

ACCELERATOR DIVISION ES&H PROCEDURE

ADSP-05-1214

KAUTZ ROAD SUBSTATION MOS 86, 87 & 89 LOCKOUT

RESPONSIBLE DEPARTMENT ES&H

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

APPROVED BY Mike Lindgren DATE 11/15/19
Mike Lindgren
Accelerator Division Head

REVISION NO. 7 REVISION ISSUE DATE 10/22/19

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 David Capista DATE 11/6/19
Dave Capista
AD Main Injector/Recycler 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. Specified training required for Lead Authorized Person. Added procedure training requirements in sections 8.1 and 8.2. Changed some grammar to help clarify. Added Appendix A. Corrected table of contents page numbers. Added header and footer to all pages.	10/22/2019

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 MAINTENANCE ACTIVITY	2
6.0	SPECIAL REQUIREMENTS FOR SHIFT/PERSONNEL CHANGE.....	4
7.0	THE STEPS FOR RETURN TO SERVICE	4
8.0	PROCEDURE TRAINING REQUIREMENTS.....	5
9.0	PROCEDURE DISTRIBUTION.....	5
Appendix A: ACCELERATOR DIVISION SAFETY PROCEDURE 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 13.8 KVac Manually Operated Switches (MOS) 86, 87, & 89 at the Kautz Road Substation.

2.0 **PERFORMANCE OF MAINTENANCE ACTIVITIES**

During maintenance/repair activities of the accelerator, the 13.8 KVac power feeder system at Kautz Road Substation needs to be locked out. The positive control point for Lockout/Tagout of the power feeders is at the Kautz Road Substation, which is a limited access area. It would be impractical for every individual performing maintenance on systems that require lockout/tagout of these feeders to perform Lockout/Tagout at the Kautz Road Substation. Therefore, Group Lockout by a Lead Authorized Person is necessary. The completion of the Lockout/Tagouts are to be documented using lockout forms developed and maintained by the Operations Department and the ES&H Section and approved by the ES&H AD Division Safety Officer.

3.0 **THE NECESSITY OF WRITTEN LOTO**

The need for a written LOTO procedure is due to the necessity to lock out multiple energy sources in an area in which access is restricted to authorized personnel only. After these feeders are properly locked out, other procedures will be implemented to detail how these lockouts will be utilized to protect personnel for entry in given enclosures.

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 and the ES&H Section and approved by the 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.

4.2 **LEAD AUTHORIZED PERSONNEL**

The role of the Lead Authorized Person is to properly Lockout/Tagout the switches which de-energize 13.8 KVAC feeders at the Kautz Road Substation. The completion of the Lockout/Tagout is to be documented using a lockout form developed and maintained by the Operations Department and the ES&H Section and approved by the ES&H AD Division Safety Officer.

Other procedures will be implemented to detail how this lockout will be utilized to protect personnel for access to given beamline enclosures.

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.

Lockout at the MCR MI Group Lockboxes shall be conducted by authorized employees who 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 of these feeder systems, 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. In particular, the Duty Electrician shall be notified that LOTO is to be performed.

5.3 **Shut Down:**

If MOS 86 & 87 are to be Locked off:

The Lead Authorized Person shall check that the Main Injector ramps are halted and the power supply Vacuum Circuit Breakers have been opened.

CONTROLLED DOCUMENT

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

The Lead Authorized Person shall remove the 13.8 KVac Manually Operated Switch (MOS) 86 & 87 OPEN (GREEN TAG) control keys from the MCR Lock Box.

If MOS 89 is to be Locked off:

All Main Injector power supplies connected to the Beamline Feeder need to be turned off including supplies connected in F-Sector Enclosure and M1 Line loads. The Lead Authorized Person shall remove the 13.8 KVac Manually Operated Switch (MOS) 89 OPEN (GREEN TAG) control key from the MCR Lock Box.

The Lead Authorized Person shall meet the Duty Electrician at the Kautz Road Substation. The Lead Authorized Person will turn off all circuit breakers via the KRSS-MMI (Man Machine Interface) AB PLC located in the southwest most rack in the Kautz Road Substation.

Note: After the circuit breakers have opened, ALL indicator lights on the circuit breaker front panels should be GREEN for the MOS being opened. If any of the circuit breakers are still RED or not lit, stop the procedure. FESS High Voltage personnel should be called in to investigate the problem.

