MC-1 Building

Hazard Awareness Training Handout

Version 1.0
Date 6/18/2014

Overview

The installation phase of the Muon g-2 experiment presents many hazards. This document is intended to inform you of the potential hazards you may encounter in the MC-1 facility and the proper precautions to take to prevent unsafe situations. Please read the entire document, then sign and submit the signature sheet at the end. This hazard awareness training is mandatory for all personnel who enter MC-1 or work at MC-1 routinely. It is valid for one year.

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1. Introduction

This training document outlines the hazards specific to the MC-1 building.

If entering the g-2 hall, you MUST check the whiteboard (located on the mezzanine) for the daily hazards. If you may be creating any hazards with your work, inform the MC-1 Coordinator (or designee) so that this information can be included on the whiteboard.

If you find a situation in which you need advice, training, review or a decision in regards to safety or safe operations, you should first go to your immediate supervisor. If you and your supervisor conclude that the matter goes beyond your own group, that you need assistance in resolving it, or that you need to arrange for safety training, you should contact PPD ES&H. In the event of an emergency, you should call ext. 3131 from any Fermilab telephone.

Environmental Safety, Health & Quality (ESH&Q) materials referenced in this document can be consulted for guidance on ESH&Q issues. These materials can be found on-line at this URL: http://esh.fnal.gov/xms/

1.1. Programs for Controlling Hazards

The ES&H programs for controlling the hazards that may be found within the facility generally have three parts: (1) reviews to minimize hazards of new systems; (2) personnel training; and (3) documented operating and safety procedures or guidelines to follow. In addition, work activities performed by Fermilab employees shall be reviewed via a Job Hazard Analysis (JHA) before work is started (see Chapter 2060 of the Fermilab Environmental, Safety, and Health Manual (FESHM)). Reviews to minimize hazards in the design, construction, and operation of new systems are conducted by specific review committees or Environmental, Safety, and Health (ES&H) personnel. If you are involved in an operation that you feel should be reviewed, contact your supervisor or the facility coordinator/spokesperson. Training courses are conducted by supervisors, the Particle Physics Department (PPD) ES&H Group, or the Fermilab ESH&Q Section, depending on the specific need. Written procedures and job hazard analyses are usually developed by those doing the work and their supervisors, in consultation with ES&H personnel when necessary.

2. Electrical Hazards

Many components utilize potentially dangerous high voltages and/or currents. In addition, certain electrical devices/components may retain significant electric charge after their high-voltage sources are removed. These sources of energy can cause electric shock to personnel if work on these devices is carried out improperly. All personnel are required to have Electrical Safety Orientation [FN000387] Training, which is a brief orientation to the Fermilab Lockout/Tagout (LOTO) program and NFPA-70E for unqualified workers. People performing service or maintenance work on or near equipment that could cause them injury if it were to become energized must lockout and tagout that equipment's energy source(s) and must have current Fermilab LOTO Level 2 [FN000212] Training.

Only LOTO Level 2 trained personnel are authorized to work on equipment that could become hazardous to them if that equipment were unexpectedly energized. LOTO requires the use of a designated red lock and a DANGER tag to isolate the hazardous stored energy source (e.g., electricity, gravity, springs). All LOTO activities must be recorded in the LOTO logbook. Additional information about LOTO can be found in Chapter 5120 of the FESHM.

NOTE: The term "configuration control" applies to the lockout and tagging of equipment that could not jeopardize worker safety. The application of "configuration control" locks does not require LOTO Level 2 Training or procedures and should be implemented with a (non-red) padlock and a CAUTION tag.

A common hazard is 'daisy-chaining' of extension cords and power strips. Extension cords and power strips are designed to be used individually and not connected to others in series. Such improper installations can become a fire hazard by creating an over-current condition. Figure 1 shows examples of acceptable and unacceptable usages of extension cords and power strips. These are examples of configurations found onsite at Fermilab, however acceptable and unacceptable configurations are not limited to the examples. Contact the building manager if you have any questions.

