FESHM 2001: ENVIRONMENT, SAFETY & HEALTH FOR PROJECTS

Revision History

Author	Description of Change	Revision Date
J. Donald Cossairt	1. Incorporate the addition of responsibilities of ESH&Q Project Coordinators 2. Editorial corrections.	June 2015
J. Donald Cossairt	Initial release of Chapter 2001	November 2012

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1.0 INTRODUCTION

All projects at Fermilab are bound by the requirements of the Director's Policy Manual, the Fermilab Engineering Manual, and this Fermilab ES&H Manual (FESHM) inclusive of the Fermilab Radiological Control Manual (FRCM), and the Quality Assurance Manual (QAM). The purpose of this chapter is to provide an overview of major environment, safety, and health requirements that apply to such activities. The tables of contents of the Fermilab manuals mentioned above should be consulted by all project managers.

2.0 DEFINITION

Project A unique effort having defined start and end points undertaken to create a product, facility, or system. Built upon interdependent activities planned to meet a common objective, a project focuses on attaining or completing a deliverable within a predetermined cost, schedule and technical scope baseline. Projects include planning an execution of construction, assembly, renovation, modification, environmental restoration, decontamination and decommissioning, capital equipment, and technology development activities. A project is not constrained to any specific element of the budget structure (e.g., operating expense). (Adapted from DOE O413.3B, *Program and Project Management for the Acquisition of Capital Assets,* 11-29-2010.)

3.0 RESPONSIBLILITIES

All personnel involved with projects are subject to the requirements of FESHM 1010 and all other requirements of the FESHM,FRCM, and QAM.

In addition, Project Managers are directed to the specific requirements of this chapter as listed below where their specific responsibilities are enumerated.

3.1 ESH&Q Project Coordinator Responsibilities.

At the discretion of the Chief Safety Officer, an ESH&Q Project Coordinator (ESHQPC) may be appointed for designated projects. The ESHQPC is responsible for:

1. Assuring that various ESH&Q requirements specified elsewhere are carried out on a time scale consistent with project milestone dates.

2. Monitoring project activities to assure conformance with accepted ESH&Q standards as delineated separately in FRCM, FESHM, and QAM.

3. Promptly reporting to the Project Manager and the Chief Safety Officer significant issues related to ESH&Q that merit mitigation.

4. Attending project-related meetings and discussions and participate in the associated Project Management Group (PMG) meetings.

5. Being available for internal and DOE reviews as appropriate.

4.0 PROCEDURES

4.1 General Procedures

1. Projects of a wide range of sizes and complexity constitute a major focus of activities at Fermilab. Project Managers, upon initial assignment to this role, shall determine the environment, safety, and health impact on their projects. Project Managers are encouraged to avail themselves of services of the appointed ESHQPC to assist in this role.

2. Some projects are subject to the requirements of DOE O413.3B and its hazard analysis (HA) and critical decision processes. Other Fermilab projects below the applicability threshold of this DOE Order are still required to perform a written hazard analysis (HA).

3. For all projects consultation with the staffs of the relevant division/section/center, the division safety officer or the the ESH&Q Section will be of paramount importance. The appointed ESHQPC is expected to assist in such consultations.

4. It is quite common for projects of all scopes and sizes to overlap multiple organizational units. Thus all relevant organizations early in the planning process shall be involved in the implementation of environment, safety, and health requirements.

5. Project Managers are required to comply with a number of other Fermilab policies in addition to the provisions of this chapter including those cited as references below. The integration of the requirements of all Fermilab policies shall include environment, safety, and health requirements at all stages of project design, and execution including utilization and operation as well as decontamination and decommissioning. The appointed ESHQPC is charged with providing assistance to the project on these topics.

4.2 Specific Environment, Safety, and Health Policies

There are several FESHM Chapters that are directly applicable to projects. These are given below in roughly the chronological order that they should be considered. Given the scientific mission of Fermilab, most, but not all, projects are related to the development, constructions, and operation of particle accelerators or high energy physics experiments.

