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Jefferson Lab
Thomas Jefferson National Accelerator Facility

# Temporary Operational Safety Procedure Form

**(See ES&H Manual Chapter 3310 Appendix T1 Operational Safety Procedure (OSP) and Temporary OSP Procedure for instructions.)**

Click For Word Doc

| | | | |
|---|---|---|---|
| **Title:** | Gun High Voltage Conditioning at Upgraded Injector Test Facility (UITF) with Spellman High Voltage Power Supply | | |
| **Location:** | Test Lab High Bay Area, room 1127-1129 | **Type:** | ☐ **OSP** ☒ **TOSP** |
| **Risk Classification** (per Task Hazard Analysis attached) (See *ESH&Q Manual Chapter 3210 Appendix T3 Risk Code Assignment*.) | | **Highest Risk Code Before Mitigation** | 3 |
| | | **Highest Risk Code after Mitigation (N, 1, or 2):** | 1 |
| **Owning Organization:** | Center for Injectors and Sources, Accel. Div. | **Date:** | April 24, 2017 |
| **Document Owner(s):** | Matthew Poelker/Carlos Hernandez-Garcia | | |

## DEFINE THE SCOPE OF WORK

**1. Purpose of the Procedure –** Describe in detail the reason for the procedure (what is being done and why).

This TOSP describes the procedure for safely applying voltage to a new photogun inside the UITF enclosure using a 225 kV Spellman high voltage power supply that is NOT attached to the UITF PSS, for the purpose of "high voltage conditioning" the new photogun. This TOSP does NOT describe making photoemission beam using the 225kV Spellman high voltage power supply.

Applying voltage to a new photogun for the first time is called "high voltage conditioning". This procedure is considered "temporary" because we imagine this to be an infrequent event. Once the gun has been high voltage conditioned at UITF, it will be moved to the CEBAF injector where it will be used to provide electron beams for the upcoming physics program. UITF represents a convenient location for initial gun high voltage conditioning – it provides adequate radiation shielding and UITF is in close proximity TL1137 where the gun will be constructed.

**2. Scope –** include all operations, people, and/or areas that the procedure will affect.

When a new photogun is constructed, it is not unusual to observe field emission from the photogun cathode electrode, especially when high voltage is first applied. New photoguns must be high voltage conditioned to rid the cathode electrode of field emitter tips.

If there is field emission, the field emitted electrons will strike the anode and the vacuum chamber walls. When field emission is produced at cathode bias voltages > 20kV, the x-ray radiation that is produced can penetrate the photogun vacuum chamber walls, which poses a health hazard. Therefore, gun high voltage conditioning must happen within a shielded enclosure. Application of voltage must happen remotely - the enclosure cannot be occupied. To prevent damage to equipment, diagnostic signals must be monitored, including vacuum conditions within the photogun, radiation levels near the gun, and field emission current levels at the photogun anode. The current-limit setpoint of the high voltage power supply must be set to a suitably small level, on the order of tens of microamps.

Plainly stated, this TOSP addresses **possible** field emission from the photogun cathode electrode. Any field

emission that is observed will be inadvertent. This TOSP does not address hazards associated with intentional generation photoemission electron beam. There will be no photoemission from the gun because there will be no photocathode inside the gun, there will be no drive laser, and the photogun will not be attached to a beamline.

**3. Description of the Facility** – include building, floor plans and layout of the experiment or operation.

The UITF is home to a keV beamline and photogun powered by a Glassman high voltage power supply which is connected to the UITF Personnel Safety System (PSS). To be clear, this TOSP describes a second photogun and a Spellman high voltage power supply that will NOT be connected to the PSS. Because we don't anticipate using the Spellman high voltage power supply very often at the UITF, we don't think it is necessary to connect it to the PSS.

The location of UITF is the High Bay Area of the Test Lab. Figure 1 shows the UITF lay out and identifies Caves 1 & 2. **Gun high voltage conditioning will occur inside Cave1**, near the quarter cryomodule where there is plenty of space. Figure 2 shows UITF with concrete shielding over the roof of Cave 1. Electronics racks are located above Cave1. In Figure 2, for illustration purposes only, the roofs of Cave2 and labyrinth are shown removed. The labyrinth is the main entry/exit for UITF. There is also an entry/exit at the back of Cave 1 but this is typically not used on a routine basis. It primarily serves as an emergency exit.

