NEH Test Mode keyswitch to the NORMAL position (B950-02-(29)).

11.1.2 Open the Rollup Door. Have a tester hold both Rollup Door switches closed with magnets while another tester secures the Hutch.

11.1.3 Acquire the Hutch 1 Search Complete Status by actuating all of the hutch presets, *exiting the hutch*, closing the hutch door, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:

- a. The Search Complete indicator LED on the Hutch Users Panel is lit.

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		Initial Tested Items	
		EPICS	Local
<ul style="list-style-type: none"> b. The Permit Chain A indicator LED on the Hutch Users Panel is lit. c. The Permit Chain B indicator LED on the Hutch Users Panel is lit. 			
11.1.4 Release Rollup Door switch ‘A’ while continuing to hold switch ‘B’ closed with a magnet and verify the following:			
<ul style="list-style-type: none"> a. The Rollup Door Closed indicator LED on the Hutch Users Panel is not lit. b. The Search Presets 1 indicator LED on the Hutch Users Panel is not lit. c. The Search Presets 2 indicator LED on the Hutch Users Panel is not lit. d. The Search Presets 3 indicator LED on the Hutch Users Panel is not lit. e. The Search Presets 4 indicator LED on the Hutch Users Panel is not lit. f. The Search Complete indicator LED on the Hutch Users Panel is not lit. g. The RAD Warning Not Complete indicator LED on the Hutch Users Panel is lit. h. The RAD Warning Complete indicator LED on the Hutch Users Panel is not lit. i. The Permit Chain A indicator LED on the Hutch Users Panel is not lit. 			

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		Initial Tested Items	
		EPICS	Local
j.	The Permit Chain B indicator LED on the Hutch Users Panel is not lit.		
k.	The Permit Chain A indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
l.	The Permit Chain B indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
m.	The Permit Chain A indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
n.	The Permit Chain B indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
o.	The Permit Chain A indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
p.	The Permit Chain B indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
q.	The Security Fault Sonalert at the Hutch Users Panel is sounding.		
11.1.5	Turn the Hutch OFFLINE, and then back ONLINE, to silence the Security Fault Sonalert.		
11.2	Chain B Run Mode Crash Test		
11.2.1	Have a tester hold both Rollup Door switches closed with magnets while another tester secures the Hutch.		
11.2.2	Acquire the Hutch 1 Search Complete Status by actuating all of the hutch presets, <i>exiting the hutch</i> , closing the hutch door, inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:		

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		Initial Tested Items	
		EPICS	Local
a.	The Search Complete indicator LED on the Hutch Users Panel is lit.		
b.	The Permit Chain A indicator LED on the Hutch Users Panel is lit.		
c.	The Permit Chain B indicator LED on the Hutch Users Panel is lit.		
11.2.3	Release Rollup Door switch 'B' and hold switch 'A' closed with a magnet and verify the following:		
a.	The Rollup Door Closed indicator LED on the Hutch Users Panel is not lit.		
b.	The Search Presets 1 indicator LED on the Hutch Users Panel is not lit.		
c.	The Search Presets 2 indicator LED on the Hutch Users Panel is not lit.		
d.	The Search Presets 3 indicator LED on the Hutch Users Panel is not lit.		
e.	The Search Presets 4 indicator LED on the Hutch Users Panel is not lit.		
f.	The Search Complete indicator LED on the Hutch Users Panel is not lit.		
g.	The RAD Warning Not Complete indicator LED on the Hutch Users Panel is lit.		
h.	The RAD Warning Complete indicator LED on the Hutch Users Panel is not lit.		

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		Initial Tested Items	
		EPICS	Local
i.	The Permit Chain A indicator LED on the Hutch Users Panel is not lit.		
j.	The Permit Chain B indicator LED on the Hutch Users Panel is not lit.		
k.	The Permit Chain A indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
l.	The Permit Chain B indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
m.	The Permit Chain A indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
n.	The Permit Chain B indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
o.	The Permit Chain A indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
p.	The Permit Chain B indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
q.	The Security Fault Sonalert at the Hutch Users Panel is sounding.		
11.2.4	Turn the Hutch OFFLINE, and then back ONLINE, to silence the Security Fault Sonalert.		
11.2.5	Close the Hutch Rollup Door.		
11.3 End-to-End Security Fault Crash Test			
11.3.1	Have MCC insert the BTH stoppers to protect the LINAC from subsequent LCLS Secure Loop faults.		

