

**400 MeV Test Area (MTA) Hazard Awareness Training Handout**  
**Version 1**  
**September 4, 2020**

**Overview**

This document is intended to inform you of some of the common hazards encountered in the 400 MeV Test Area (MTA) enclosure. This hazard awareness training is required for all personnel who intend to access or work in the MTA enclosure. It is valid for a period of two years. Please read the entire document and take the on-line test associated with Fermilab Course FN000690/CR/01 or sign the signature sheet available in the Main Control Room.

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**Definition of Terms**

*MTA*: 400 MeV Test Area, referring to the beam enclosure and service building as well as the beam line. This is the name to use in communications with the Main Control Room. This space was previously known as the MuCool Test Area with the same MTA acronym.

*ITA*: Irradiation Test Area, referring to the shielded experimental cave at the end of the MTA beam line as well as the program of user test experiments taking place at the facility. Experiments involve studying the effects of radiation on materials in the MTA beam. Experimental activities in the MTA facilities are overseen by the ITA coordinator.

Counting House: Refers to one half of the service building located adjacent to the entrance to the beam enclosure on the surface in the parking lot. This room was previously known as the MuCool or MTA Refrigeration Room and housed cryogenic equipment for the previous experiment. The room has been refurbished to serve as a counting house for experiments. It is connected to the beam enclosure through a series of penetrations. This building is divided in half by a set of double doors, the other half of the building being the Compressor Room.



Photo 1: Annotated aerial view showing beam alcove, experiment hall, and counting house approximately as situated in the grass-covered berm. Beam direction and path are indicated by the cyan arrow and dotted line.

## **Introduction**

The MTA has been repurposed as a test area to study the effects of radiation on materials and detector components. This training will cover activities both inside the beam enclosure and in the nearby service building that acts as a counting house. There are hazards that you need to be aware of.

## Programs for Controlling Hazards

Fermilab employees and users should ensure their supervisor or Individual Training Needs Assessment contact is aware they are working at MTA and updates their ITNA appropriately.

Work activities performed by Fermilab employees and users should be done using the methods presented in training course [FN000628 - Work Planning and Hazard Analysis](#). All users should have completed this course and review it periodically. Written procedures and job hazard analyses are usually developed by those doing the work and their supervisors, in consultation with ES&H personnel or subject matter experts when necessary. Technical assistance is generally not available late in the afternoon or in the evening and overnight. You are encouraged to do sufficient work planning to make use of assistance when it is available.

All user equipment at MTA must undergo an “Operational Readiness Clearance” (ORC) safety review before going into operation. See [FESHM 2005](#) for details of the ORC program. Contact the ITA Coordinator to arrange for this review. Equipment should not be energized or operated until the completion of this review.

## **Experimental Hall: Access Control**

The door at the top of the stairs leading to the experimental hall and the door from the labyrinth hallway to the lower exterior pit area are to be kept closed at all times. Enclosure Enter keys are to be checked out from the Main Control Room (MCR). Every entrant is to have their own individual enclosure Enter key. The exterior door to the vestibule, that is before the door to the stairs, is locked with an AC4 key. That key can be checked out from the MCR. Only one AC4 key per group is required.

## **Experimental Hall: Access Requirements**

### Two Person Rule

Adherence to the two-person rule is required for all accesses to the experimental enclosure.

### Hazard Awareness Training

All personnel accessing the hall must read the 400 MeV Test Area (MTA) Hazard Awareness Training Handout (this document) and take the online test associated with Fermilab Course FN000690/CR/01 (or return the completed signature sheet available in the Main Control Room) to indicate that they have read and understood the information presented herein.

### Radiological Control Requirements

Radiological Worker training is required for personnel accessing the experimental hall. Controlled Access training and Radiation Safety Officer (RSO) approval are also required if accessing the experimental hall while in controlled access mode. All accesses to the experimental hall are governed by a Radiological Work Permit (RWP). The active RWP for the Hall is available in the MCR (or online at [rwp-esh.fnal.gov](http://rwp-esh.fnal.gov)) and must be reviewed and signed, in conjunction with obtaining an enclosure Enter key, before accessing the hall. The RWP contains information on the radiological training, PPE, and dosimetry required for access. There are

separate RWPs for Supervised Access and Controlled Access. A frisker and wallflower are located in the entrance alcove.

## **Experimental Hall Hazards and Controls**

### **Ionizing Radiation Sources**

When beam is transported through the MTA Beamline, ionizing radiation is a significant radiation hazard. In order to protect workers and the general public, the enclosures and beam pipes are surrounded either by sufficient amounts of shielding (earth, concrete or iron), and/or networks of interlocked detectors to keep any prompt radiation within acceptable levels.

Beam delivery at high intensity produces activated materials which result in residual dose rates in the hall after beam operations. Residual activation hazards are handled operationally as in all other primary beam enclosures. The RWP for the hall details the controls necessary for access. Survey all equipment that has been in the enclosure for activation upon removal.

All equipment being brought into the experimental hall for use during beam operations must be reviewed with ITA staff first during the experimental planning stages. The experimental hall has a high intensity beam and could lead to the activation or damage of equipment. All equipment brought into the hall must be removed after the experiment and surveyed. For equipment which may be sensitive to the radiation field within the experimental hall, arrangements can be made to operate it outside the hall or if necessary, provide shielding for it.

