

ACCELERATOR DIVISION ES&H PROCEDURE

ADSP-05-1217

NUMI MI65 13.8KVAC LOCKOUT/TAGOUT PROCEDURE

RESPONSIBLE DEPARTMENT ES&H

PREPARED BY *Joe Compton* DATE 11/4/19
Joe Compton
AD Operations Department

APPROVED BY *Mike Lindgren* DATE 11/15/2019
Mike Lindgren
Accelerator Division Head

REVISION NO. 2

REVISION ISSUE DATE 11/4/19

CONTROLLED DOCUMENT

Users are responsible for ensuring they are working to the latest approved revision. Printed or electronically transmitted copies are uncontrolled.

REVIEW AND CONCURRENCE RECORD

REVIEWED BY *Tom Kobilarcik* DATE 11/16/2019
Tom Kobilarcik
AD External Beams Department Head

REVIEWED BY *Todd Sullivan* DATE 11/05/19
Todd Sullivan
AD Operations Department Head

REVIEWED BY *Chris Jensen* DATE 11/5/19
Chris Jensen
AD EE Support Department Head

REVIEWED BY *Joseph Pathiyil* DATE 11/7/19
Joseph Pathiyil
FESS High Voltage Engineering

REVIEWED BY *Eric McHugh* DATE 11/15/19
Eric McHugh
ES&H AD Division Safety Officer

CONTROLLED DOCUMENT

Users are responsible for ensuring they are working to the latest approved revision. Printed or electronically transmitted copies are uncontrolled.

Author	Description of Change	Revision Date
Joe Compton	Adjusted titles to reflect organizational changes. Added revision history. Removed the itemized clothing lists from NFPA 70E class 0. Now it states it is required to follow NFPA 70E class 0 requirements. Specified training needed for Lead Authorized Person. Correct lockbox name to MI-65/Numi Lockbox. Added procedure training requirements in sections 8.1 and 8.2. Changed some grammar to help clarify. Added Appendix A.	10/24/2019

CONTROLLED DOCUMENT

Users are responsible for ensuring they are working to the latest approved revision. Printed or electronically transmitted copies are uncontrolled.

1.0	PURPOSE AND SCOPE	1
2.0	PERFORMANCE OF MAINTENANCE ACTIVITIES	1
3.0	THE NECESSITY OF WRITTEN LOTO PROCEDURE	1
4.0	RESPONSIBILITIES	1
5.0	THE STEPS OF LOCKOUT/TAGOUT PRIOR TO MAINTENACE	2
6.0	SPECIAL REQUIREMENTS FOR SHIFT/PERSONNEL CHANGES	4
7.0	THE STEPS FOR RETURN TO SERVICE	4
8.0	PROCEDURE TRAINING REQUIREMENTS	4
9.0	DISTRIBUTION	5
Appendix A: ACCELERATOR DIVISION SAFETY PROCECURE WRITTEN LOTO DEVELOPMENT AND REVIEW PROCEDURES		1

CONTROLLED DOCUMENT

Users are responsible for ensuring they are working to the latest approved revision. Printed or electronically transmitted copies are uncontrolled.

1.0 PURPOSE AND SCOPE

The purpose of this Accelerator Division Safety Procedure (ADSP) is to outline and detail the conduct of LOCKOUT/TAGOUT (LOTO) for Group Lockout of the NuMI beamline enclosure accessed from the MI-65 service building. This LOCKOUT/TAGOUT is expected to be performed by Operations personnel before access is permitted into the MI-65 enclosure.

2.0 PERFORMANCE OF MAINTENANCE ACTIVITIES

During maintenance/repair activities of the NuMI MI-65 devices in the enclosure, the 13.8kVAC that powers the associated 480VAC power panel needs to be locked out. The positive control point for Lockout/Tagout is in the MI-65 service building.

3.0 THE NECESSITY OF WRITTEN LOTO PROCEDURE

The need for a written LOTO procedure is due to the necessity to lock out an energy source, which powers an exposed buss, in the area in which access is restricted to authorized personnel only. The NuMI beamline devices at MI-65 are powered from the Main Injector conventional house power Feeder 52/53 through a 13.8kVAC remote controlled switch DS-TR-MI65B. This switch powers a 2000kVA transformer TR-MI65B and then a 480 panel SWBD-MI65B1. This panel then powers each supply through individual breakers.

4.0 RESPONSIBILITIES

4.1 OPERATIONS DEPARTMENT HEAD

The Operations Department Head shall develop and maintain a list of Authorized Personnel and coordinate their training.

In addition, the Operations Department Head will ensure that the Lead Authorized Person implementing this procedure utilize an appropriate lockout form which is developed and maintained by the Operations Department and the ES&H Section and approved by the ES&H AD Division Safety Officer prior to use.