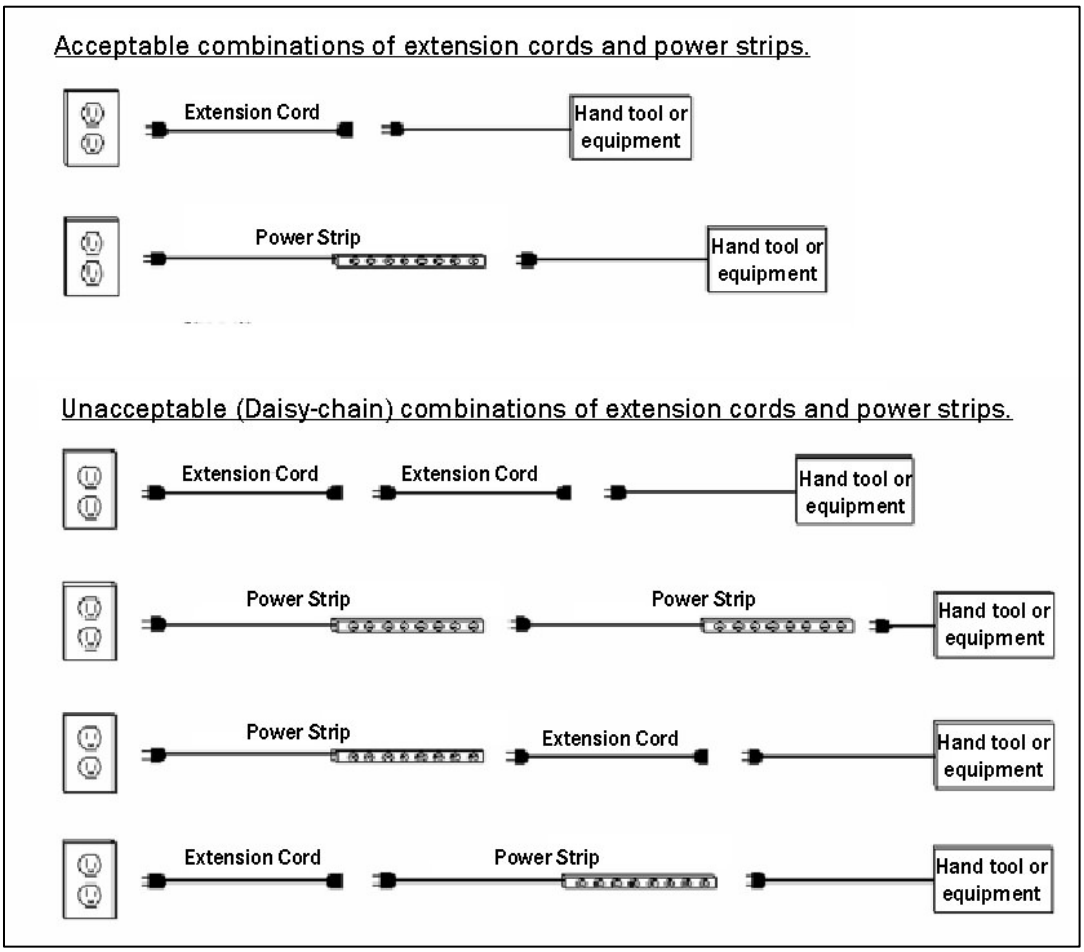

Figure 1. Examples of Acceptable and Unacceptable Combinations.

3. Chemical Hazards

Small amounts of chemical materials, such as epoxies and solvents, are used or stored in certain areas. If handled incorrectly, some of these materials may become harmful. As a general practice, the use of combustibles should be limited. All hazardous (e.g., flammable, corrosive, reactive, or toxic) materials that are not in use must be stored in specially designated cabinets. Flammable liquids, such as acetone, must be stored in a Flammable Liquids Cabinet. Figure 2 shows an example of a Flammable Cabinet. Rags or Kim Wipes used in the application or cleanup of such solvents must be collected in flammable

rag containers and must be emptied every night. Safety Data Sheets (SDS's) containing information on all of these and other materials within the facility can be found online at http://www-esh.fnal.gov/pls/ip/msds_search.html. Additional information regarding chemical hazard communication is outlined in Chapter 5051 of the FESHM.