### **Electrical Hazards**

Many MTA components utilize potentially dangerous high voltages or electrical currents and may not be isolated from their sources during accesses. In addition, certain electrical devices and components may retain energy after their power has been disabled. All personnel working on or near potentially energized components must have LOTO Level II training [FN000212 / CR](#) and must lockout, tagout, and verify that the equipment energy sources have been de-energized before beginning work.

Faults that occur in electrical equipment operating at 50V or above must be reported to the Division Safety Officer (DSO). Users may not repair Fermilab-owned electrical equipment without explicit permission of the ITA Coordinator.

A document to help guide new users through the Operational Readiness Clearance review process can be found in “Electrical Safety ORC Review Guidelines” located here: <https://esh-docdb.fnal.gov/cgi-bin/ShowDocument?docid=3270>. It is strongly recommended that all users read this document before installing any equipment. A common problem is “daisy-chaining” of extension cords and power strips. Extension cords and power strips may not be connected in series. All electrical conductors need to have current protection such as fuses, circuit breakers, or a current-limited supply to prevent the current from exceeding the rated capacity of the conductor.

There are a set of shielding penetrations that exist between the MTA and the counting house. ITA staff must be consulted before pulling any additional cables through these penetrations.

## Fire

The experimental hall is provided with an automatic sprinkler system and a fire alarm system. If a fire alarm sounds (see Photo 2) in the experimental hall while personnel are in access, the personnel shall evacuate the hall and assemble in the parking lot outside of the counting house. The evacuated personnel should contact the Comm Center at ext. 3131 and shall wait for the arrival of the Fire Department and report any information they have on the situation to the Incident Commander.



Photo 2: Fire Alarm

## Mechanical

At various times, some experimental chambers will utilize high pressure gasses in the enclosure that may become hazardous if handled improperly. All gas cylinders must be properly regulated while in use and capped while in storage. They also must be secured at all times from falling.

An aerial lift is located in the hall. Only personnel who have taken the Fermilab Aerial Lift course ([FN000532](#)), or have been given equivalency credit by the ES&H Section, may operate the lift. Hard hats may be needed by users of the lift and by those working on the floor underneath the lift.

A motion table exists within the facility to position experimental equipment into and out of the path of the particle beam, located on the front porch of the shielding cave. This table generally moves at a slow pace but can pose potential pinch hazards. No user shall operate a motion table without a briefing from ITA staff. Make sure you know the location of the emergency stop button.

## Experimental Counting House

Located nearby the experimental area and accessible from the parking lot is a counting house (formerly known as the MTA refrigeration room). The purpose of this room is for users to monitor their experiment during beam periods and to store samples and materials in a freezer after they have been exposed to the beam.

Access to this room requires an AC4 key which may be checked out from the MCR. A unique key is not required for each individual accessing the counting house. A two-person rule in the counting house is encouraged but not required. GERT is sufficient to be in the counting house except in situations noted below.

This room contains a freezer for the storage of samples that have been exposed to the beam. The freezer is surrounded by movable shielding blankets containing lead and this assembly is kept under RSO lock. The shielding should not be moved, and the freezer will not be accessed without the presence of a Radiological Control Technician (RCT). The counting house is nominally posted as a Controlled Area/Radioactive Materials Area with exposures under 0.05 mR/hr and the freezer will be shielded accordingly so there are no occupancy restrictions. It is possible that access to the counting house will be restricted or its occupancy limited as samples are being retrieved or depending on the stored contents. The posting for the counting house could change and users should always consult the MTA RWP before entering.

If a user experiment does not involve equipment that requires monitoring from the counting house during beam operations, users will be asked to monitor beam from a different location. Upon arrival for installation users will coordinate their access needs to the counting house with ITA staff.

### **Emergencies**

In the event of a fire alarm, either in the experimental hall or the counting house, evacuate the area in alarm and call ext. 3131 (630-840-3131) from outside the area in alarm.

In the event of an emergency situation not requiring evacuation (e.g., personnel injury) call ext. 3131 from the phone in the upstairs counting house or a phone in the Booster West Gallery. Stay on the phone until the emergency operator indicates that they have all the necessary information.

In the event of a Tornado Warning, proceed to the West Booster Gallery and then north to the Linac Gallery. Take the stairs at the south end of Linac Gallery into the Linac Lower Level shelter.

**Signature Page and Training Record**

“I have read the **400 MeV Test Area (MTA) Hazard Awareness Training Handout** and understand the hazards present within the facility. Also, I agree to follow all of the listed work rules and emergency procedures.”

Print your name: \_\_\_\_\_ Fermilab ID#: \_\_\_\_\_

Division/Section/Affiliation: \_\_\_\_\_ Department/Group: \_\_\_\_\_

Fermilab Phone #: \_\_\_\_\_ Mail Station: \_\_\_\_\_

Email address: \_\_\_\_\_

Your signature: \_\_\_\_\_

Today's Date: \_\_\_\_\_

*If you have not completed this training online*, please complete this form and return to:

**Training, MS 119**

-----FOR ADMINISTRATIVE USE ONLY-----

Course: 400 MeV Test Area (MTA) Hazard Awareness Training (FN000690/CR/01)

Authorization: \_\_\_\_\_

(Must be signed by ESH Section personnel)