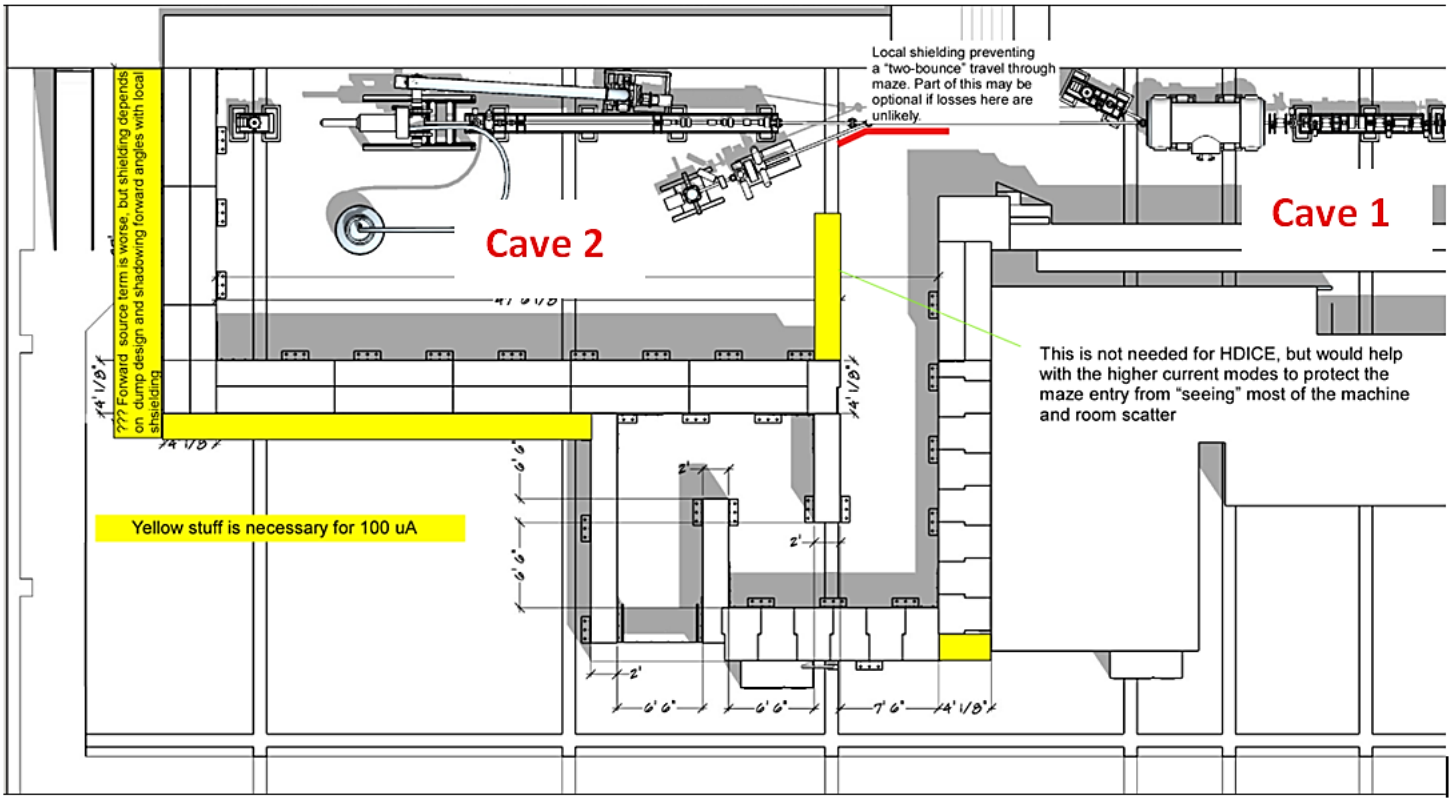


Figure 1 UITF beamline layout showing the two Caves that compose UITF.

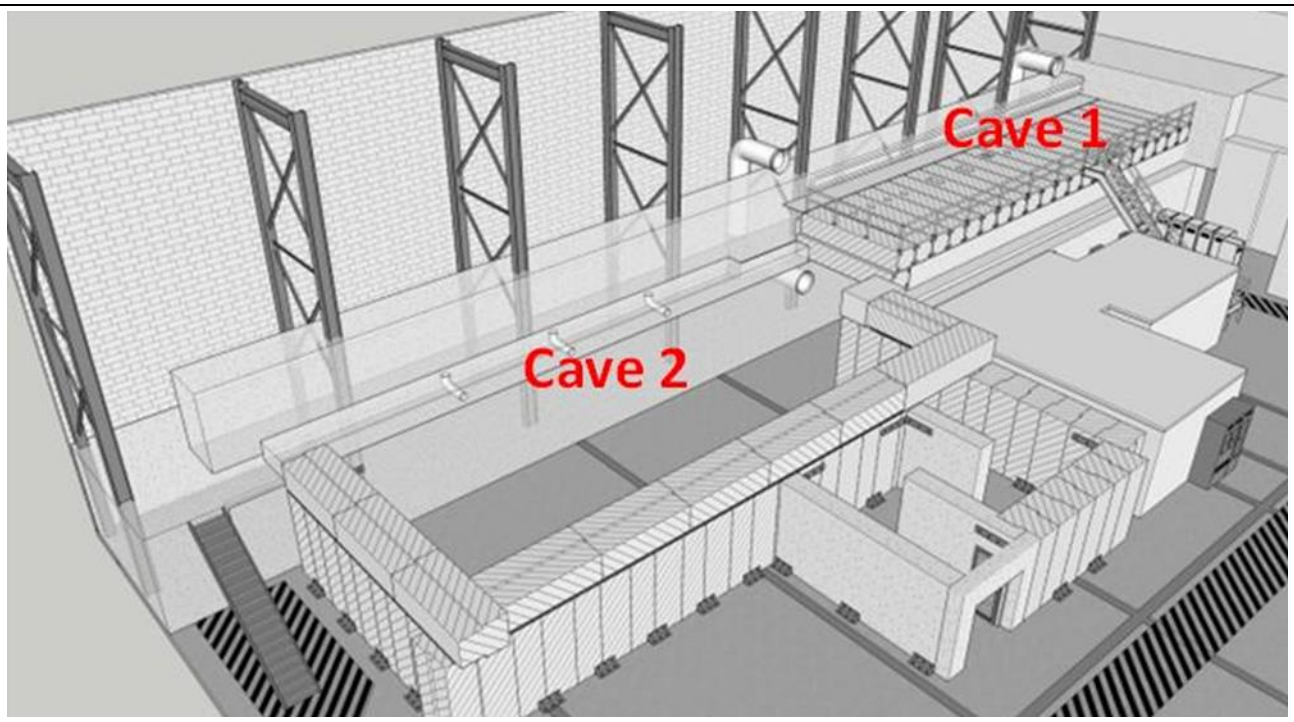


Figure 2: UITF layout showing the main entrance Labyrinth and shielded roof of Cave 1. Ceiling tiles are shown removed from Cave2 and the labyrinth, for illustration purposed only.

