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C-A OPERATIONS PROCEDURES MANUAL

9.1.16 Lockout/Tagout for Radiation Safety (RS LOTO)

Attachments

Text Pages 2 through 8

Hand Processed Changes

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Approved: _____ *Signature on File* _____
Collider-Accelerator Department Chairman Date

E. Lessard

9.1.16 Lockout/Tagout for Radiation Safety (RS LOTO)

1. Purpose

This procedure provides instructions for [liaison physicists](#), [liaison engineers](#), members of the Access Controls Group, Operations Coordinators (OC), and applicable members of the Radiation Safety Committee, to follow in order to lock out and tag out equipment or beam lines for radiation protection.

Note:

Equipment or beam lines are to be locked out during barrier modifications or removals, or whenever the security system alone does not provide the required protection. This lockout may also be required in order to limit beam parameters such as polarity and intensity, or whenever a beam line is not authorized to operate.

2. Responsibilities

- 2.1 Liaison physicists, liaison engineers, members of the Access Controls Group, OC, and members of the Radiation Safety Committee who are familiar with this procedure, are responsible for following this procedure and are the ONLY persons authorized to perform RS LOTO.
- 2.2 The RSC Chairman, or the ESSHQ Division Access Controls Physicist, provide initial indoctrination to personnel listed in Section 2.1, who will be implementing this procedure. The RSC Chairman, or the ESSHQ Division Access Controls Physicist, will authorize new users on the computer-based RS LOTO database.
- 2.3 RS LOTO ONLY those areas that you are familiar with.
- 2.4 Keep your own key to a SAFETY LOCK; DO NOT lend it out.
- 2.5 It is the responsibility of all personnel affected by the RS LOTO to follow all the rules including leaving the RS LOTO alone when required.
- 2.6 The RSC Chairman, or designee, shall periodically review and verify that all obsolete RS LOTO tags are removed and that the RS LOTO log sheets and computer database reflect current conditions.
- 2.7 The personnel applying RS LOTO should use the computer logging system. The paper log should only be used in the event the computer system is inoperable or unavailable. If it is necessary to use the paper sheets, they should log the information into the computer system at the earliest possible time and discard the paper sheets from the logbook.
- 2.8 The user password replaces the signature in the computer logging system. The users are responsible to maintain the security of their passwords.

3. Prerequisites

- 3.1 All personnel working on any electrical system or equipment in the C-AD shall be familiar with BNL [SBMS Electrical Safety](#), BNL [SBMS Lockout/Tagout \(LO/TO\)](#), [C-A-OPM 1.5, “Electrical Safety Implementation Plan”](#), [C-A-OPM 1.5.3 “Procedure to Open or Close Breakers and Switches and Connecting/Disconnecting Plugs”](#), [C-A-OPM 2.36, “Lockout/Tagout for Control of Hazardous Energy”](#). C-AD will provide on-site/work specific training to individuals in the electrical safety aspects of their job functions and assignments.
- 3.2 Electrical and electronic systems, which are routinely locked out by non-system experts for radiation safety, shall have a clearly labeled and lockable toggle switch, which provides a non-ambiguous radiation safety lockout function.
- 3.3 The toggle switch shall be appropriately sized with a colored, preferably red, lockable safety cover.
- 3.4 The toggle switch shall accommodate the standard C-A safety lock. Locks are issued by the ESSHQ Division Safety Engineering Office.
- 3.5 The system is safe when the cover is locked down or closed.
- 3.6 The switch shall be labeled “RS LOTO”, preferably in magenta letters with yellow background.
- 3.7 In cases where RS LOTO leaves dangerous voltages or other sources of energy connected to the system, an additional label shall clearly state “RS LOTO does not provide electrical safety LOTO for this system”.

4. Precautions

- 4.1 All personnel shall ensure their own safety by following the standards, safety rules, and the training they receive. In general, all energy sources must be locked out and tagged. Working on or near energized sources, “Working Hot”, is not permitted unless a valid working hot permit has been issued. Personnel shall utilize tools, instruments, equipment (e.g., proper connectors and proper ac line cords), etc., that are safe and proper for the job. If any part of a job appears unsafe to any individual, it is their duty to discontinue work and inform the supervisor, manager, ESH Coordinator, or the C-A ESSHQ Division Head, of the unsafe condition.
- 4.2 Before starting RS LOTO, decide which beam line(s) must be made safely off, or which polarity, or intensity is required. Consult with the Radiation Safety Committee Chair if you are not sure. This will help ensure that appropriate and sufficient RS LOTO(s) are applied.