4.2.1. FESHM Chapter 8060, National Environmental Policy Act Review Program

The purpose of this chapter is to ensure that actions proposed by Fermilab receive the appropriate review of potential impacts to the ‘quality of the human environment’, which includes impacts to the natural and built environment as well as human health, pursuant to the National Environmental Policy Act (NEPA). NEPA requires federal agencies to consider the

potential ES&H impacts of proposed actions prior to initiating those actions. Consequently, the terms of NEPA must be met during the planning phase of an action/project (or when substantial action/project changes are being considered). The NEPA evaluation should begin as soon as there is enough information about the proposed action/project to engage in meaningful analysis but before it's too late to modify the proposed design. The FESHM chapter serves to assure that potential ES&H impacts of proposed actions/projects, to be taken by Fermilab, are reviewed in a timely manner and that the appropriate documentation, if necessary, is generated. This is an important initial step required of all projects.

The action/project manager/director/owner or their designee (e.g. project deputy manager, project ES&H coordinator/manager, etc.), in consultation with their associated D/S/C ES&H Departments, are responsible for coordinating NEPA reviews and submitting information in the form of a NEPA Project Information Form to the ESHS. The NEPA Program Manager within the ES&H Section compiles NEPA documentation, based upon information received, that is ultimately submitted to DOE FSO for approval and concurrence on the recommended level of review.

4.2.2. FESHM Chapter 8010, Environmental Protection Program

In addition to the NEPA requirements cited above, there are many topics in the area of environmental protection that clearly merit early consideration in the planning and execution of projects. This chapter describes Fermilab's Environmental Management System and also contains a convenient index to other environmental topics. Input on the environmental protection ramifications of projects is often quite important at an early stage given the need to meet regulatory requirements pertaining to environmental permits. The lead times required to obtain such permits or modifications of existing permits is set by outside regulatory agencies beyond the control of Fermilab or the Department of Energy. Also, commonly there are design features needed to meet these requirements that can best be accomplished at optimum cost early in design.

4.2.3. FESHM Chapter, 2060, Work Planning and Hazard Analysis

The purpose of this chapter is to specify the HA process for all tasks and projects at Fermilab. While this chapter covers tasks ranging from mundane work activities to complex projects, the HA process specified here is applicable to projects and can be used to meet the HA requirements of DOE O413.3B Projects of all types shall develop a written HA within the procedures of this FESHM chapter. For large projects, it is likely useful to develop a preliminary hazard analysis report (PHAR) early in the life of the project that is developed further as the project proceeds into a final HA. For projects involving new or modified particle accelerators or modules thereof, the PHAR or HA constitutes the first stage of environment, safety, and health assessment that eventually becomes the Safety Assessment Document (SAD) (see FESHM 2010, referenced below). PHARs correctly point to applicable FESHM and FRCM chapters as references to accepted Fermilab methodologies for hazard mitigation

as appropriate.[1] For project that are not related to particle accelerators, the HA process is reviewed and approved within the applicable Division/Section/Center(s) unless the Critical Decision (CD) process of DOE O413.3B applies.

4.2.4. FESHM Chapter 2010, Planning and Review of Accelerator Facilities and their Operations

This FESHM chapter describes the formal review procedures established by the Laboratory to assure that accelerator facilities and their operations comply with Fermilab ES&H standards and with DOE O 420.2C, *Safety of Accelerator Facilities*. This review system shall be applied to new accelerator projects or when significant modifications, including decommissioning, occur. The review of Safety Assessment Documents (SADS) is conducted by the FESHCom Safety Assessment Document Review Subcommittee.

4.2.5. FRCM chapter 8, ALARA Management of Accelerator Radiation Shielding

Nearly all accelerator projects involve the production of ionization radiation. This FRCM chapter sets forth the policies for the design of new facilities and major modifications to existing facilities and for the preparation of radiation shielding assessments. The review of shielding assessments is conducted by the FESHCom Shielding Assessment Review Subcommittee. Generally, the shielding assessment constitutes an important part of the accelerator SAD.