The new photogun looks similar to the photogun shown in Figure 3 (left). A new cathode electrode with special shape designed to protect the fragile insulator triple point (where insulator, metal and vacuum meet) is shown in Figure 3 (right), foreground. It is hoped that the new electrode provides a means to reach 225kV with little or no field emission, and without the accompanying damage to the gun that sometimes results from field emission.

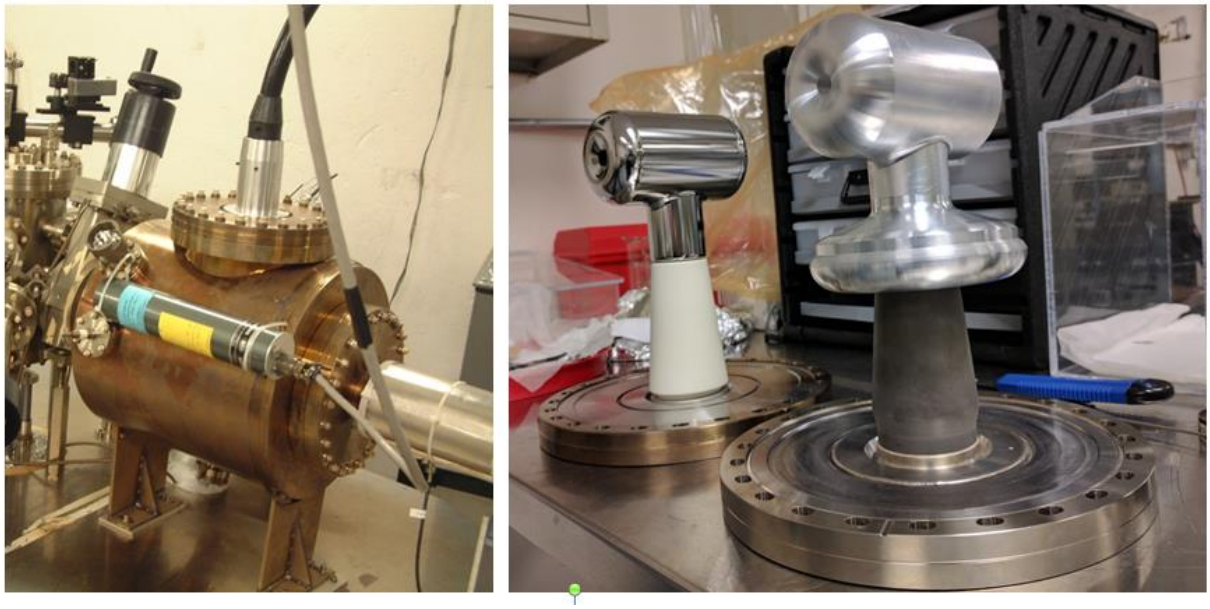

Figure 3: (left) the gun high voltage chamber and (right) the old and new electrodes and insulators. High voltage conditioning of the new electrode and insulator at UITF will ensure we do not remove a functioning photogun from CEBAF and replace it with a gun that suffers field emission.

The 225 kV Spellman high voltage power supply (Figure 4) is a self-contained, stand alone unit that will be positioned near the photogun. A high voltage cable will connect the photogun to the high voltage power supply. There is no exposed high voltage and no SF6 tank. The high voltage power supply will be operated remotely from the UITF Control Room via EPICS or using a personal computer with vendor-provided controls software.

Figure 4: The 225 kV Spellman high voltage power supply, front (left) and back (right), will be located inside the UITF enclosure placed near the photogun, and operated remotely from the UITF Control Room. A high voltage cable connects the photogun to the high voltage power supply, there is no exposed high voltage and no SF6 tank required.

The 225kV Spellman high voltage power supply relies on two AC power cords: a 208VAC power cord associated with controls and readback, and a 240VAC power cord associated with high voltage generation. To protect against application of high voltage to the photogun while the UITF is OPEN and occupied, the 240VAC power cord associated with the high voltage generation will be plugged into a 240 VAC outlet that has been de-energized and locked OUT at a breaker panel that resides outside the UITF enclosure (Figure 5). This outlet will be energized only when the UITF has been swept and cleared of personnel. More details provided below.


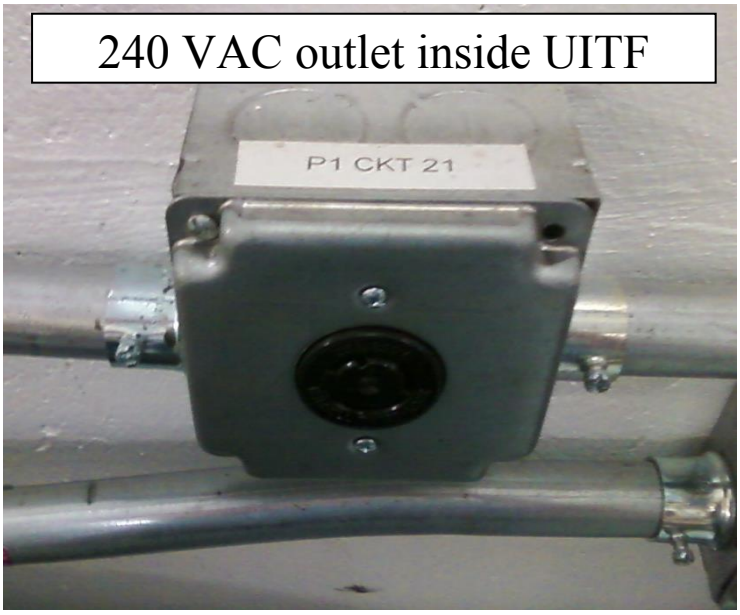


Figure 5: (left) Circuit breaker panel "FEL P1" outside UITF enclosure that feeds power to the 240 VAC outlet (right) inside the UITF enclosure (P1 CKT 21). The 240VAC power cord of the 225kV Spellman high voltage power supply associated with high voltage circuitry will be plugged into this outlet. While the UITF is OPEN, this outlet will be de-energized by removing power via the circuit breaker panel using an approved lock.

