

COLLIDER-ACCELERATOR DEPARTMENT

Title: OSH Training Plan for Experiments

Author: E. Lessard
Group: ESH&Q

Approvals:

_____ *Signature on File* _____ Date: _____
ESH&Q Division Head

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

(Indicate additional signatures)

Y N

- x FS Representative: _____ Date: _____
- x Radiological Control Coordinator: _____ Date: _____
- x Chief ME: _____ Date: _____
- x Chief EE: _____ Date: _____
- x ESH Coordinator: _____ *Signature on File* _____ Date: _____
- x QA Manager: _____ Date: _____
- x Other: _____ Date: _____

Occupational Health and Safety Training Package for Experiments

This package has been designed to aid in the delivery of required job-specific training for the work activities identified in the [Workplace Hazard and Risk Assessment for Experiments](#).

Your position has been determined to have a potential to significantly impact the safety and health of yourself and others. Thus, C-A Department Management has prepared the questions & answers on the following pages for your specific work/processes.

This safety and health material is incorporated into your current job and procedure training. If you have specific questions about this information after you have read the material, contact the C-A Department ESH&Q Division Head, Ray Karol (<mailto:rck@bnl.gov>).

You may keep this material as a handout and use it as a reference aid.

This specific training course is linked to your job-training assessment (JTA). You must read and acknowledge this material as part of the qualification to perform work in the accelerators. Please print and fill out the [Read and Acknowledgement form](#) on the last page, and return it promptly.

Occupational Health and Safety Training Package for Experiments

Experimental Area Hazards:

- Ionizing Radiation
- Non-ionizing Radiation
- Hazardous or Toxic Materials
- Radioactive Materials
- Electrical Energy
- Explosive Gases and Liquids
- Oxygen Deficiency
- Kinetic Energy
- Potential Energy
- Thermal Energy
- Cryogenic Temperatures
- Protracted/irregular hours

Contacts for Further ESHQ Information:

Associate Chair for ESHQ, E. Lessard

Head of ESHQ Division, R. Karol

Environmental Coordinator, J. Scott

Environmental Compliance Representative, M. VanEssendelft

ESH Coordinator A. Etkin

Radiological Control Division Representative, P. Bergh

Procedures Coordinator, L. DiFilippo

Quality and Assessment Manager, D. Passarello

Self Evaluation Program, A. Piper

Source Custodian, P. Cernigliaro

Tier 1 Coordinator, A. Piper

Training Coordinator, J. Maraviglia

Training Records, A. Luhrs

Course Objective: Because your work activities have been identified as having significant potential to impact yours and other's safety and health, this course has been designed to provide you with the job-specific information that you must know to protect yourself and others from hazards encountered in the accelerators.

1) What hazards are associated with your activities?

Experiments at C-AD change from year to year. Therefore, this training document serves to define a large class of activities for the purposes of defining most if not all experimental hazards at C-AD. Not surprisingly all of the hazards indigenous to accelerators are also represented in the experimental areas: high currents to 5000 A dc, high voltage to 500 kV dc, high radiation within the highly protected primary beam lines, high flammability/explosion hazards associated with liquid hydrogen targets and oxygen deficiency hazards represented by use of cryogenic liquids or detector gases. Standard industrial hazards also are present such as: rigging, bridge cranes, occasional welding, large mechanical hazards associated with moving equipment, mechanical hazards from vacuum equipment, small radiation sources for testing equipment, magnetic fields, toxic

materials used for counting gases, confined spaces, and many types of counting gases that are either flammable or inert, which represents an oxygen deficiency hazard. The following is additional information about specific hazards:

- Although the dominant shield materials are concrete and iron, lead shielding is sparsely found throughout the complex. In any handling operation, routine industrial hygiene procedures must be followed.
- Materials Safety Data Sheets must be used by personnel who work with hazardous chemicals. Typical chemicals include cleaning agents and water treatment chemicals. The use of solvents, lead, beryllium or other toxic materials requires personal protective equipment. All chemicals must be registered with the ESH Coordinator.
- Welding gases and flammable/explosive gases in experimental detectors are widely used and must be stored according to National Fire Protection Association codes. Gases stored in compressed gas cylinders must meet DOT specifications.
- The personnel risks associated with the fire hazard are considered low. The fire protection of some experimental detectors is improved by the installation of fire suppression systems. Emergency power and lighting are available in all parts of the accelerator complex and the maximum travel distance from any point to an exit is less than 300 feet.
- Electrical hazards leading to personnel injury include electrical shock and high current arcing. Electrical shock presents the greatest hazard. High voltages are present in many parts of the experiment. Experimenters or Users may not work on electrical equipment that is energized with 1) greater than 50 V ac rms, 2) greater than 50 V dc, 3) greater than 10 ma of available current or 4) greater than 10 joules of energy. Users must contact the C-A Training Coordinator (x7343) to complete additional electrical safety training requirements before beginning electrical work of this nature. The red hold tag is used for protection of personnel, and the equipment should never be operated when tagged. Only the person who attached the tag may remove it. In the event this person is not available, a special review process can be initiated by C-A Main Control (x4662).
- The RHIC tunnel, which is contiguous to some experimental areas, contains a large volume of cryogenic liquid that can be released to create an oxygen deficiency hazard in the RHIC tunnel.
- High direct current magnetic fields may be present in experimental area magnets, particularly spectrometer magnets. Use extreme caution with iron and steel objects when working around magnets, especially those magnets with large gaps. Be sure you do not inadvertently energize a magnet before the area is clear. Remember that the field may be effective at a surprisingly long distance. Obey warning signs regarding pacemakers, and respect local magnetic safety plans and barriers, if any. It is required that persons with implants or cardiac devices have a physical prior to work in posted magnetic field areas. Large spectrometer magnets require an ESH review before initial turn on and following any modifications to adjacent apparatus or shielding.
- Many areas contain high power rf systems that generate large fields of electromagnetic radiation in the frequency range of a few hundred kilohertz to a few hundred megahertz.
- All lasers in the experimental areas need to be reviewed by the BNL Laser ESH Officer, Chris Weilandics, x2593, before initial use or following modification to a

previously reviewed laser. Make sure that you are aware of the ESH requirements, including medical surveillance requirements, established for the laser(s) in your area.