Figure 2. Example of a Flammable Cabinet.

4. Environmental Hazards

An accidental release of some materials (e.g., oil, gasoline, diesel fuel) from certain equipment could become harmful if it is not promptly contained. Such a release can be considered harmful if it can potentially cause adverse effects to people or the environment. If you know or suspect that such a release has occurred or will occur, call ext. 3131 to report a spill emergency. Designated personnel are trained to execute procedures designed to minimize the spread of accidentally released materials. In addition, the following materials are prohibited from disposal in trash cans and dumpsters:

- all hazardous (e.g., flammable, corrosive, reactive, toxic) materials
- degreasing agents (e.g., Freon)
- uncured epoxy
- ethylene glycol ("anti-freeze")
- fluorescent light bulbs
- oils
- paints
- pesticides
- radioactive material, radiation signs and labels
- scrap metal
- NiCad, lead/acid, and lithium batteries
- any free liquids (regardless of chemical nature)

Contact PPD ES&H personnel or the facility manager for information regarding the proper disposal of such items. Whenever possible, please recycle rather than throw away materials that are no longer of use.

Specific Environmental Hazards at the MC-1 Facility:

Contact PPD ES&H for assistance with waste determination and disposal requirements.

5. Hazards Associated with Operating Machinery

5.1. Cranes and Forklifts

Improper use of certain equipment, such as cranes and forklifts, can endanger people working in the area as well as material being moved. People operating cranes and forklifts must complete operator training and renew this training every three years. Operators must warn others of approaching loads. All personnel are prohibited from the area near or under any suspended load. Procedures for crane use can be found in the FESHM.

Specific Hazards Associated with Cranes and Forklifts at the MC-1 Facility:

When the overhead crane is in use to load/unload materials from the loading dock, no one shall be under the loading dock. Crane operators are responsible for clearing personnel from the area of the lift.

Hard hats are required whenever the crane is in operation.

5.2. Machine Shop Equipment and Power Tools

Machines in this area present hazards due to moving parts. Power tool operations present similar hazards. Work with some machines requires the use of Personal Protective Equipment (PPE). Any loose clothing or jewelry that might become entangled must be removed prior to operating these machines. Hair that might become entangled should be covered or tied back. All hammering, drilling, cutting, grinding, and power tool operations require the use of protective eyewear (e.g. safety glasses or goggles) with side shields that fit snugly to the face. In addition to glasses or goggles, grinding operations also require the use of a full-face shield. Some operations may require other forms of PPE (e.g., hearing protection, gloves). Manufacturer's recommended operating instructions are a good source of information on how to operate equipment safely.

5.3. Aerial and Scissor Lifts

Aerial lifts are devices used to elevate personnel to sites above ground, which use articulating or extensible boom platforms. Scissor lifts are mobile supported scaffolds, which can be powered or unpowered.

Improper use or poor maintenance of either aerial or scissor lifts can pose a serious safety hazard. PPD employees and users who will utilize aerial/scissor lifts will receive training on the proper operating procedures, and hazards associated with the equipment and operating the equipment.

Specific Hazards Associated with Aerial and Scissor Lifts at the MC-1 Facility:

Hard hats are required whenever working in an area where lifts are in use. Fall protection is required when working from aerial lifts.

6. Hazards Associated with Working at Heights

There are unusual places throughout the facility from which people or things have the potential to fall. These include ladders, scaffolds, personnel (aerial and scissor) lifts, etc.. The physical condition of ladders and scaffolds should always be inspected prior to their use and must be used in accordance with all posted instructions and/or safety precautions. Personnel lifts are available in some areas for workers

trained in their use. Work from elevated platforms that have no railings requires Fall Protection Orientation [FN000304] Training, the use of a body harness and lanyard, and a written rescue plan in the hazard analysis (found below, if applicable). Hard hats must be worn whenever someone is working above you or during rigging activities.