The new photogun will be constructed on a bake table that includes oven panels. The bake table is approximately 3 feet wide, 6 feet long and 3 feet tall. Following bakeout, the photogun, bake table and Spellman HV power supply will be positioned inside Cave1, to the left of the quarter cryomodule shown in Figure 6, corresponding to the MeV side of the new quarter cryomodule. If deemed necessary by the Radiation Control Department, a CARM can be moved from the present location inside Cave1, at the ceiling above the keV beamline, to a location near the new gun test area.

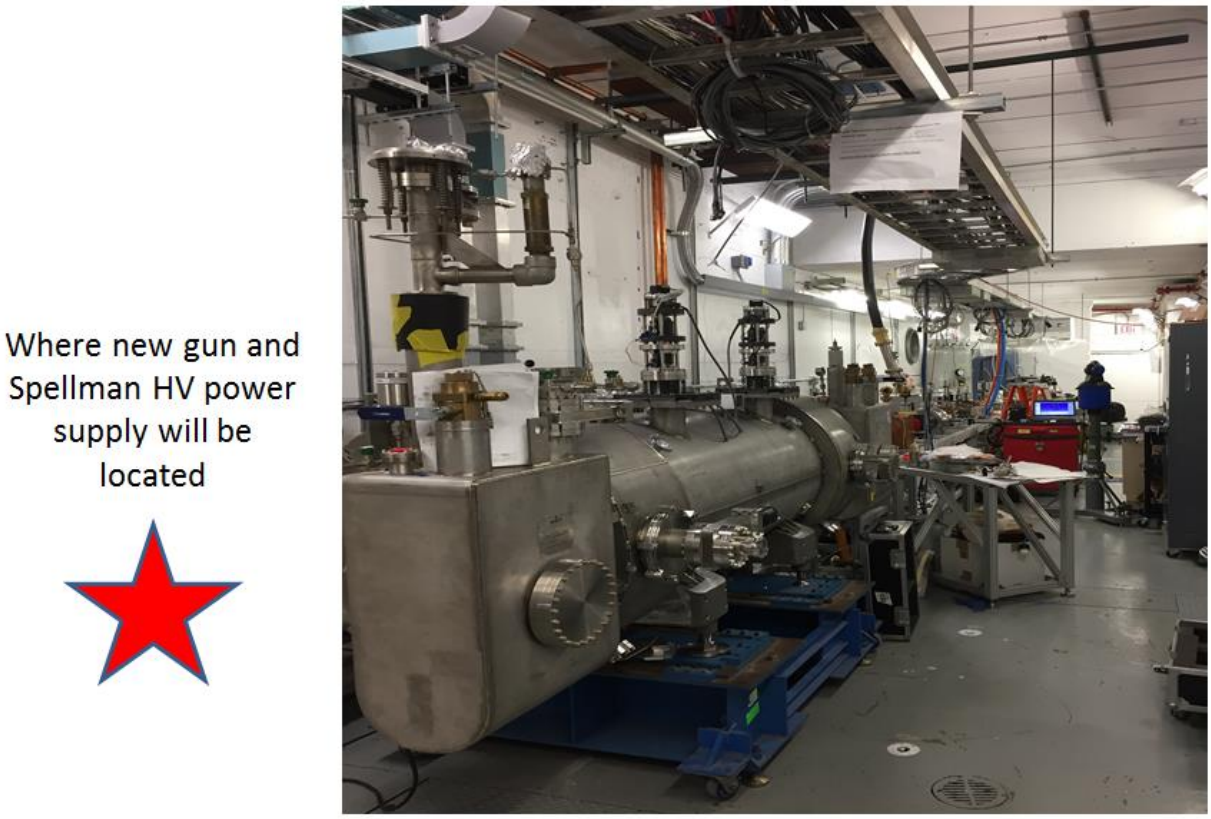


Figure 6: The preferred testing location, to the left of the new quarter cryomodule (i.e., MeV side) inside Cave 1, where there is plenty of space for the gun, bake table and 225 kV Spellman HV supply.

## ANALYZE THE HAZARDS and IMPLEMENT CONTROLS

**4. Hazards identified on written Task Hazard Analysis**

Refer to attached Task Hazard Analysis Work Sheet for details and mitigation. The following lists the hazards.

1. Ionizing Radiation
2. Electrical
3. Pressure/Vacuum
4. ODH

**5. Authority and Responsibility:**

**5.1 Who has authority to implement/terminate**

Matthew Poelker and Carlos Hernandez-Garcia

**5.2 Who is responsible for key tasks**

Matthew Poelker, Carlos Hernandez-Garcia, Don Bullard, Phil Adderley, John Hansknecht and Marcy Stutzman

**5.3 Who analyzes the special or unusual hazards including elevated work, chemicals, gases, fire or sparks** (See ES&H Manual Chapter 3210 Appendix T1 Work Planning, Control, and Authorization Procedure)

Ionizing Radiation – Vashek Vylet
Electrical – T. Kujawa
Henry Robertson – Safety System Group

Safety Warden – J. Hansknecht
Pressure / Vacuum – W. Oren

**5.4 What are the Training Requirements** (See http://www.jlab.org/div_dept/train/poc.pdf)

Photogun high voltage conditioners must have the following Training

- SAF 100 – ES&H Orientation
- SAF603A – Electrical Safety Awareness: Classes, Modes, etc.
- SAF 104 – Lock, Tag and Try
- SAF 801– Rad worker
- SAF130AU – Pressure Systems Safety Awareness for Users
- Read and sign this OSP

## 6. Personal and Environmental Hazard Controls Including:

### 6.1 Shielding

The temporary location of the new photogun will be inside Cave1 near the quarter cryomodule (MeV side), but it will not be attached to a beamline.