The Lead Authorized Person will give the MOS OPEN (GREEN TAG) key(s) to the Duty Electrician and he/she will open the MOS for each pulsed power Bus (MOS-86, MOS-87, and/or MOS-89). A minimum distance of ten feet must be maintained from the duty electrician while he opens each MOS.

5.4 **Verify:** The Duty Electrician shall verify that the breakers are open before opening the MOS. The Lead Authorized Person is to verify that all three switchblades in the MOS cabinets being opened are in the "Open" position (Must be visually verified, take a flashlight). The Lead Authorized Person shall indicate on the approved lockout form the accomplishment of this step.

Note: If the switch blades do not open, the procedure must be halted and alternative measures taken for lockout after consultation with the ES&H AD Division Safety Officer and a High Voltage supervisor from Facility Engineering Services Section.

5.5 **Lock and Tag Out:**

5.5.1 **KAUTZ ROAD SUBSTATION:** The Duty Electrician shall remove the CLOSE Kirk keys (RED TAG) from the opened MOS, which lock the actuator, and give the keys to the Lead Authorized Person. The CLOSE (RED TAG) Kirk key can only be removed when the MOS are in the "Open" position.

CONTROLLED DOCUMENT

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

5.5.2 The Lead Authorized Person shall return the Kirk key(s) to the MCR. The MOS 86 CLOSE Kirk key shall be placed in the MOS 86 Kirk Key transfer block & turned, releasing the two transfer keys ("MI10 Exposed Bus MOS 86" and "MI20-62 Exposed Bus MOS 86").

MOS 87 CLOSE Kirk key shall be placed in the MOS 87 Kirk Key transfer block & turned, releasing the two transfer keys ("MI10 Exposed Bus MOS 87" and "MI20-62 Exposed Bus MOS 87").

The MOS 89 CLOSE Kirk key shall be placed in the MOS 89 Kirk Key transfer block & turned, releasing the three transfer keys ("MI10 Beamline Feeder MOS 89" and "MI20-62 Beamline Feeder MOS 89", "F-Sector Beamline Feeder MOS 89").

For areas to be accessed, transfer keys will be distributed to the appropriate Group LOTO boxes, MI10, MI20-62 and/or F-Sector in accordance with ADSP-05-1210. The Lead Authorized Person shall attach **BT-5** padlocks (MCR Crew Chief lock) to each 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 lock box and ensure that all personnel have removed their locks and tags.
- 7.2 **Check Work Area:** Check that the Main Injector tunnel and/or F-Sector is secure and all keys are returned.
- 7.3 **Notify:** The MCR Crew Chief or Lead Authorized Person shall notify the duty electrician that they are ready to reenergize.

CONTROLLED DOCUMENT

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

- 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 group lockboxes and return the transfer keys for MOS 86, MOS87 and MOS 89 to the kirk key transfer blocks, and release the Kirk 13.8 KVac (RED TAG) MOS CLOSE key(s). He/she shall designate a Lead Authorized Person to take the Kirk 13.8 KVac (RED TAG) MOS CLOSE key(s) to the Kautz Road Substation. The Lead Authorized Person shall then contact the Duty Electrician and meet at the Kautz Road Substation. A minimum distance of ten feet must be maintained from the duty electrician while he closes each MOS. The Lead Authorized Person is to give the (RED TAG) CLOSE key(s) to the Duty Electrician to close the associated MOS unless the MOS is currently locked out locally. After the MOS are closed, the (GREEN TAG) OPEN key(s) are to be returned to The Lead Authorized Person. The Lead Authorized Person can now turn on all circuit breakers via the KRSS-MMI, the AB PLC located in the southwest most rack in the Kautz Road Substation, for the associated MOS. After the lead person returns to the MCR, he/she shall place the (GREEN TAG) OPEN key(s) in the MCR keytree.

This completes the requirements for returning the equipment to service.

8.0 **PROCEDURE TRAINING REQUIREMENTS**

Initial training shall consist of reading and understanding this procedure and participating with a qualified operator. The time interval for re-qualification shall be every year in accordance with Laboratory policy.

- 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: 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 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: _____



Mike Lindgren
Accelerator Division Head

DATE 11/15/2019

¹ ADAP-01-0001 3.1.2c

² ADAP-01-0001 3.1.2d

³ FESHM 2100 5.7

⁴ 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.