It is common for work to be conducted at elevations above floor level. When working with ladders, a number of rules apply:

- Always use the appropriate ladder for the job. Avoid reaching or leaning from a ladder to complete a task.
- When ladders are not in use, they must be stored in a secure location that will not cause an obstruction to walkways or workspaces.
- The physical condition of ladders and scaffolds should always be inspected prior to use and must be used in accordance with any posted instructions and/or safety precautions.
- Ladders are required to access cable trays.

7. Hazards Associated with Compressed Gas and Pressure Vessels

Many facilities contain systems and operations that utilize compressed gases and pressure vessels that may become hazardous if ruptured or handled improperly. All gas cylinders must be properly regulated while used and capped while stored. They also must remain protected from falling down at all times, for example by securing them to a storage rack or other solid object. Only trained personnel should handle compressed gasses. You can find the Fermilab Compressed Gas Training [FN000213] here: http://www-esh.fnal.gov/pls/default/class_sched.html. Additional requirements and procedures regarding compressed gas systems and pressure vessels can be found in Chapter 5031 of the FESHM.

8. Emergencies

Call ext. 3131 in the event of an emergency situation, such as personnel requiring medical treatment for any reason. Stay on the phone until the emergency operator indicates that s/he has all of the necessary information, including your name, location and nature of the emergency. Do not attempt to bandage another person or clean any bodily fluids from another person's injury.

When evacuating any area, proceed to the designated assembly point and wait there until the 'all clear' signal is given. If you must leave and can't wait for the 'all clear', tell your supervisor or an Emergency Warden. Rescue attempts will be made by the Fire Department if someone is unaccounted-for and believed to be in an unsafe area (e.g., burning structure, oxygen deficient area). If you notice that a fellow worker is missing during an emergency, immediately report this to an Emergency Warden, the Incident Commander (Fire Dept.) or the Fire Chief.

8.1. Steady Alarm

This is a fire alarm and it means that smoke or fire has been detected in the area.

Specific Procedures for a Steady Alarm at the MC-1 Facility:

Exit via the closest exit door; gather at the emergency assembly area, located across the street in the Booster Tower parking lot (see Figure 3).

Figure 3. Aerial view of MC-1 Building with Emergency Assembly Area location indicated.

8.2. Whooper Alarm

This is a hazardous atmosphere (i.e., ODH) or interlock alarm.

Specific Procedures for a Whooper Alarm at the MC-1 Facility:

Exit via the closest exit door; gather at the emergency assembly area, located across the street in the Booster Tower parking lot (see Figure 3).

8.3. Sitewide Emergency Warning System (SEWS)

This is a verbal communication system broadcast throughout all areas of the laboratory. It is used to notify personnel when hazardous conditions exist and what protective actions to take. It is very important that you respond to its warning tones and messages and that you follow the transmitted instructions. If the nature of the message indicates severe weather, promptly go to the designated shelter for your area.

Specific Procedures for a SEWS Message at the MC-1 Facility:

The designated shelter area for the main building is the Power Supply Room. If in the experimental hall, shelter under the loading dock. Remain in the shelter until given directions via the safety alert monitor that it safe to exit.

