

## FESHM 6010: FIRE PROTECTION PROGRAM

### Revision History

Author	Description of Change	Revision Date
Jim Niehoff	Added reference to DOE Standard 1066 & ESHQS-SA1 Procedure; Added regular facility fire inspections to Section 3.15 Responsibilities Matrix; Added FESHM Chapter 2005, ORC to Section 4.2. Updated Appendix A to latest codes and standards and Added Appendix B, Overview of Site Specific Fire Protection Program.	May 2018
Jim Niehoff	Added applicability statement for Fermilab Leased Spaces.	December 2017
Jim Priest & Jim Niehoff	Added Wildfire and updated NFPA references in Technical Appendix. Updated template and changes to reflect the laboratory's reorganization, i.e., changed SSO to DSO.	September 2015
Jim Priest & Jim Niehoff	Added SAD & User definitions; Removed term "Elements" from chapter title; Applied the FESHM Template; Incorporated references to other section's documents comprising the lab's Fire Protection Program; Updated Technical Appendix A with recent code editions	March 2013
Bill James	Revised definitions	April 2010
Bill James	Minor revisions	April 2005
Bob Barnes	Initial release Chapter 6010	April 1999

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## 1.0 INTRODUCTION

The objective of US Department of Energy (DOE) is to provide a level of safety protection consistent with “highly protected risk” class of Industrial risks. This objective requires significant facilities and processes to be protected by an overlapping combination of robust fire protection physical features, highly developed emergency response capabilities, and well organized programmatic and procedural infrastructures. Such measures often promote fire protection mitigation to a greater degree than building and fire codes. In addition, there is an expectation for these various fire safety constructs to interlace with other safety programs and systems to create an overarching safety environment within DOE’s Integrated Safety Management System (ISMS).

To that end, the 6000 series of the Fermilab Environment, Safety, and Health Manual (FESHM) chapters describe the organization and structure of the laboratory’s fire protection program. This program is to provide a level of fire protection and fire suppressions capability sufficient to minimize losses from fire and related hazards consistent with the best protected class of industrial risks, that is, Highly Protected Risk (HPR). Other related FESHM chapters include, but are not necessarily limited to, 1010, 1050, 1070, 2001, 2005, and 2010.

This chapter only applies to the Fermilab site. Leased spaces will follow the rules and regulations set forth by the partnering institute and/or state or local codes and standards.

## 2.0 DEFINITIONS

- **International Code Council (ICC)** – recognized publisher of building and fire codes.
- **Building Manager** - Designated employee for each building on site that will serve as the contact point for all activities that will affect that building as a result of daily operations or services requested from both internal and external sources.
- **Fermilab Fire Department (FFD)** – Individuals of an organization trained and tasked with emergency care, preventing, and extinguishing fires, and other emergency responses, such as Oxygen Deficiency Hazard (ODH).
- **Fire Hazard Subcommittee (FHS)** – Subcommittee of the Fermilab ES&H Committee is delegated the Alternate Authority Having Jurisdiction (AHJ) in absence of the primary AHJ Site Fire Protection Engineer approved by Fermi Site Office (FSO). The FHS is responsible for fire safety, life safety aspects of facilities, processes and experiments, and flammable and compressed gas systems.
- **Fire Protection Engineer (FPE)** – Is delegated as the primary Authority Having Jurisdiction (AHJ) and approved by FSO. The FPE shall be highly trained and educated professional responsible for overseeing the overall implementation and development of the Fermilab fire protection program.
- **Fire Systems Maintenance (FSM) Technician** – Individuals trained in the inspection, testing, and minor maintenance of fire protection systems throughout the Laboratory (including Water Based Systems, Fire Alarm Systems, and Special Hazards Systems).
- **FIRUS - Facility Incident Reporting and Utility System** - Lab-wide system that monitors building fire alarm systems and transmits alarms to the Communications Center in Wilson Hall.
- **Highly Protected Risk (HPR)** - A facility that is characterized by a level of fire protection of the best protected class of industrial risks.

- **Irregularity Report** - A form issued by FESS Fire Systems Maintenance (FSM) technicians and Fermilab Fire Department (FFD) personnel to communicate critical deficiencies in fire protection systems to the ESH&Q Fire Protection Engineer (ESH&Q-FPE). The form is presented in chapter 6010.
- **Landlord** - The Division/Section (D/S) responsible for the facility or space where work is planned or occurring.
- **NFPA – National Fire Protection Association** – Organization dedicated to fire safety through creating consensus standards and codes.
- **ORC & TSW** – Operational Readiness Clearance (ORC) and Technical Scope of Work (TSW).
- **Prescribed Fire** – Any fire ignited by management actions under certain, predetermined conditions to meet specific objectives related to hazardous fuels or habitat improvement.
- **Prescribed Fire Plan (Burn Plan)** – A document/procedure providing the information needed to implement an individual prescribed fire project.
- **Safety Assessment Document (SAD) Accelerator Readiness Review Documentation** - A formal review document describing the analysis of Fermilab projects, operations and experiments for hazards and their final method of mitigation.
- **Division Safety Officer (DSO)** - An individual who is assigned duties as the principal ES&H advisor to the division/center/section head.
- **Users/Experimenters** – Individuals responsible for maintenance and operation of an experiment.
- **Wildland Fire** – Any nonstructural fire, other than prescribed fire, that occurs in wildland.

