SeaQuest Hazard Awareness Training Handout

Version 1.1

5 March 2012

Overview

This document is intended to inform you of some of the more common hazards that may be encountered at the SeaQuest experiment. Please read the entire document and then complete the quiz at the end. Return the completed quiz and signature sheet as indicated. This basic hazard awareness training is required for all personnel who intend to work at the SeaQuest Experiment. It is valid for two years.

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I. INTRODUCTION

This training document outlines hazards specific to the SeaQuest Experiment. The SeaQuest experiment consists of the SeaQuest spectrometer housed in the NM4 enclosure. The SeaQuest target area is housed in the NM3 enclosure and is not covered in this document. The goal of this training is to advise you of potential hazards and the proper precautions to take to prevent unsafe situations.

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 the SeaQuest Spokespersons or the SeaQuest Fermilab contact. In the event of an emergency, you should **call ext. 3131** from any Fermilab telephone.

ES&H materials referenced in this document can be consulted for guidance on ES&H issues. These materials can be found on-line at this URL:

http://www-esh.fnal.gov/pls/default/esh_home_page.page?this_page=10

II. PROGRAMS FOR CONTROLLING HAZARDS

The ES&H programs for controlling the hazards that may be found within the SeaQuest Experiment 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 Hazard Analysis (HA) before work is started (see *Fermilab ES&H Manual,* Chapter 2060). Reviews to minimize hazards in the design, construction, and operation of new systems are conducted by specific review committees or ES&H personnel. If you are involved in an operation that you feel should be reviewed, contact your supervisor or the SeaQuest Spokespersons. Training courses are conducted by supervisors, the PPD ES&H Group, or the Fermilab ES&H Section, depending on the specific need. Those doing the work and their supervisors, in consultation with ES&H personnel when necessary, usually develop written procedures and job hazard analyses.

A list of common hazards at the SeaQuest Experiment follows, along with the associated personnel training programs and operating procedures to minimize them.

1. General Industrial Hazards

The SeaQuest Experiment is an industrial space. As such, the proper PPE (personal protective equipment) must be implemented for various situations. In addition to specific PPE requirements listed below, close-toed shoes must be worn at all times within the facility.

Working at Heights

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.

Work from elevated platforms that have no railings requires Fall Protection Orientation [FN000304/CR/01] training and the use of a body harness and lanyard.

NOTE: All areas above the height of the shielding blocks are prohibited during beam-on operations.

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. Crane operators in the high bay do this by using a bell. All personnel are prohibited from the area near or under any suspended load. Procedures for crane use can be found in the *Fermilab ES&H Manual.*

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Power Tools

Power tool operations in the area present hazards due to moving parts. All 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.

Motion Tables

One motion table exists within the SeaQuest experiment for changing between targets in the beam line. The motion of this table is covered in the target for use within the beamline. A separate document covers this and can be found at http://projects-docdb.fnal.gov/cgi-bin/ShowDocument?docid=1088.

2. Magnetic Fields

The SeaQuest experiment employs to large dipole magnets, known as FMag (upstream, solid iron) and KMag (downstream open air gap). Both magnets, but KMag in particular, may have large fringe fields. These fields may affect pace makers. In addition, these fields will attract loose metal (such as keys, tools, nuts and bolts, *etc.*) and may cause them to fly toward the magnet with great speed. Users must be aware of the conditions of the magnets, indicated by lights on the magnets themselves, before approaching the magnets. If there is any question, contact the SeaQuest control room to determine the magnets status. (As an aside, these fringe fields also have the ability to erase credit cards.)

3. Electrical Hazards

Many the SeaQuest Experiment 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 the SeaQuest Experiment personnel are required to have Electrical Safety Orientation [FN00387/CR/01] training, which is a brief orientation to the Fermilab 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 training. Additional information about LOTO can be found in section 9 of this document.

A common electrical 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. Below are 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 or the SeaQuest experiment spokespersons if you have any questions.

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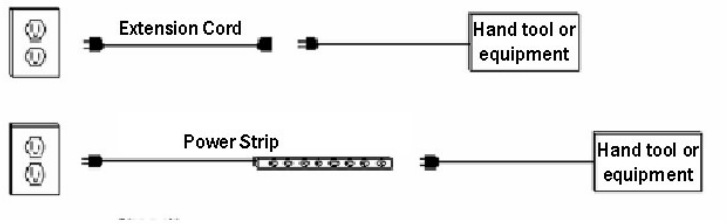
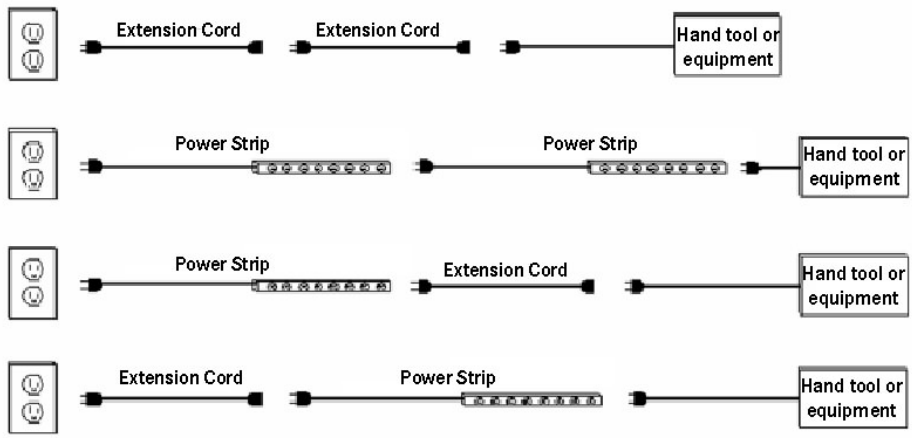
Acceptable combinations of extension cords and power strips.