4.2.6. FESHM Chapter 6010 Fire Protection Program

This chapter describes the organization and structure of the Laboratory Fire Protection Program, incorporates the requirements of DOE Order 420.1B, and is designed to provide a level of fire protection and fire suppression capability sufficient to minimize losses from fire and related hazards consistent with the best protected class of industrial risks ("Highly Protected Risk"). The technical basis for an acceptable program is a body of policies, requirements, codes, standards, guidelines, and interpretations. With regard to facilities, the "code of record" (the code in effect at the time of design) is in effect for the life of the facility. The current code will apply to the facility in the event of a major renovation or if a significant hazard endangers the building occupants as determined by the Environment, Safety, and Health Section Fire Protection Engineer (FPE).

Additional internal building requirements are to be found in sections:

- 6020.4 Concepts of Egress
- Section 6040.1 Fire Construction Requirements-Fire Retardant Coatings
- Section 6040.2 Interior Finishes
  Section 6040.3 Protection of Openings in Fire Rated Assemblies

[1]FESHM 2010 will soon be being revised to incorporate the requirements DOE O420.2C. Thus, for accelerators, the PHAR mentioned can be written to concurrent fulfill the role of the Preliminary Safety Assessment Document (PSAD) discussed in older versions of FESHM 2010 that were based on predecessors to DOE O420.2C.

4.2.7. Projects and experiements working with flammable gases are subject to FESHM Chapter 6020.3 *Storage and Use of Flammable Gases*

The use of flammable gases in physics experiments presents a unique type of installation, requiring special considerations. In many cases, mixing of gases is involved. Large volumes of gases may be present; thus even small leaks or ruptures of thin windows may cause incursions into the flammable concentration region with a large inventory to support fire. Some flammable gases may be stored in the liquid state, increasing the inventory in terms of mass. Electrical equipment is an integral part of such installations and can thus provide an ignition source if such a system is improperly designed, fabricated, or operated. The purpose of this chapter is to mitigate the hazards associated with storage and use of flammable gases.

This chapter is intended to apply to activities using flammable gases, whether part of approved experiments taking beam or in testing labs and shops located across Fermilab. This chapter excludes gasses used as fuels, gasses used for welding, burning and brazing procedures and transportation of compressed gasses addressed by other chapters. It also excludes liquid hydrogen targets and the area immediately around them, but does not exclude hydrogen storage or piping outside the tent or immediate vicinity of the target if there is no tent.

Compliance of all flammable gas system components with other relevant mandatory Fermilab ES&H Standards is required. If the amount of flammable gas stored at any single location exceeds 10,000 pounds the requirements of OSHA part 1910.119, Process Safety Management of Highly Hazardous Chemicals, shall be followed.

4.2.8. FESHM Chapter 6013 Facility Incident Reporting Utility System (FIRUS)

This chapter describes the Facility Information Reporting Utility System (FIRUS) computer network system that monitors and reports on the status of various fire, security and utility sensors positioned throughout the Laboratory buildings, experiments and systems. Internal diagnostic systems provide for constant monitoring and reporting of the system to key manned and unmanned operating positions. In the event of sensor(s) being activated, disconnected or communications between the sensors, mini, console and front being disrupted, selected, manned consoles are provided audible alerting and written prepared instructions on which the Operator reacts. As the project matures into a more recognized purposed facility, fire, security, utility and other devices as appropriate will need to be connected to the FIRUS network. For experiments this will be a necessary part of the process in order to bring the experiment on-line. Monitoring of the experiment through FIRUS will be necessary especially if there are flammable gases involved or if there is other unique/high hazard conditions present or having the potential to exist.

5.0 REFERENCES

5.1 Fermilab Director's Policies

http://www.fnal.gov/directorate/Directors_Policy/policies.shtml