The new photogun will be conditioned using a Spellman 225 kV power supply with maximum current capability of 5mA, although current will be limited to tens of microamps using the current limit feature of the high voltage supply. As mentioned above, this TOSP addresses the possible inadvertent generation of free electrons that strike the vacuum chamber walls and produce x-rays. This TOSP does not describe intentional generation of electron beams, for example, via photoemission. There is no photocathode inside the gun, no drive laser and the gun is not attached to a beamline.

Cave 1 has 30” concrete shielding on the roof. The penetrations have 3.5” iron shielding (Figure 7 below). The penetrations provide a means to pass cables from the electronics racks above Cave1 to beamline elements inside Cave1. These penetrations will be used to pass cables for the gun ion pump and the RadMon GM tubes.

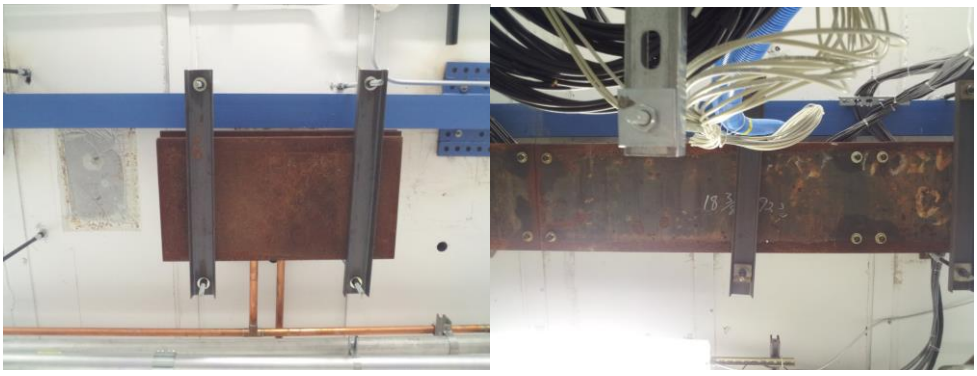

Figure 7 Steel plates covering penetrations in Cave 1. Cables pass through the penetrations linking the electronics racks and the new gun. Specifically, cables for the gun chamber ion pump and RadMon radiation detectors.

Radiation Control Department (RCD) approved local shielding will mitigate radiation hazards. Of the two walls in Cave 1 the east wall (see figure 1) is many meters thick and is an effective radiation barrier. The west wall is 36” thick. The local shielding on the dumps will mitigate radiation hazard.

During gun high voltage conditioning, access to the entire roof area of Cave 1 will be prohibited using chains with signage, at the top and bottom of the stairs. Signage prohibiting access to Cave1 rooftop will also be posted at the roof of Cave2, although access to the roof of Cave2 is unusual and always prohibited unless appropriate fall protection is used. Although we expect only low levels of field emission during these tests, signs will be applied to the UITF doors indicating "High Radiation Area" while tests are in progress. This designation represents a worst-case scenario.

A CARM probe located near the photogun under test will be used to monitor x-ray production that results from field emission. Test will be terminated if radiation levels exceed 500 mRem/hour. RCD will be consulted immediately to determine proper course of action.

We will invite RCD to measure the radiation at the roof and the UITF walls in the high bay area during this procedure. Any additional shielding measures or reduction in measures will be described in an amendment to this TOSP based on these radiological measurements.

The main entrance labyrinth and the south access labyrinth prevent line of sight exposure to x-ray radiation.

### 6.2 Barriers (magnetic, hearing, elevated or crane work, etc.)

The UITF enclosure will be swept and locked closed, to prevent anyone from being inside the UITF enclosure during gun high voltage conditioning, as described below.

Access to the UITF roof above Cave1 will be restricted using chains locks and signs, placed at the top and bottom of the UITF stairways.

The back door can be locked using the commonly-used 4A1X key and in case of emergency, the door can be opened from the inside by simply pushing the push-bar. The front gate can be locked with the same 4A1X key, and opened from the inside by rotating the deadbolt.

A chain with break-away lock can be applied to the front gate if deemed necessary.

### 6.3 Interlocks

There are no interlocks associated with this TOSP.

UITF (see Figure 8) is a completely enclosed area. No one will be allowed inside the UITF enclosure during gun high voltage conditioning.

Because this work is considered "temporary", we will NOT ask the Safety System Group to attach the Spellman high voltage power supply to the existing UITF PSS. So although UITF possesses a PSS, we will NOT be using it

Personnel exposure to radiation will be prevented through administrative (sweep procedure, postings, locked gate and door) and engineered means (concrete enclosures).

