Jefferson Lab
Thomas Jefferson National Accelerator Facility

Task Hazard Analysis (THA) Worksheet

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

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Complete all information. Use as many sheets as necessary

Task Title:	Gun High Voltage Conditioning at Upgraded Injector Test Facility (UITF) with Spellman High Voltage Power Supply			**Task Location:**	UITF, High Bay Area of Test Lab
Division:	Accelerator	**Department:**	Center for Injectors and Sources	**Frequency of use:**	
Lead Worker:	Matt Poelker, Carlos Hernandez-Garcia				

Mitigation already in place:
Standard Protecting Measures
Work Control Documents

Ionizing Radiation Engineered Controls

- Below 7' height inside Cave 1, the walls provide concrete shielding of at least 55". Above 7', the East wall thickness is 27"
- The ceiling in the keV section of UITF is made of concrete at least 30" thick. Iron plate 3" thick is placed below cable penetrations.
- The ceiling of MeV section of UITF is made of 22" concrete.
- The main entrance to UITF is a labyrinth with walls 36" concrete and ceiling 22" concrete.

Oxygen Deficiency Hazard

A preliminary ODH assessment was performed that considers cryogenic nitrogen and helium, and gaseous nitrogen for the entire UITF enclosure and considering MeV beam production using the SRF ¼ cryomodule, and installation of the HDIce target. The assessment is deemed "preliminary" until all ODH-related precautions and requirements have been implemented and verified adequate. In this assessment, the UITF enclosure was assigned a rating of ODH0 for areas below 9'. Above 9' the enclosure is considered ODH1. Signage will clearly indicate these conditions. Fixed oxygen and nitrogen monitoring systems will be used to detect and alert for OHD conditions. Sensors are located in appropriate areas. The preliminary assessment can be found at:
https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-135009/UITF%20prelim_%20ODH%20assessment.pdf

In this THA, the focus is on gun high voltage conditioning, which does not require cryogenic nitrogen or helium. The analysis in this THA describes gaseous nitrogen used for venting the gun.

Note: This TOSP addresses inadvertent field emission. No effort will be made to intentionally generate an energetic free electron beam. There will be no photocathode inside the gun, no drive laser and the gun will not be attached to a beamline.

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

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1	Gun operation / Exposure to Ionizing Radiation	M	M	3	See Mitigations already in place The 240 VAC outlet that provides power to the Spellman high voltage circuitry will be locked out until the UITF has been swept and locked Closed	The shielding related to Cave1 (where the new photogun will be located) provides adequate radiation shielding for field emitted electrons at energy up to 225kV A sweep will be done prior to closing the UITF entrance door using the procedure referenced in the UITF TOSP. Personnel are not allowed inside the UITF enclosure during gun high voltage conditioning. CARMs will indicate the presence of ionizing radiation inside the UITF enclosure, and above Cave1 near the locations of electronics racks.	1
2	Electrical and High Voltage	M	M	3	Terminals insulated or guarded to prevent inadvertent contact. The inverted insulator design guarantees there is no exposed high voltage	Approved LTT procedure followed when attaching the electron gun to the HV power supply. Voltage applied to the gun only when personnel have left the UITF enclosure	1
3	ODH (GN2)	M	L	3	Restricted flow orifices and automatic valve closure at power outage	Personnel will exit UITF when ODH alarms sound. All personnel entering the area must have ODH1 training and follow procedures based on EH&S signage.	1

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4	Pressure / Vacuum	L	M	2	Category 1 vacuum system	Gun vacuum chamber manufactured by vendor with extensive experience (Kurt Lesker). Chamber wall thickness specified by vendor.	1

Highest Risk Code before Mitigation:	3	**Highest Risk Code after Mitigation:**	1

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 –

ISSUING AUTHORITY	TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	REVIEW DATE	REV.
ESH&Q Division	Harry Fanning			

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