- Heat sources such as soldering irons and vacuum heating blankets exist in several areas of the accelerator/experimental area complex. Skin contact may cause burns.
- Cryogenic liquids exist in several areas of the accelerator/experimental area complex. Skin contact with cryogenic materials due to spills or splashes may cause freezing or “cryogenic burns.”
- Kinetic energy hazards are associated with motorized materials handling equipment and with the operation of hand and shop tools.
- Potential energy hazards are those associate with compressed gases and vacuum windows, as well as those associated with hoisting and rigging operations. Be sure a vacuum window shutter is in place when working around large vacuum windows. Remember that an air hammer may cause significant equipment damage and personnel injury should you be a few feet from a failed window.

2) What consequences may result if your operations were to impact safety and health?

- Not following the OSH rules could injure myself and others, incur regulatory penalties and cause extended accelerator shutdowns
- Injuries and illnesses can create loss of DOE, regulator and public trust

3) What benefits or positive effects would you notice with improved OSH performance?

- Prevention of injury/illness
- Safer, cleaner workplace
- Clear roles and responsibilities
- Improved relationship with DOE, regulators and the public

4) What role and responsibility do you have for these potential impacts and OSH performance?

My responsibilities are:

- To prevent work-related injuries, ill health and incidents
- To comply with C-AD occupational safety and health requirements
- Where appropriate, to provide input on safety and health to the Worker Occupational Safety and Health Committee, my supervisor and C-A management
- To take action when controls fail
- To contact supervision if you are unsure of how to perform the work or if the procedures are unclear or incorrect
- To ensure that my required training is current

5) What C-AD specific controls, procedures or programs are implemented to reduce the potential for work related injury/illness?

- [C-AD Building/Facility Information and Pictures](#)
- [Conduct of Operations](#)

- [Enhanced Work Permits](#)
- [Facility Specific Training](#)
- [Glove Selection for Chemicals at C-AD](#)
- [Hazard Screening Tool](#)
- [Housekeeping Policy](#)
- [How to Review an Experiment for ESH](#)
- [List of Noise Areas](#)
- [List of Oxygen Deficiency Hazard Areas](#)
- [List of rf and Microwave Sources](#)
- [List of Work Control Coordinators](#)
- [Management Review](#)
- [Material Handling Requirements](#)
- [OSH Management System](#)
- [Supplemental Electrical Safety Standard](#)
- [Tier 1 Schedule](#)
- [Work Controls for C-A Staff](#)
- [Work Permits](#)
- [WOSH Committee](#)

6) How would you respond in an emergency to reduce the potential for injury/illness and what actions could be taken to mitigate the event?

- See [C-A OPM 3.0](#), Local Emergency Plan for the C-A Department
- See [C-A OPM Chapter 10](#), Occurrence Reporting
- Dial 2222 or 911 (if calling from a cell phone, dial (631) 344-2222)
- Assemble at [Emergency Assembly Points](#)

7) What occupational safety and health techniques have been or could be considered to reduce or eliminate the potential risks associated with working in the experimental areas?

The following preventive and protective measures in the following order of priority:

- Eliminate the hazard/risk (e.g., do not use a broken ladder or do not use tools with frayed power cords)
- Control the hazard/risk at source, through the use of engineering controls (e.g., use interlocks) or administrative measures (e.g., use LOTO)
- Minimize the hazard/risk through the use of safe work systems, which include administrative control measures such as check-off lists and work permits
- If residual hazards/risks cannot be controlled by the above measures, then use appropriate personal protective equipment, including clothing

8) Are there any key OSH-specific competency requirements for this position?

A job training assessment (JTA) is performed for every job category. Specific OSH training is listed in your [training record](#). Specific OSH courses available to address hazards in accelerators are listed in Section 4 of [Workplace Hazard and Risk Assessment for Experiments](#).

9) What is the function of the C-AD Worker Occupational Safety and Health (WOSH) Committee?

The WOSH Committee was formed to ensure full worker participation in work-related OSH issues. This Committee meets at least once per quarter and consists of worker representatives from all of the C-AD Sections and Groups. Each meeting reviews the latest injury data, performance indicators, critiques and occurrences, and worker feedback. The Committee also assists in the review of programs, work practices, hazard identification, risk assessments and procedures as requested by the Associate chair for ESHQ. The WOSH Committee procedure, [C-A-OPM 9.8.1](#), describes the WOSH Committee policy and requirements in detail.

Memo

date: May 13, 2004
to: Course Participant
from: J. Maraviglia
subject: OSH Training for C-AD

Read & Acknowledgement

reference: Procedure: C-A-TRN-OSH-EXP
Revision: 01
Revision Date: 5/13/04

Please complete the information below indicating that you have read the reference document. Please return this completed form to ESH&Q Division, Ann Marie Luhrs, Bldg 911A.

Thank you,
John Maraviglia

Name: _____ Life #: _____
Print

Name: _____ Date: _____
Signature

Please return this completed form to ESH&Q Division, Ann Marie Luhrs, Bldg. 911A.