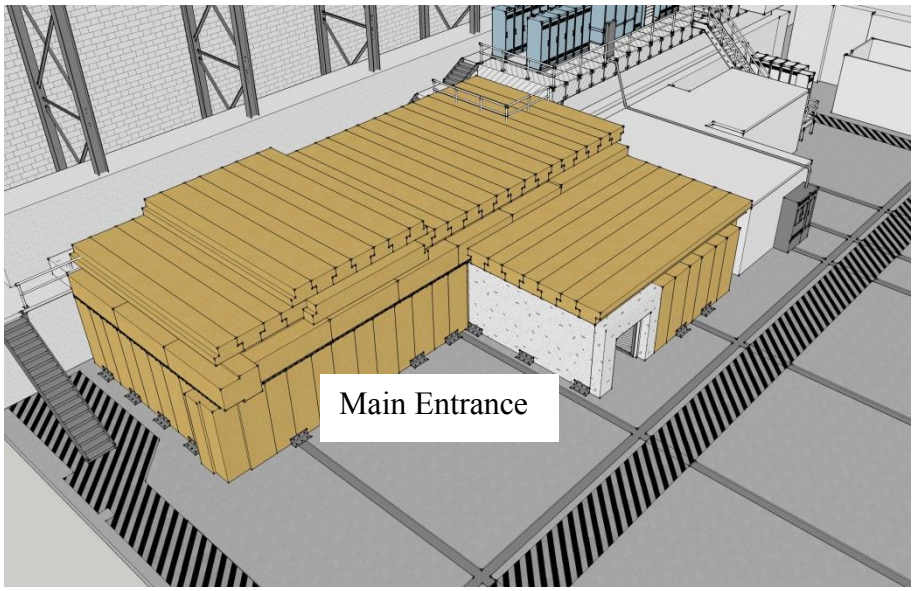


Figure 8 UITF with concrete shielding in place

Figure 9 (Left) Main entrance/exit from high bay area through the labyrinth of UITF. (Middle and Right), Secondary exit into the high bay from the southern-most location of the keV section. Both doors are connected to the Personnel Safety System but for this temporary procedure, the PSS will not be used to limit access. Rather the doors will be physically locked, as described below.

When the UITF is OPEN (doors unlocked, no radiation hazard), the main entrance/exit will be used. The secondary exit door can be used as needed, but is primarily considered an emergency exit.

## 6.4 Monitoring systems

There are two official EHS&Q related monitoring system related to this TOSP: the ODH system, which alarms when the oxygen level in the UITF enclosure drops below 19.5%. And CARMs that are used to detect x-ray radiation inside and outside the UITF enclosure. The CARMs are attached to the UITF PSS but the PSS will not be used for this TOSP. So the CARMs will not turn OFF the Spellman high voltage power supply when radiation levels are elevated above background, however, the CARMs will provide diagnostic measurement of radiation.

There are diagnostic signals related to field emission: gun vacuum, signals from Geiger Muller tubes via the system called RadMon, and the field emission current that strikes the anode electrode. These signals will be monitored via EPICS.

## 6.5 Ventilation

For information related to ODH conditions at UITF, please see the Preliminary ODH assessment for UITF. Document attached to this TOSP.

GN2 is available inside the UITF enclosure, and will be used for vacuum pump and backfill. The GN2 supply is interlocked to the ventilation fans. If the ventilation fans lose AC power, the GN2 supply inside UITF is automatically switched OFF.

Although long-term plans call for cryogenic fluids inside UITF (liquid nitrogen and helium), there is presently no supply of cryogenic fluids inside UITF.

The nearby Glassman high voltage power supply resides within an SF6 tank. The Glassman high voltage power supply will NOT be used for high voltage conditioning the new gun. However, the SF6 toxicity assessment is attached to this TOSP.

Note: for this TOSP which describes a compact photogun with inverted insulator geometry, and the 225 kV Spellman high voltage supply, there is NO SF6 required.

## 6.6 Pressure / Vacuum

The evacuated photogun is considered at Category 1 vacuum system, per the Pressure Safety Supplement. Specifically, the diameter of the photogun vacuum chamber is 14". As such, it has a cross sectional area larger than 33 $in^2$.

Relevant text from the Pressure Safety Supplement:
*Vacuum systems that meet the criteria for Category 1 shall be designed by a qualified Responsible Vacuum Engineer experienced in the design of vacuum systems and vessels. The design, fabrication, testing, repair, and alteration of Category 1 systems shall comply with all the requirements of this section. A PS number and folder structure are not required.*

*Vacuum systems in Category 1 are not required to meet the full rigor of the ASME Codes. These systems shall be designed to ensure that the system maintains suitable safeguards against buckling collapse. This can be verified using applicable paragraphs from ASME BPVC Section VIII Div 1 or Div 2. Alternatively, vacuum system design may be verified using other peer approved methods. A buckling analysis with a minimum factor of safety of 2 shall be performed by a Responsible Vacuum Engineer and reviewed by another Responsible Vacuum Engineer or Design Authority.*

In the case of the 225kV photogun, the vacuum chamber design was initiated at Jefferson Lab and reviewed by commercial vacuum company Kurt Lesker. Wall thicknesses were specified by Kurt Lesker. The chamber was manufactured by Kurt Lesker. The vacuum chamber has been under vacuum for years without incident.

**6.7 Other (Electrical, ODH, Trip, Ladder)** (Attach related Temporary Work Permits or Safety Reviews as appropriate.)

The manuals for photogun high voltage systems can be found at: https://wiki.jlab.org/ciswiki/index.php/ITF21 Manuals clearly state that the high voltage power supplies must be de-energized before work is performed, in accordance with JLab LTT policy.

The ODH assessment for the UITF is attached. It is deemed "preliminary" until the complete MeV beamline has been constructed and the ODH-related recommendations have been implemented and verified adequate. This assessment can be found at:
https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-135009/UITF%20prelim_%20ODH%20assessment.pdf

The document OSP 65773 keV beam line of the Upgraded Injector Test Facility (UITF).pdf describes keV beam operations at UITF. Other safety documentation related to UITF can be found at:
https://wiki.jlab.org/ciswiki/index.php/UITF_Safety_Documents

See Section 5.3 above for a complete list of hazards.

## 7. List of Safety Equipment:

### 7.1 List of Safety Equipment:

1. Safety glasses when performing mechanical work, as needed
2. Gloves depending on mechanical or shielding work

### 7.2 Special Tools:

N/A

## 8. Associated Administrative Controls

- Radiation Control Department staff is responsible for:
  - Maintenance and calibration of fixed and hand held radiation monitors
  - Area and personnel dosimeters
  - Providing High Radiation Area signage
  - Radiation measurements/surveys

- Center for Injectors and Sources (CIS) staff is responsible for:
  - Ensuring that high voltage cables are attached to the gun and power supply in accordance with LTT procedures.
  - Ensuring that the 240VAC circuit that provides power to the high voltage circuitry of the Spellman high voltage power supply is de-energized and locked out when UITF is OPEN. Power to this outlet is only provided when the UITF has been swept free of personnel and locked closed.
  - Sweeping the UITF Cave1 rooftop and the enclosure and ensuring that no personnel are in these areas when voltage is applied to the new photogun, and posting informative signage at appropriate locations described in this TOSP.
  - Locking the doors to prevent access to the UITF enclosure during gun conditioning, in manner described

below
- Safe operation of the 225 kV Spellman high voltage power supply, and setting the current limit value t prevent field emission current greater than tens of microamps.