Unacceptable (Daisy-chain) combinations of extension cords and power strips.



4. Radiation

The SeaQuest Experiment contains areas where radiation hazards associated with accelerator operations are present. Radiation fields can also be found near activated accelerator components and radioactive sources. Radiation dosimeter badges are required when working with radioactive sources and in any posted radiation area. Temporary badges are available from the Communications Center (on the Ground Floor of Wilson Hall, x4251). Quarterly radiation dose reports for people who have permanently assigned badges can be obtained through your local RSO.

People working at the SeaQuest Experiment must have current Radiation Worker I as a minimum. All items removed from the beamline area are assumed to be radioactive and must be checked for radioactivity by the person(s) removing them. In addition, potentially activated or contaminated items must be surveyed by an authorized person prior to them being taken off the Fermilab site. Contact the Particle Physics Division Radiation Safety Officer to request such a survey. Only personnel who have current Radioactive Source Training and Radiological Worker Training can sign out radioactive sources from the designated the SeaQuest Experiment "source monitors". The names of the source monitors are posted on the radioactive source storage box.

If a female radiological worker knows or suspects she is pregnant, she can notify the Fermilab Medical Office in writing and consult with the Occupational Medical Director and a radiation safety staff member to discuss options for minimizing her prenatal radiation exposure. This notification is voluntary and can be arranged with the assistance of PPD Radiation Safety Officer.

Further information regarding Fermilab standards for radiological work can be found in the *Fermilab Radiological Control Manual*.

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5. Chemicals

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. All hazardous (e.g., flammable, corrosive, reactive, or toxic) materials that are not in use must be stored in specially designated cabinets. Material Safety Data Sheets (MSDS's) containing information on all of these and other materials within the SeaQuest Experiment facilities can be found at http://www-esh.fnal.gov/owa_user/msds_search.html. Additional information regarding chemical hazard communication is outlined in Chapter 5051 of the *Fermilab ES&H Manual*.

As a general practice, the use of combustibles within the SeaQuest Experiment should be limited. If there are questions regarding the combustibility of building materials (cables, foam board, plastics, etc), please obtain a sample of the building materials and contact the SeaQuest spokespersons. There is a system in place to test these materials.

6. Compressed Gas/Pressure Vessels

Some the SeaQuest Experiment detector systems and operations 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/CR/00] 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 *Fermilab ES&H Manual.*

7. Controlled Access Areas

Controlled Access is the normal mode of access during brief down-times of accelerator operation when it is expected that the beamline area interlocks will be maintained. Controlled Access is made by following the Fermilab Controlled Access training and procedures, along with the SeaQuest Experiment controlled-access procedure. Additional training is required before you can participate in a controlled access. The Controlled Access training can be scheduled with the ES&H section: http://www-esh.fnal.gov/pls/default/class_sched.list

There may be areas at the SeaQuest Experiment posted "NO ACCESS". No entry to these areas should be attempted without explicit permission from the SeaQuest experiment spokespersons.

8. Emergencies

The following list summarizes the proper responses to the two different audible alarms that warn you of certain hazardous conditions at the SeaQuest Experiment facilities:

- Steady Alarm - This is a fire alarm and it means that smoke or fire has been detected in the area. Leave the area via the nearest exit and go to the designated assembly point, which is in the parking lot north of the hall.

- 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 area, which are the bathrooms of the SeaQuest building. *If the experimental hall is accessible,* the stair wells leading to the lower level may also be used as tornado shelters.

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 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 or Fire Chief.

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.

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9. Environmental

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 SeaQuest Experiment Building Manager for information about the proper disposal of these items.

10. Miscellaneous

The following describes some additional hazards and work rules which exist within the SeaQuest Experiment:

- Only Lockout/Tagout (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). Additional information about LOTO can be found in Chapter 5120 of the *Fermilab ES&H Manual.*

  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.

- Smoking at the SeaQuest Experiment is permitted only outdoors.
- Since janitorial personnel do not service some areas within the SeaQuest Experiment facilities, you must clean up after yourself.
- It is always preferred that people not work alone, especially in the beamline area. When this is impractical, workers should at least insure 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.
- All new visitors working at Fermilab must register with the Users' Office (WH1E, ext. 3111) upon their arrival.

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III. SIGNATURE PAGE AND TRAINING RECORD

This training is not valid unless the following information is completed:

"I have read the document "**the SeaQuest Experiment Hazard Awareness Training Handout**" and understand the hazards present at the SeaQuest Experiment facilities. Also, I agree to follow all of the listed work rules and emergency procedures."

Print your name: _____ Fermilab ID #: _____

Division/Section/Affiliation: _____ Department/Group: _____
(Home institution if a User)

Fermilab Phone #:_____ Mail Station: _____

E-mail address: _____

Your Signature: _____

Today's Date: _____ (This training will expire two years from this date)

Please complete this form and return to:

Angela Sands, MS 355

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TRAIN group assignment: _____

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

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