CONTROLLED DOCUMENT

Users are responsible for ensuring they are working to the latest approved revision. Printed or electronically transmitted copies are uncontrolled.

4.2 LEAD AUTHORIZED PERSONNEL

The role of the lead Authorized Personnel is to properly Lockout/Tagout the 13.8 kVAC switch, SD-TR-MI65B, which energizes the TR-MI65B transformer. The completion of the Lockout/Tagout is to be documented using a lockout form developed and maintained by the Operation Department and the ES&H Section and approved by the ES&H AD Division Safety Officer.

The Lead Authorized Person shall carry the approved lockout form and each applicable step shall be checked off as they are performed. A copy of the completed form shall be placed in the Main Control Room (MCR) electronic log (e-log). Completed original forms shall be maintained for one calendar year.

The Lead Authorized Personnel shall be from the Accelerator Operations Department who are authorized in writing by the Operations Department Head. Authorized employees are to have the necessary knowledge and current Lockout/Tagout training required by FESHM chapter 2100.

5.0 THE STEPS OF LOCKOUT/TAGOUT PRIOR TO MAINTENANCE ACTIVITY

Upon desiring to perform LOTO on the NuMI MI-65 enclosure devices, the MCR Crew Chief shall designate a Lead Authorized Person from the list of such named personnel maintained by the Operation Department Head.

- 5.1 **Prepare:** The lead Authorized Person shall review this written procedure if necessary and obtain a copy of the approved lockout form. (Copies will be kept in a lockout binder on the Duty Assistant's desk).
- 5.2 **Notify:** Notification shall be given to personnel deemed appropriate by the MCR Crew Chief.
- 5.3 **Shut Down:** The Lead Authorized Person should check that the NuMI MI-65 enclosure devices are off. The 13.8kVAC controller (MI65 Safety Lockout Chassis) in the MI-65 Electronics Room rack #MI65-101 is provided to limit switching the 13.8kVAC while standing near the switch. It will also provide a sequenced off command to each supply before opening the 13.8kVAC switch avoiding opening the switch under load. In addition to the 13.8kVAC control, three meters connected to the main transformer output on each phase are installed on the front of the controller.

CONTROLLED DOCUMENT

Users are responsible for ensuring they are working to the latest approved revision. Printed or electronically transmitted copies are uncontrolled.

The lockout is to be performed at MI-65 and checks are performed using the following:

- a. Verify the MI-65 13.8kV Disconnect Switch Cabinet Lock is in place on the right front access door of the DS-TR-MI65B cabinet.
- b. Verify that no personnel are standing within 10 feet of the **DS-TR-MI65B** switch at the outside utility pad.
- c. Check that each of the **three volt meters** on the **MI65 Safety Lockout Chassis** read **~277 volts** and the **13.8KV Switch Control Power** light is **ON**.
- d. Turn the “T” handle on the **MI65 Safety Lockout Chassis** to the **OFF** position. This will then open the DS-TR-MI65B switch at the outside utility pad. The three meters then should be checked that they drop to zero at the end of the cycle.
- e. The control power disconnect for the 13.8kVAC controller, **DS-TR-MI65B HV Load Break Switch Power**, is located in the MI-65 power supply room. Operation of the disconnect in this step requires NFPA 70E Class 0 activity. Operate the disconnect switch handle to the **OPEN (OFF and Down)** position. Remove the NuMI LOTO Kirk Key. The key is to be returned to the MCR NuMI Job Lock Box in step 5.5 below. This disconnect removes all control power to the motor and motor controller located internal to the 13.8kVAC switch DS-TR-MI65B.

5.4 **Verify:** The Lead Authorized Person shall verify that all **three volt meters** on the **MI65 Safety Lockout Chassis** changed to **zero volts** and the **13.8KV Switch Control Power** turned **OFF**. Then the Lockout/Tagout persons shall go out to the switch and verify through the window that **all three blades** are **OPEN**. There is a light internal to the switch to assist in viewing and the on/off switch is on the front of the switch gear. The Lead Authorized Person shall indicate on the approved lockout form the accomplishment of these steps.

5.5 **Lock and Tag Out:** Return to the Main Control Room and place NuMI LOTO Kirk Key and the MI-65 13.8kV Disconnect Switch Cabinet Lock Out key in the NuMI Job Lockbox and attach a BT-5 padlock (MCR Crew Chief lock) to the NuMI Job Lockbox. A copy of the completed lockout form shall be entered into the MCR e-log.

CONTROLLED DOCUMENT

Users are responsible for ensuring they are working to the latest approved revision. Printed or electronically transmitted copies are uncontrolled.