## DEVELOP THE PROCEDURE

**9. Operating Guidelines**

The guidelines for high voltage conditioning a new photogun at UITF are outlined in this Temporary Operational Safety Procedure, which addresses hazards associated with this task, and the means to mitigate the hazards. Fault conditions at the UITF can produce only local work area impacts.

**Staffing**

The UITF can be operated by a single trained and authorized user (the person conducting the test). During gun high voltage conditioning, tests can happen in unattended mode, for example an overnight soak at high voltage.

**UITF Operation**

Although a PSS exists at UITF, it will not be used, due to the temporary and infrequent nature of this task. Access to the interior of UITF and the top of Cave 1 will be prohibited/prevented via locks, chains and signs.

Prior to beam operations,

**UITF Operator Requirements**

In addition to the training listed in section 4.4, the UITF operator must:

1. Read and understand this TOSP that includes sweep procedure,
2. Receive the practical training on this TOSP and on UITF operational procedures from system owner (Matthew Poelker or designee)
3. Perform walkthrough of the following areas: UITF control room and Cave 1 roof where the electronics racks are located.

**10. Notification of Affected Personnel (who, how, and when include building manager, safety warden, and area coordinator)**

Safety: UITF Safety Warden, John Hansknecht 269-7097
UITF system owner: Matthew Poelker, office 269-7357, cell. 757-897-9408
Principle Investigator: Carlos Hernandez-Garcia, office and pager 269-6862

**11. List the Steps Required to Execute the Procedure:** from start to finish.

The new photogun will be constructed at TL1337 and moved to a temporary location inside Cave1 of the UITF enclosure, near the quarter cryomodule (Figure 6, above). The Spellman High Voltage power supply will be positioned near the new photogun and operated remotely from the UITF control room via EPICS or laptop or desktop computer.

The vacuum inside the photogun will be monitored during high voltage conditioning, with increased vacuum levels denoting the presence of field emission and x-ray radiation. Radiation will be monitored using Geiger

Muller tubes (RadMon) and field emission that strikes the anode electrode will be detected using a Keithley picoammeter. We will use the same probes that are used at the LERF photogun, and the LERF GTS photogun, which have been shown to detect low level x-ray radiation.

There is one photon CARM probe located inside Cave1 above keV beamline, and two photon CARM probes located above Cave1. Because the Spellman HV power supply will not be attached to the UITF PSS, the CARM probes will not turn OFF the Spellman gun high voltage power supply, but they represent a useful x-ray radiation monitoring system. The CARMs will be monitored throughout the test and if radiation levels exceed 500mRem/hour, the test will be terminated. RCD will be consulted to determine a proper course of action.

The RCD will position the interior Cave1 CARM probe near the new photogun under test.

RCD will provide signage for both doors indicating High Radiation Area, which represents a worst case scenario. Signs will be applied to doors by CIS group members before conducting tests, and signs will be removed when the test is complete.

The following describes the operating procedures for gun high voltage conditioning.

**Procedure:**

**Inside Cave1 of the UITF**

1. Bake the new photogun and achieve good vacuum (at least low $10^{-11}$ Torr)
2. Verify that photogun ion pump current, RadMon signals and anode current are monitored by Epics. Note the background levels of these signals with Spellman high voltage power supply OFF, and no voltage applied to the gun.
3. With Spellman high voltage power supply disconnected from the AC power sources (i.e., unplugged from wall outlet), attach the high voltage cable to the photogun, in accordance with HV cable connection procedure. Media:Ds1079.pdf https://wiki.jlab.org/ciswiki/index.php/Electrodes_and_Insulators_Area
4. Outside the UITF enclosure, go to the circuit breaker panel "FEL P1" bolted to the exterior wall of the Laser Clean Room and open the circuit CKT 21 to de-energize the 240VAC outlet "P1 CKT 21" inside the UITF enclosure, and attach approved lock to prevent accidental power up of Spellman high voltage circuitry.
5. Enter the UITF and connect the 208VAC power cord of the Spellman high voltage power supply associated with controls and readback. This will enable communication to the Spellman high voltage power supply, but does not enable high voltage generation.
6. Connect the Spellman 240 VAC power cord associated with high voltage generation to the de-energized 240 VAC outlet "P1 CKT 21".
7. Sweep and lock the UITF enclosure:
    a. Apply "High Radiation Area" signs at both doors, visible to people from outside the UITF enclosure

b. Climb the stairs to the top of Cave1 where the electronics racks are located, inform people of impending gun high voltage conditioning test, and ask people to leave the roof. Attach chain to the top of the stairs, with sign stating that no one is permitted on the top of Cave 1 during gun high voltage conditioning.
c. Attach another chain at the bottom of the stairs, with sign stating no one permitted on top of Cave 1.
d. Walk to the stairway outside of UITF, near the north side of Cave2. Climb stairs and attach sign stating no access to Cave2 roof is permitted (Cave2 is not a designated work space, access to Cave2 only occurs when shield blocks are moved/reconfigured)
e. Enter the UITF enclosure through the main entryway (fence/gate) and inform occupants of impending high voltage test, and ask occupants to leave UITF enclosure.
f. With all personnel removed from UITF, return to the main entry way, and lock the fence Closed from the inside, by rotating the deadbolt.
g. Sweep the UITF enclosure making sure there are no occupants, and exit the rear door, locking the door Closed using the 4A1X key, locked from the outside.
h. Bring the door key to the UITF control room and place in designated location.