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		Initial Tested Items	
		EPICS	Local
11.3.2	Acquire the Hutch 1 Search Complete Status by actuating all of the hutch presets, closing the hutch door <i>with a tester remaining inside</i> , inserting the hutch door key into the hutch users panel, then pressing the Interlock Reset Button and after 15 seconds verify:		
	a. The Search Complete indicator LED on the Hutch Users Panel is lit.		
	b. The Permit Chain A indicator LED on the Hutch Users Panel is lit.		
	c. The Permit Chain B indicator LED on the Hutch Users Panel is lit.		
11.3.3	Push the Stoppers Out CMD button on the Hutch Users Panel and verify:		
	a. The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is lit.		
	b. The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is lit.		
	c. The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
	d. The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		
	e. The Chain A Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
	f. The Chain B Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is not lit.		
	g. The Chain A Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		

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		Initial Tested Items	
		EPICS	Local
h.	The Chain B Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is not lit.		
i.	The Chain A Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
j.	The Chain B Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is not lit.		
k.	LCLS Secure Loop Chain A displays COMPLETE on the BTH EPICS Panel.		
l.	LCLS Secure Loop Chain B displays COMPLETE on the BTH EPICS Panel.		
m.	Secure Loop Latched Chain A is LATCHED on the BTH EPICS Panel 1.		
n.	Secure Loop Latched Chain B is LATCHED on the BTH EPICS panel.		
11.3.4	Push the Stoppers In CMD button on the Hutch Users Panel and verify:		
a.	The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is not lit.		
b.	The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is not lit.		
c.	The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is lit.		
d.	The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is lit.		

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		Initial Tested Items	
		EPICS	Local
e.	LCLS Secure Loop Chain A displays COMPLETE on the BTH EPICS Panel.		
f.	LCLS Secure Loop Chain B displays COMPLETE on the BTH EPICS Panel.		
g.	Secure Loop Latched Chain A is LATCHED on the BTH EPICS panel.		
h.	Secure Loop Latched Chain B is LATCHED on the BTH EPICS panel.		
11.3.5	Push and hold in the Stoppers In CMD button, then push the Stoppers Out CMD button on the Hutch Users Panel. Verify that the stoppers all remain IN. Release the Stoppers In CMD button.		
11.3.6	Push the Stoppers Out CMD button on the Hutch Users Panel and verify:		
a.	The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is lit.		
b.	The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is lit.		
c.	The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is not lit.		
d.	The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is not lit.		
e.	LCLS Secure Loop Chain A displays COMPLETE on the BTH EPICS Panel.		
f.	LCLS Secure Loop Chain B displays COMPLETE on the BTH EPICS Panel.		

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		Initial Tested Items	
		EPICS	Local
g.	Secure Loop Latched Chain A is LATCHED on the BTH EPICS panel.		
h.	Secure Loop Latched Chain B is LATCHED on the BTH EPICS panel.		
11.3.7	Open the sliding Hutch Door with the emergency exit mechanism and verify:		
a.	The Door Closed indicator LED on the Hutch Users Panel is not lit.		
b.	The Stoppers Out Status Chain A indicator LED on the Hutch Users Panel is not lit.		
c.	The Stoppers Out Status Chain B indicator LED on the Hutch Users Panel is not lit.		
d.	The Stoppers In Status Chain A indicator LED on the Hutch Users Panel is lit.		
e.	The Stoppers In Status Chain B indicator LED on the Hutch Users Panel is lit.		
f.	The Chain A Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
g.	The Chain B Summary In indicator LED on the 'S1' Stopper Chassis (B950-02(23)) is lit.		
h.	The Chain A Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		
i.	The Chain B Summary In indicator LED on the 'S2' Stopper Chassis (B950-02(21)) is lit.		