5. Procedure

5.1. APPLYING THE RADIATION SAFETY LOCKOUT/TAGOUT (RS LOTO)

5.1.1 Obtain a Radiation Safety RED TAG, [C-A-OPM-ATT 9.1.16.a](#), from the Main Control Room (MCR).

5.1.2 Complete all RED TAG information.

5.1.3 IF equipment is capable of being physically "locked out," THEN:

5.1.3.1 Apply a LOCK OUT device in addition to a RS RED TAG.

5.1.3.2 Use only a clearly designated SAFETY LOCK or the appropriate accountable key (e.g., a Kirk Key).

Warning:

Be sure you understand which Kirk Key is to be removed and which remains captive. Consult a CAS or other knowledgeable worker.

5.1.4 Place the RS RED TAG, STUB, and the LOCK in locations indicated in [C-A-OPM-ATT 9.1.16.c](#).

Note:

When a stub is not attached to either a padlock or key, it shall be destroyed. Effort should be made to use both the tag and stub.

5.1.4.1 Place the KEY and STUB in an appropriate location (E.G., the RS LOTO Lock Box in the MCR, or desk of lock owner) for any situation not described in detail in [C-A-OPM-ATT 9.1.16.c](#).

Note:

If the key and stub are stored in another location other than the RS LOTO Lock Box in the MCR, indicate the storage location in the special tagging and lock instructions.

5.1.5 Affix the RS RED TAG with non-reusable nylon cable tie. Use ties with an unlocking strength of no less than 50 pounds.

5.1.6 Complete the RS LOTO Log Sheet using the computer logging program. In the event the computer system is inoperable or unavailable use the paper sheets. The instructions below are based on the paper logging sheets. Complete RS LOTO Log Sheet Items 1, 2, 3, 3a and 5. The RS LOTO Log Sheet is found in the MCR (see [C-A-OPM-ATT 9.1.16.b](#)).

5.1.6.1 If there are special locking and tagging instructions, then complete Item 4.

5.1.6.2 If there are special removal instructions then complete Item 7.

5.1.6.3 If the MCR is manned, then complete Item 6 and,

5.1.6.3.1 Inform the Operations Coordinator that you are planning to apply a RS LOTO, explain the plan you are to use to insure radiation safety, and obtain the Operations Coordinator's signature on the RS LOTO Log Sheet.

5.1.7 Place the completed RS LOTO Log Sheet in the appropriate RS LOTO binder in the MCR.

5.2 VERIFYING THE RS LOTO

Warning:

Component settings to be used for RS LOTO may not be clearly labeled; for example, positive and negative positions for a polarity switch may not be marked. Incorrect positioning may result in unnecessary radiation exposure.

Note 1:

The status of the beam line can be affected by several LOCK OUTS, and not just the one you have applied. The status indicators on the Security System may not be able to distinguish your specific LOCK OUT.

Note 2:

The settings of polarity switches, collimators and similar devices are not necessarily sensed by the Security System.

5.2.1 For beam lines, verify that the RS LOTO has occurred by observing the status information on the Security System computer screen in the MCR, when appropriate.

5.2.2 For component position settings that are not clearly labeled, have another knowledgeable person verify the position of the setting.

5.2.2.1 If another knowledgeable person is used to verify the position settings, have that person sign the RS LOTO Log Sheet (use Item 5 on the RS LOTO Log Sheet).

Note:

The knowledgeable person must be knowledgeable about the device being locked out, not necessarily knowledgeable about radiation safety.

5.3 REMOVING THE RS LOTO

Warning:

To prevent accidental radiation exposure, the RS LOTO shall ONLY be removed by the individual who attached it unless the 'Three-Man Rule' is invoked. Whenever the individual who attached the RS LOTO is not available GO TO step 5.4 of this procedure.

5.3.1 Inform the OC that you are going to remove the RS LOTO from the area specified on the RS LOTO database or sheet sheet.

