

ACCELERATOR DIVISION ES&H PROCEDURE

ADSP-05-1222

M4 Enclosure
480 Volt LOCKOUT/TAGOUT PROCEDURE

RESPONSIBLE DEPARTMENT Operations

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REVIEW AND CONCURRENCE RECORD

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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 Muon Campus M4 enclosure for general access.

2.0 **PERFORMANCE OF MAINTENANCE ACTIVITIES**

During maintenance/repair activities of the M4 enclosure devices in the enclosures, the 480 Volt circuit breakers need to be locked out. The positive control points for LOCKOUT/TAGOUT are at the MC1 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 in an area in which access is restricted to authorized personnel only. The M4 enclosure devices are powered from the panel serviced by disconnect **DS-PHP-MC1B1-1** at the MC1 service building. 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 Lead Authorized Personnel and coordinate their training.

In addition, the Operations Department Head will ensure that the Lead Authorized Personnel implementing this procedure utilize appropriate lockout forms which are developed and maintained by the Operations Department, Electrical Engineering Support Department, Muon Department, and approved by the ES&H AD Division Safety Officer prior to use.

4.2 **LEAD AUTHORIZED PERSONNEL**

The role of the Lead Authorized Person is to properly Lockout/Tagout the disconnect switch which de-energizes the 480-volt circuit power. The completion of the Lockout/Tagout is to be documented using a lockout form developed and maintained by the Operations Department, Electrical Engineering Support Department, Muon Department, and approved by the ES&H AD Division Safety Officer.

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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, who have the necessary knowledge and current Lockout/Tagout training required by FESHM chapter 2100 shall conduct lockout of the M4 Group Lock Box.

5.0 THE STEPS OF LOCKOUT/TAGOUT PRIOR TO MAINTENANCE ACTIVITY

Upon desiring to perform LOTO on the M4 enclosure devices, the MCR Crew Chief shall designate a Lead Authorized Person from a list of such named personnel maintained by the Operations 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 shall check that the M4 enclosure devices are off. (DS-PHP-MC1B1-1 feeds supplies for a part of the Extraction Enclosure including the Extraction Stub as well as the M4 Enclosure).

At the MC1 Service Building lock out the disconnect switch for the power supplies by performing the following:

- A. Open disconnect switch **DS-PHP-MC1B1-1**.
 - a. Operation of the disconnect switch in this step requires NFPA 70E Class 0 activity.
- B. Turn and remove the Kirk Key from the actuator thus locking the disconnect in the open position.
- C. **Verify:** The Lead Authorized Person shall verify that all three switches are open, though the windows. The Lead Authorized

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Person shall indicate on the approved lockout form the accomplishment of this step.

- 5.4 **Lock and Tag Out:** The Lead Authorized Person shall return to the Main Control Room. Proceed to the **Muon Campus Kirk Key Lockout Board**. The **DS-PHP-MC1B1-1** kirk key shall be placed in the appropriate slot in the MC1-1 block. Turn the key in the MC1-1 block to release the **M4 Enclosure LOTO key**. The **M4 Enclosure LOTO key** shall be placed in the M4 Enclosure Group LOTO lockout box.

The Lead Authorized Person shall attach a **BT-5** padlock (MCR Crew Chief lock) to the lockout box. A copy of the completed lockout form shall be entered into the MCR e-log.

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 coordinate 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 M4 enclosure is secure and all keys have been returned.
- 7.3 **Notify:** The MCR Crew Chief or Lead Authorized Person shall notify appropriate personnel that they are ready to reenergize.
- 7.4 **Remove Padlocks and Tags and Reenergize:** The MCR Crew Chief or Lead Authorized Person shall remove the Crew Chief locks and tags from the M4 Enclosure group lockbox. The Lead Authorized Person shall obtain the **M4 Enclosure LOTO key** and return it to the appropriate slot in the Muon Campus Kirk Key Lockout Board MC1-1 block. Turn the key to release the **DS-PHP-MC1B1-1** kirk key and take to the field.

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At the MC1 Service Building enable the disconnect switch for the power supplies by performing the following:

- A. Insert the **DS-PHP-MC1B1** kirk key and turn to allow the operation of the **DS-PHP-MC1B1-1** disconnect.
- B. Close disconnect switch **DS-PHP-MC1B1-1**.
 - a. Operation of the disconnect switch in this step requires NFPA 70E Class 0 activity.
- C. **Verify:** The Lead Authorized Person shall verify that all three switches are closed, though the windows.

This completes the requirements for returning the equipment to service.

8.0 **PROCEDURE TRAINING REQUIREMENTS**

Initial training shall be coordinated by the Operations Department Head. 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).

9.0 **DISTRIBUTION**

An electronic controlled copy of this procedure is maintained on the AD ESH website at: https://ad.fnal.gov/hq/AD_AP.html.

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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 departments¹, in this case as a written LOTO procedure, to control access to AD facilities as needed to protect the health and safety of personnel².

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 drafted³ and reviewed⁴ 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 12/18/2019

Mike Lindgren
Accelerator Division Head

¹ ADAP-01-0001 3.1.2c

² ADAP-01-0001 3.1.2d

³ FESHM 2100 5.7

⁴ FESHM 2100 4.4