6.0 SPECIAL REQUIREMENTS FOR SHIFT/PERSONNEL CHANGE

If the accelerator enclosure activities continue beyond a shift, the next MCR Crew Chief assumes the responsibility and authority of the off-going MCR Crew Chief for this group lockout.

7.0 THE STEPS FOR RETURN TO SERVICE

The MCR Crew Chief or Lead Authorized Person must perform the following steps prior to returning the equipment to service after service or maintenance activity.

- 7.1 **Check Equipment:** Check the MCR lockbox and ensure that all personnel have removed their locks and tags.
- 7.2 **Check Work Area:** Check that the MI-65 enclosure is secure and all keys have been returned.
- 7.3 **Notify:** The MCR Crew Chief shall notify appropriate personnel that they are ready to reenergize.
- 7.4 **Return the NuMI LOTO KIRK Key:** Return the NuMI LOTO Kirk Key to the **DS-TR-MI65B HV Load Break Switch Power** disconnect and turn it clockwise. Operation of the disconnect in this step requires NFPA 70E Class 0 activity. Switch the disconnect **ON**. This will provide power to the Safety Lockout Chassis. Verify that no personnel are standing within 10 feet of the DS-TR-MI65B switch at the outside utility pad. The "T" handle, on the **MI65 Safety Lockout Chassis** should then be turned to the **ON** position. Verify that the **three meters** changed from zero volts to **277** volts and the **13.8KV Switch Control Power** light is **ON**.

This completes the requirements for returning the equipment to service.

8.0 PROCEDURE TRAINING REQUIREMENTS

Initial training of Lead Authorized Personnel shall consist of reading and understanding this procedure and participating in the performance of the procedure with a qualified operator. The time interval for re-qualification will be every year in accordance with Laboratory procedures.

- 8.1 All personnel performing this procedure are required to be trained in Lockout/Tagout Level 2 (FN000212 / CR).
- 8.2 All personnel performing this procedure are required to be trained in Electrical Safety in the Workplace (NFPA 70E) (FN000385 / CR).

CONTROLLED DOCUMENT

Users are responsible for ensuring they are working to the latest approved revision. Printed or electronically transmitted copies are uncontrolled.

9.0 DISTRIBUTION

An electronic copy of this procedure is available at http://ad-esh.fnal.gov/ad_adsp.html.

CONTROLLED DOCUMENT

Users are responsible for ensuring they are working to the latest approved revision. Printed or electronically transmitted copies are uncontrolled.

APPENDIX A: ACCELERATOR DIVISION SAFETY PROCEDURE WRITTEN LOTO DEVELOPMENT AND REVIEW RESPONSIBILITIES

This appendix describes the responsibilities for drafting and reviewing written procedures used for exposed bus Lock Out/Tag Out (LOTO) with the purpose of accessing accelerator and beamline enclosures.

These procedures are formalized as Accelerator Division Safety Procedures (ADSP) to establish ESH&Q policies for implementation by AD departmentsⁱ, in this case as a written LOTO procedure, to control access to AD facilities as needed to protect the health and safety of personnelⁱⁱ.

The scale of the systems included in the procedures involve multiple organizational units having only partial knowledge of or responsibility for the overall system. The written LOTO procedure shall be draftedⁱⁱⁱ and reviewed^{iv} by knowledgeable employees from each D/S/P that owns, uses, maintains, or services equipment directly affected by or used to execute the written LOTO procedure, including Energy Isolating Devices, and approved by a line manager at the department head level or higher (or designee).

The AD OPS department provides the authorized and lead authorized employees, performs the inspector component of the training and maintains the training of the lead authorized personnel.

The AD EES department acts as the knowledgeable employee for magnet power supplies from the AC service LOTO Energy Isolation Device, through the power supply and to the power supply terminals. In some instances, FESS maintains the LOTO Energy Isolating Device and is the knowledgeable employee for that device.

The department(s) responsible for the enclosure act as the knowledgeable employee for the loads in the beamline enclosure.

The approval of the line manager is recorded in the REVIEW AND CONCURRENCE RECORD of the ADSP indicating that they have reviewed the procedure, provided input for their area of knowledge and recognize their responsibilities as users, owner, maintainers or servicers of a portion of the systems used in the written LOTO procedure.

APPROVAL:  DATE 11/15/2019
Mike Lindgren
Accelerator Division Head

ⁱ ADAP-01-0001 3.1.2c

ⁱⁱ ADAP-01-0001 3.1.2d

ⁱⁱⁱ FESHM 2100 5.7

^{iv} FESHM 2100 4.4

CONTROLLED DOCUMENT

Users are responsible for ensuring they are working to the latest approved revision. Printed or electronically transmitted copies are uncontrolled.