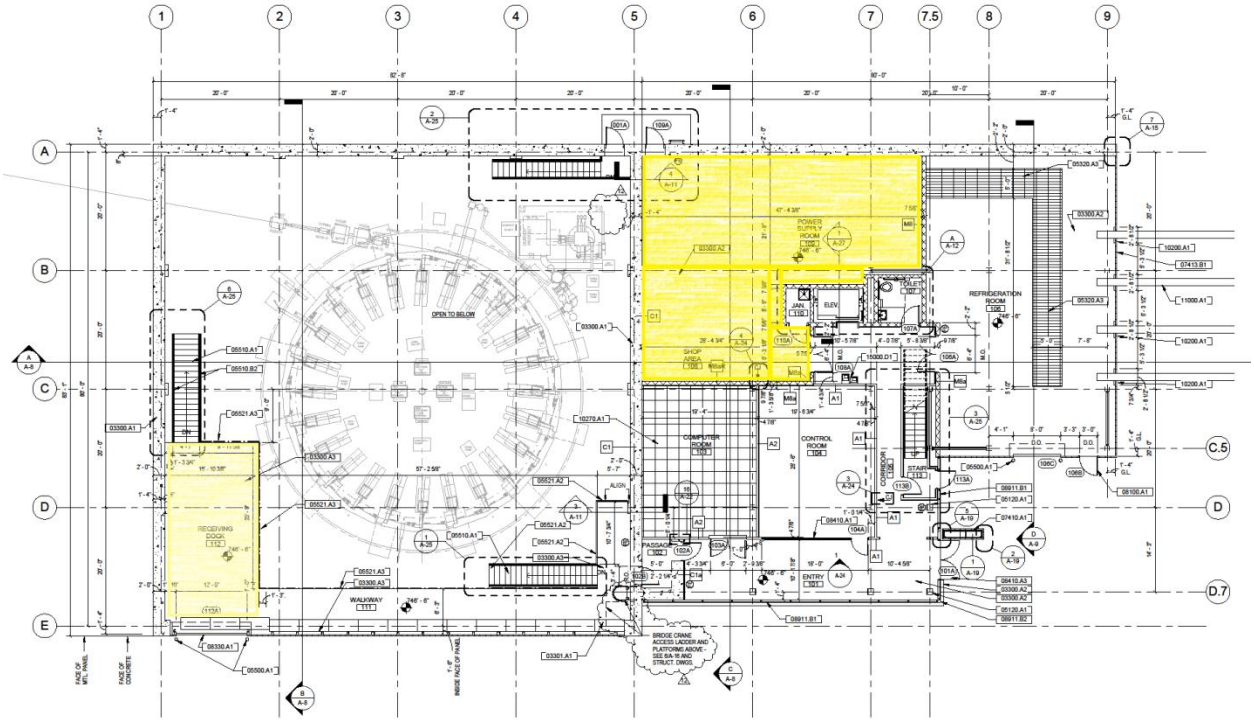

Figure 4. Aerial view of first floor of MC-1 Building with Shelter Areas highlighted.

8.4. Fire Suppression System

Specific Fire Suppression System at the MC-1 Facility:

MC-1 utilizes an automatic sprinkler system. Manual pull stations are located at building exits (use in the event that the alarm system has not activated but signs of fire are present). Smoke detectors are also located throughout the building.

9. Magnetic Field Hazards

Specific Magnetic Field Hazards at the MC-1 Facility:

None exist during the installation period.

10. Hazards Associated with Sustained High Noise Levels

Extended exposure to certain areas where high noise levels are common can cause hearing damage to people without proper hearing protection. These areas are posted accordingly and have the appropriate hearing protection available. Additional information on hearing conservation can be found in Chapter 5061 of the FESHM.

Specific Hazards Associated with Sustained High Noise Levels at the MC-1 Facility:

Some tools and equipment used during the installation period may generate high noise levels. Signs that the noise level is hazardous include if you are unable to hear a person talking (without shouting) standing 3 feet from you. If you believe the noise levels are excessive, contact PPD's Industrial

Hygienist, who can review the work and noise levels to determine if engineering controls or personal protective equipment is required.

11. Cryogenic Hazards

There may be areas within the facility where cryogens such as liquid nitrogen or argon may be routinely present. A leak of these materials can cause local zones of oxygen deficiency. In addition, there may be areas where acute physical hazards associated with handling cryogenic materials, such as burns to the eyes and skin, are present. When cryogenic materials are handled, appropriate PPE, such as gloves and protective eyewear with side shields, must be worn. Additional information regarding the controls and procedures required of cryogenic and ODH areas are contained in Chapters 5032 and 5064 of the FESHM.

Specific Cryogenic Hazards at the MC-1 Facility:

Anyone who may handle large (160 liter) dewars must complete Large Portable Liquefied Gas Dewar Handling [FN000475].