**8.** Go to the circuit breaker panel and remove the lock to the 240 VAC circuit "P1 CKT 21", close to the breaker to energize the 240VAC outlet, thereby providing power to the 225kV Spellman high voltage power supply circuitry.

**In the Control Room**

**1.** Turn ON the Spellman gun high voltage power supply using computer control, set to low voltage 10kV.
**2.** Increase voltage at modest intervals (~ 5kV steps) while monitoring gun vacuum, RadMon signals, and anode current. As bias voltage nears desired max value, 225kV, increase voltage in 1kV steps.
**3.** When field emission is encountered, adjust/increase gun bias voltage while keeping RadMon levels below 1000 counts per minute, and ion pump current below 1 uA.
**4.** Field emitters will process out (burn OFF). Continue high voltage processing until desired bias voltage is reached, nominally 225 kV, with no detectable field emission

***Shielding Verification:*** *Contact the Radiation Control Group at the beginning of the process to verify shielding. The Radiation Control Group will monitor CARMs and inform CIS personnel how to monitor these signals, and provide guidance when high levels of field emission are detected.*

**12. Back Out Procedure(s)** i.e. steps necessary to restore the equipment/area to a safe level.

## Returning the UITF to OPEN Mode

- Turn OFF the Spellman gun HVPS using the computer controls inside the Control room
- De-energize the 240VAC circuit "P1 CKT 21" at the breaker panel and add lock
- De-post restricted areas on Cave1 and Cave2 roofs
- Remove the "High Radiation Area" signs from both doors
- Unlock the back door and the front gate
- Enter the UITF enclosure, and unplug the Spellman high voltage power supply cables from the AC wall outlets.
- Revisit the breaker panel and remove lock

**13. Special environmental control requirements:**

| | |
|---|---|
| **13.1** | **List materials, chemicals, gasses that could impact the environment (**ensure these are considered when choosing Subject Matter Experts) and explore EMP-04 Project/Activity/Experiment Environmental Review below |
| | N/A (at 225kV, and with our gun design and Spellman HV power supply, we do not require SF6) |
| **13.2** | **Environmental impacts** (See EMP-04 Project/Activity/Experiment Environmental Review) |
| | N/A |
| **13.3** | **Abatement steps (**secondary containment or special packaging requirements) |
| | N/A |

**14. Unusual/Emergency Procedures** (e.g., loss of power, spills, fire, etc.)

**When UITF enclosure is OPEN and Occupied:**

The following is a list of currently installed alarms:

1. ODH (blue strobe + buzzer)
2. Fire (white strobe + high pitch)
3. Potential prompt radiation (magenta strobe beacon and 30 second siren)

For ODH and Prompt Radiation alarms, evacuate the UITF enclosure immediately and proceed to the high bay area of the Test Lab. For Fire alarm, exit the Test Lab and proceed to nearest muster point.

Return to normal operations occurs when alarms are cleared by the following personnel:

1. ODH cleared by SSG or CIS Staff
2. Fire cleared by Facilities Management

**When the UITF is Locked Closed per this TOSP**

1. If the ODH or Fire alarms sound, set bias voltage to Zero and investigate the nature of the alarm.
2. For persistent prompt radiation alarms, contact Radiation Control Group.
3. Personnel inside UITF enclosure AND the doors are locked. **NOTE: This event should never occur if proper sweep procedures are followed.** Personnel should proceed to nearest exit. The labyrinths

prevent exposure to x-rays. The back door can be unlocked from the inside by simply pressing on the pushbar. The front door/gate can be unlocked from the inside by rotating a deadbolt.

Notifications:
UITF Safety Warden, John Hansknecht 269-7097
UITF system owner: Matthew Poelker, office 269-7357, cell. 757-897-9408
ODH, Fire: Guard gate 269-5822
Other Emergencies: Guard gate 269-5822

For emergencies such as injury or fire, Please refer to:
https://jlabdoc.jlab.org/docushare/dsweb/Get/Document-24400/*.pdf (Jefferson Lab Emergency Response Procedures) or to the JLAB Emergency Action Card attached to all JLAB phones.

**15. Instrument Calibration Requirements** (e.g., safety system/device recertification, RF probe calibration)

N/A

**16. Inspection Schedules**

N/A

**17. References/Associated/Relevant Documentation**

Task Hazard Analysis
UITF ODH assessment – preliminary

**18. List of Records Generated** (Include Location / Review and Approved procedure)

Operations logbook (electronic)

Click
To Submit OSP
for Electronic Signatures

**Distribution:** Copies to Affected Area, Authors, Division Safety Officer
**Expiration:** Forward to ESH&Q Document Control

**Form Revision Summary**

**Revision 1.4 – 06/20/16 –** Repositioned "Scope of Work" to clarify processes
**Qualifying Periodic Review – 02/19/14 –** No substantive changes required
**Revision 1.3 – 11/27/13 –** Added "Owning Organization" to more accurately reflect laboratory operations.
**Revision 1.2 – 09/15/12 –** Update form to conform to electronic review.
**Revision 1.1 – 04/03/12 –** Risk Code 0 switched to N to be consistent with 3210 T3 Risk Code Assignment.
**Revision 1.0 – 12/01/11 –** Added reasoning for OSP to aid in appropriate review determination.
**Revision 0.0 – 10/05/09 –** Updated to reflect current laboratory operations

| ISSUING AUTHORITY | FORM TECHNICAL POINT-OF-CONTACT | APPROVAL DATE | REVIEW DATE | REV. |
|---|---|---|---|---|
| ESH&Q Division | Harry Fanning | 06/20/16 | 06/20/19 | 1.4 |

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