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		Initial Tested Items	
		EPICS	Local
j.	The Chain A Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
k.	The Chain B Summary In indicator LED on the 'SH1' Stopper Chassis (B950-02(25)) is lit.		
l.	LCLS Secure Loop Chain A displays COMPLETE on the BTH EPICS Panel.		
m.	LCLS Secure Loop Chain B displays COMPLETE on the BTH EPICS Panel.		
n.	Secure Loop Latched Chain A is NOT_LATCHED on the BTH EPICS panel.		
o.	Secure Loop Latched Chain B is NOT_LATCHED on the BTH EPICS panel.		
p.	The Security Fault Sonalert at the Hutch Users Panel is sounding.		
11.3.8	Turn the Hutch OFFLINE, and then back ONLINE, to silence the Security Fault Sonalert.		
11.3.9	Reset interlocks on the BTH PPS EPICS Panel and verify:		
a.	Secure Loop Latched Chain A is LATCHED on the BTH EPICS panel.		
b.	Secure Loop Latched Chain B is LATCHED on the BTH EPICS panel.		
11.3.10	Reset the sliding Hutch Door emergency egress mechanism.		

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		Initial Tested Items	
		EPICS	Local
11.3.11	Set the 'S1' Stopper Enable Keyswitch (B950-02(23)) to the DISABLE position.		
11.3.12	Set the 'S2' Stopper Enable Keyswitch (B950-02(21)) to the DISABLE position.		
11.3.13	Set the 'SH1' Stopper Enable Keyswitch (B950-02(25)) to the DISABLE position.		
11.3.14	Open the sliding Hutch Door for Hutch 2.		
11.3.15	Open the sliding Hutch Door for Hutch 3.		
11.3.16	Insert the NEH Hutch Online/Offline Key into the Online/Offline Keyswitch on the Hutch Users Panel and turn to the OFFLINE position. Return the key to XFD Managers.		
11.3.17	Remove any special buggers or jumper wires installed as noted in Table 3.		

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12.0 Records and Reports

12.1.1 Test Performed By

Signature

Name and Title (Print)

Date/Time

12.1.2 Comments

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Table 3: Temporary Testing Jumpers		
Description/location of bugger or jumper	Motivation for installation	Initial when removed

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12.2	Test Review and Close-Out
	Signature of this section indicates that the execution of this procedure has been reviewed for completeness and accuracy. Any outstanding hardware issues or procedural deviations should be noted in Tables 7 and 8, respectively. Minor typographical corrections do not constitute a procedural deviation.
12.2.1	Lead PPS Engineer Test Approval
Signature	
Name and Title (Print)	
Date	
12.2.2	XFD Safety Officer Test Approval
Signature	
Name and Title (Print)	
Date	
12.2.3	Are there any Outstanding Issues required before final signoff? If Yes, enter items below in Table 4 or Table 5, as appropriate.
	<input type="checkbox"/> Yes <input type="checkbox"/> No

Table 4: Outstanding Hardware Issues				
Line Item No.	ARTEMIS No.	RSWCF No.	Reconciled by	Date

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Table 5: Procedural Deviations	
Procedure Section or Step No.	Description of Deviation

12.3	<p>Test Review and Close-Out of Outstanding Hardware Issues and Procedural Deviations</p> <p>Signature of this section indicates that a) unresolved hardware issues pose no additional risk to personnel during operation of the facility, and b) procedural deviations are evaluated as appropriate, or amended and re-executed such that safe operation of the facility has been assured by the test.</p>
12.3.1	<p>Lead PPS Engineer Test Approval</p>
Signature	
Name and Title (Print)	
Date	
12.3.2	<p>XFD Safety Officer Test Approval</p>
Signature	
Name and Title (Print)	
Date	
12.3.3	<p>Safety Systems QC Manager Approval</p>
Signature	
Name and Title (Print)	
Date	

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13.0 Revision History

Rev No.	Date	DCO No.
01	29 Jul 09	0061