12. Confined Spaces and Limited Access Areas

Confined spaces are locations in which hazards, such as poor illumination, difficult emergency escape and ODH, can be intensified. A written permit and Fermilab Confined Spaces [FN000003] Training is required for access to any confined space. Additional policies and procedures regarding access to confined spaces can be found in Chapter 5063 of the FESHM.

Specific Confined Spaces and Limited Access Areas at the MC-1 Facility:

The sump pit in the hall is confined space. Do not enter unless you have a completed entry permit. Contact PPD ES&H for entry permit approval.

13. Miscellaneous

The following describes some additional general hazards and work rules which exist within the facilities:

- Smoking at facilities is permitted only outdoors and at least 15 ft. from the nearest indoor entrance.
- All new visitors working at Fermilab must register with the Users' Office (WH1E, ext. 3111) upon their arrival.
- It is always preferred that people not work alone. When this is impractical, workers should at least insure that another person, such as their supervisor, is aware of when and where they are working, and they should make arrangements to periodically check-in with that person. This is especially important for work during off-hours. Also note that for some types of jobs, explicit "two-man rule" requirements may exist.
- **Nothing** must be attached to or suspended from overhead sprinkler pipes.
- Since janitorial personnel do not service some areas within the facilities, you must clean up after yourself.

- Proper personal protective equipment (PPE) must be worn for various situations. Consult the written hazard analysis, your supervisor, the MC-1 coordinator (or designee), or PPD ES&H if unsure what PPE is necessary.
- Keep the roll-up door closed as much as possible to prevent stressing the Heating, Ventilation and Air Conditioning (HVAC) system.
- Note that there is a video camera in the g-2 hall that records and broadcasts all movement within the hall.

14. Hazard Awareness Quiz

Name: _____ ID#: _____ Date: _____

1) It is acceptable to plug one electrical extension cord into a multiple outlet strip (power strip).
   a) True
   b) False

2) What actions should you take if you hear the tornado sirens?
   a) Curl into fetal position and cry
   b) Take cover in the emergency shelter
   c) Get in your vehicle and drive home
   d) Go to the roof to look for tornadoes

3) What actions should you take if you hear a fire alarm?
   a) Curl into fetal position and cry
   b) Investigate if there is really a fire
   c) Evacuate the building and gather in the Booster Tower parking lot
   d) Get in your vehicle and go home

4) What personal protective equipment (PPE) is required when working in the vicinity of aerial or scissor lifts?
   a) Hard hat
   b) Safety glasses
   c) Flip flops
   d) Gloves
   e) All of the above

5) What should you do in the event any person requires medical treatment?
   a) Panic
   b) Call extension 3131
   c) Call the MC-1 coordinator
   d) Call the Main Control Room
   e) Treat the person with a first aid kit

6) Which of the following actions requires specific training prior to being performed?
   a) Work from elevated platforms (Fall Protection Orientation)
   b) Operation of cranes, forklifts or manlifts (Operator Training)
   c) Handling of compressed gases (Compressed Gas Cylinder Safety)
   d) Work on equipment that could become hazardous if equipment were unexpectedly energized (LOTO 2)
   e) All of the above

7) Where can you store a flammable liquid (e.g. ethanol, acetone) overnight?
   a) Anywhere, as long as it's labeled
   b) It's ok to leave in your work area
   c) In a toolbox
   d) In a special cabinet designated for flammable liquid storage
   e) B & C

8) What should you do if you find an unsafe situation?
   a) Ignore it
   b) Curl into the fetal position and cry
   c) Stop work immediately and inform your supervisor or ES&H personnel
   d) Immediately inform the Fire Department
   e) None of the above

15. Signature Page and Training Record

"I have read the **MC-1 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 the quiz and this form and return both to:

MC-1 Hazard Awareness, MS 355
OR
Fax 630-840-8602

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

Course: MC-1 Hazard Awareness Training (PDMC1001/CB/01)

Quiz score: _____/8 (score < 6 = fail)

TRAIN group assignment: _____

Authorization: _____
(Must be signed by PPD ES&H personnel)