5.3.2 Ensure that the condition for which the TAG was placed is cleared.

5.3.2.1 Check Item 7 on the appropriate RS LOTO Log Sheet for any special instructions prior to removal.

5.3.3 Remove the LOCK and TAG.

5.3.3.1 Return the equipment to operating condition.

5.3.4 Return the tag to the MCR LOTO Book, along with the STUB.

5.3.4.1 Staple the STUB to the TAG.

5.3.5 Sign the appropriate RS LOTO Sheet and record the RS LOTO Removed Date in Item 8, if not in the computer database.

5.3.6 Remove the LOTO sheet, stub, and red tag together from the MCR LOTO Book and discard.

5.3.7 Inform the OC that the RS LOTO removal is complete.

5.4 REMOVING THE RS LOTO BY SOMEONE OTHER THAN WHO APPLIED IT (THREE-MAN RULE)

Note:

A committee of three employees must be formed, one of whom must be a member of the Radiation Safety Committee who is familiar with this procedure, and two of whom must be responsible persons as listed in section 2.1. They shall be familiar with the area under the RS LOTO and they shall determine if it is safe to remove the RS RED TAG and LOCK.

- 5.4.1 Verify that the person who applied the RS RED TAG and LOCK is not at the C-A complex.
- 5.4.2 Have the MCR page the originator of the tag.
- 5.4.3 Fill out RS LOTO Form "Removal of C-A RS LOTO by Others" (see [C-A-OPM-ATT 9.1.16.d](#)). If the RS-LOTO is entered in the computer database, use the appropriate system options.

Note:

Instructions below are based on the paper form.

- 5.4.3.1 Call the originator of the tag at home.
 - 5.4.3.1.1 IF the originator of the tag is reached by telephone AND that person can verify that the removal of the RS RED TAG and LOCK is OK THEN
 - 5.4.3.1.2 Complete items 1 through 4, and item 8. Note that only one person is required to perform this removal in this case.
- 5.4.3.2 IF the originator of the tag cannot be contacted, then complete items # 1 through 7 and item # 9.
- 5.4.4 Obtain the replacement key from ESSHQ Division Safety Engineering Office (call x4422).
- 5.4.5 Remove the RS RED TAG and LOCK using steps in 5.3.
- 5.4.6 Within a reasonable period of time and prior to the person resuming work, notify the person whose RS LOCK and RED TAG were removed before he or she resumes work by placing a written notice at that person's work station.
- 5.4.7 Notify the supervisor of the person whose RS LOCK and RED TAG were removed. Contact the supervisor by phone, e-mail, or by placing a written note at the supervisor's work station.

- 5.4.8 Attach the completed form with TAG and STUB to the appropriate RS LOTO Log Sheet in the MCR if not logged in the computer database, otherwise dispose of the tag and stub.
- 5.4.9 Return the LOCK to the ESSHQ Division Safety Engineering Office.
- 5.4.10 Sign item 8 on the RS LOTO Log Sheet.
- 5.4.11 Properly dispose of any remaining paperwork for this RS LOTO.

6. Documentation

- 6.1 RS LOTO Log Sheet Binder in the MCR
- 6.2 RS RED TAG in the MCR
- 6.3 Computer logging database

7. References

- 7.1 [C-A-OPM 9.3.1 "Procedure for Reviewing Conventional Safety Aspects of a C-A System"](#).
- 7.2 [C-A-OPM 1.5, "Electrical Safety Implementation Plan"](#).
- 7.3 [C-A-OPM 1.5.3 "Procedure to Open or Close Breakers and Switches and Connecting/Disconnecting Plugs"](#).
- 7.4 [C-A-OPM 2.36, "Lockout/Tagout for Control of Hazardous Energy"](#).
- 7.5 [SBMS Electrical Safety](#).
- 7.6 [SBMS Lockout/Tagout \(LOTO\)](#).

8. Attachments

- 8.1 [C-A-OPM-ATT 9.1.16.a "Recommended RS RED TAG"](#).
- 8.2 [C-A-OPM-ATT 9.1.16.b "RS LOTO Log Sheet"](#).
- 8.3 [C-A-OPM-ATT 9.1.16.c "Typical Lock and Tag Locations for Radiation Safety at C-A"](#).
- 8.4 [C-A-OPM-ATT 9.1.16.d "Form for the Removal of C-A RS LOTO by Others."](#)