

Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)
[Work Planning, Control, and Authorization Procedure](#))

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Author:		Date:		Task #: If applicable	
Complete all information. Use as many sheets as necessary					
Task Title:	Hazard Analysis and Mitigation for LERF RF Operations - LCLS II	Task Location:	LERF		
Division:	Accelerator	Department:	SRF Operations	Frequency of use:	As Needed
Lead Worker:	Joe Gubeli				
Mitigation already in place: Standard Protecting Measures Work Control Documents	SAF143				

Sequence of Task Steps	Task Steps/Potential Hazards	Consequence Level	Probability Level	Risk Code (before mitigation)	Proposed Mitigation (Required for Risk Code >2)	Safety Procedures/ Practices/Controls/Training	Risk Code (after mitigation)
	Cryomodule Installation/Removal for Testing						
	Hoist Failure while lifting the return U-tube into place	M	L	2	The hoist is rated for 5x the load. Hoist is load tested on an annual basis. Inspect rigging gear prior to each use.	<ul style="list-style-type: none"> SAF403 Overhead Crane Operator Qualification MED01 Medical Monitoring for Hazardous Work 	1
	Material handling & lifting w/Crane	M	L	2	The hoist is rated for 5x the load. Hoist is load tested on an annual basis and proper lift plan. Inspect rigging gear prior to each use.	<ul style="list-style-type: none"> SAF403 Overhead Crane Operator Qualification MED01 Medical Monitoring for Hazardous Work 	1

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	Pinch points	M	L	1	Limit personnel access to immediate area	<ul style="list-style-type: none"> SAF403 Overhead Crane Operator Qualification 	1
	U-Tube insertion and removal	H	L	3	ODH monitors & installed system	<ul style="list-style-type: none"> SAF 103 	1
Excessive Noise Exposure							
	Cryomodule vacuum failure: <ul style="list-style-type: none"> Implosion: puncture ear drum Vacuum failure when cryomodule is full of cryogen will lead to cryogen release (refer to mitigation for oxygen deficiency) 	L	L	1	<ul style="list-style-type: none"> All vacuum windows are covered or contained in waveguide during normal operations. All reliefs are located away from face level. 	<ul style="list-style-type: none"> Equipment specific training 	1

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	Electrical Exposure						
	Cryomodule Installation and Preparation for Testing: Electric Shock Ion pump power supply Cold cathode gauge high voltage +/- 3kV at 5 mA	H	L	3	Only SHV connectors are used. This type of connector makes the ground connection first when plugging in and breaks it last when unplugging the connector	All voltage sources are “plug in “. Must unplug before servicing. Power-down procedures are in place.	1
	Cryomodule Installation and Preparation for Testing: Electric Shock Energizing 1300 MHz Solid State Amp (SSA) 480 V Hazards Arc Flash from Disconnect	H	L	3	<ul style="list-style-type: none"> Admin Lockout on power supply Safety glasses Hearing protection Heavy duty leather glove Long sleeve shirt and long pants both of a non-melting/non-flammable material 	General Electrical Training <ul style="list-style-type: none"> SAF603A Electrical Safety Awareness SAF603N Basic NFPA-70E Training SAF104 LOTO 	N
	Magnetic Fields						
	Static Magnetic Fields	M	L	2	Signage for pacemakers	Training and administrative controls as specified in ES&H Manual Chapter 6420 Non-Ionizing Radiant Energy and specified in work control document	1
	Non-ionizing Radiation						

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	Non- Ionizing Radiation due to RF leakage from waveguide: RF burns, eye damage, tissue heating due to improperly assembled waveguide joints or component failure	M	M	3	<ul style="list-style-type: none"> Bolt torque pattern (attached) to be followed for all waveguide connections upstream of the LOTO shutter located within the cave. RF survey after assembly of joints upstream of the LOTO shutter located within the cave. No personnel in cave during high power RF operations through the use of Personnel Safety Interlocks. Air pressure interlock 	OSP for LCLS-II Cryomodule testing in the LERF	1
Oxygen Deficiency Hazard							
	Cold cryomodule ODH hazard Pressure relief due to cryogenic failure	H	L	3	<ul style="list-style-type: none"> ODH Monitoring system 2 x 12" passive vents in vault to roof 	<ul style="list-style-type: none"> ODH assessment and rating of accelerator enclosure 	1
	ODH Hazard in Control Room due to cryogenic failure in the Cave	M	L	2	Penetrations that connect the control room and the cave are sealed.	<ul style="list-style-type: none"> ODH Risk Assessment LERF ODH training Required for LERF Personnel 	1

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	cryogenic gas leaks	H	L	3	<ul style="list-style-type: none"> • ODH System 	Training and administrative controls as specified in ES&H Manual Chapter 6550 Cryogenic Safety Program	
	cryogenic liquid leaks	H	L	3	<ul style="list-style-type: none"> • ODH System 	Training and administrative controls as specified in ES&H Manual Chapter 6550 Cryogenic Safety Program	
	Cryogenic materials - gas and liquids	H	L	3	<ul style="list-style-type: none"> • ODH System • Safe Handling of materials 	Training and administrative controls as specified in ES&H Manual Chapter 6550 Cryogenic Safety Program	
	Ionizing Radiation						

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	Ionizing Radiation Inherent hazard from operating high gradient cavities in vacuum.	H	H	4	<ul style="list-style-type: none"> Shielding in place Personnel Safety System ensures that high voltage is not permitted on the high power RF sources when the switching network permits the RF to enter the cave and the cave can be occupied. Radiation surveys by trained staff or fixed monitoring equipment at turn on and at regular power increase intervals. Area radiation monitors are interlocked to RF power. 	Personnel excluded from the cave during high power ops (anything above 1W RF power delivered to input coupler of device under test). SAF800 GERT <ul style="list-style-type: none"> SAF801 Rad Worker I Equipment specific training 	1
	Storage and Handling of Radioactive Materials	L	L	1		Radiation Worker Training requirements and ES&H Manual Chapter 6310 Protection from Ionizing Radiation implementation and specified in work control document.	1

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Highest Risk Code before Mitigation:

4

Highest Risk Code after Mitigation:

When completed, if the analysis indicates that the Risk Code before mitigation for any steps is “medium” or higher (RC≥3), then a formal [Work Control Document](#) (WCD) is developed for the task. Attach this completed Task Hazard Analysis Worksheet. Have the package reviewed and approved prior to beginning work. (See [ES&H Manual Chapter 3310 Operational Safety Procedure Program](#).)

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Form Revision Summary

Periodic Review – 08/13/15 – No changes per TPOC

Revision 0.1 – 06/19/12 - Triennial Review. Update to format.

Revision 0.0 – 10/05/09 – Written to document current laboratory operational procedure.

ISSUING AUTHORITY	TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	REVIEW DATE	REV.
ESH&Q Division	Harry Fanning	08/13/15	08/13/18	0.1

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