### 3.0 ROLES & RESPONSIBILITIES

#### 3.1 Laboratory Directorate

- Overall responsibility for the fire protection program rests with the Director's Office.
- The Director assures that adequate resources are available to carry out the elements of the fire protection program as delineated in this chapter.

#### 3.2 Division/Section Heads/ Project Manager

- Implementation and continuing operation of the fire protection program within the areas for which they have responsibility. This includes assuring that all assessments, inspections, tests, and maintenance of fire detection and suppression equipment are conducted by support organizations in accordance with the requirements hereafter set forth.
- General facility audits or audits of inspection reports, irregularity reports, or other documentation (e.g., using the Self-Assessment process as defined by Fermilab Quality Assurance Manual Chapter 12080) to ensure compliance with the various elements of the Fire Protection Program.
- For all fire protection system designs, it is the responsibility of the landlord. The D/S is to assure that reviews are performed which assure that a satisfactory level of protection is being provided, that the installation is satisfactory, that acceptance tests are adequate to assure proper operation of the fire protection system, and that the system has been properly tested.

- Division/Section/Project personnel must periodically audit their fire protection systems through the Tripartite Assessment process.
- Ensuring the ORC is followed per FESHM Chapter 2005.

### 3.3 Building Manager

- The Building Managers assigned to specific buildings within each D/S is responsible for periodic inspections of fire protection system components in accordance with Technical Appendix A.
- Any deficiencies noted during the inspections must be corrected by 1) creating a requisition or work order to correct the condition or 2) contacting the FESS FSM technicians, FFD, or ESH&Q-FPE directly for immediate assistance.
- Manage the emergency preparedness, including exiting and evacuation plans, drills, and readiness in accordance with FESHM 2050.

### 3.4 Environment, Safety, Health, and Quality Section (ESH&Q)

- The ESH&Q Section Fire Protection Engineer (ESH&Q-FPE) reviews all fire protection system designs to assure that (1) a satisfactory level of protection is being provided, (2) the applicable fire protection provisions of the IBC International Building Code, the International Fire Code, and National Fire Protection Association Standards (NFPA) are being met, (3) the installation plan is satisfactory, and (4) acceptance tests are adequate to assure proper operation of the fire protection systems. ESH&Q is responsible for documenting these reviews.
- The ESH&Q Section will periodically audit fire protection systems as part of the tripartite assessment process.

### 3.5 ESH&Q- Fire Protection Engineer

- Assists FESS\Engineering Department or Project as requested during the design, installation, testing, and acceptance of fire protection systems.
- Reviews civil construction drawings and participants in the ORC & TSW processes as delineated in FESHM Chapter 2005.
- Conducts periodic assessments of Fermilab facilities to evaluate compliance of each facility with the requirements of the best protected class of industrial risks, or highly protected risks (HPR).
- Monitors system operation, effectiveness, and failures (including the FIRUS system) found during routine testing via the Irregularity Report system and audits.
- Reviews Fermilab Fire Department (FFD) Run Reports.
- Shall be notified by telephone, regardless of day or time, of all significant FFD Runs involving:
  - Loss of water protection (i.e. broken water lines).
  - Loss of electrical power resulting in fire detection and/or FIRUS systems relying on backup power.
  - Any fire related event that results in physical damage to structures or equipment that had the potential for endangering personnel.

- Notification of the ESH&Q-FPE will be made by the Communications Center upon direction of the Senior Fire Department Officer. This notification will not be made ahead of any time-urgent emergency response notifications or efforts.

### **3.6 Fermilab Fire Department**

- Responds to fire emergencies.
- Assists the FESS FSM technicians by performing required testing of the fire protection systems, as specified in Technical Appendix A. They will issue Irregularity Reports as required.
- Generates a Fire Department Run Report, which documents the details of all responses to fire alarms and emergencies.
- Conducts a general fire inspection for all buildings semi-annually and issues a report of findings to the Division/Section DSO.
- Conducts a general inspection of all fire pump rooms monthly.
- Performs fire inspections, see FESHM Chapter 6015 for further details.
- Inspects all Village housing units semi-annually (includes alarm systems, CO detectors, GFCI tests, and fire extinguishers) and issues a report to the Building Manager.
- Reviews and oversees the Hazard Map Program.
- Maintain the Baseline Needs Assessment in conjunction with the ESHQ-FPE.
- May participate in reviews and witnessing of fire protection system testing.

### **3.7 Fermilab Security Department**

- Oversees and directs the operation of the Communications Center, including testing of FIRUS (see Technical Appendix A).

### **3.8 Communications Center**

- Monitors FIRUS on a 24-hour basis.
- Dispatches emergency response personnel as directed by received FIRUS messages.
- Notifying Duty personnel (FSM Techs, Mechanics, Electricians, etc.) as directed by received FIRUS messages.
- Maintains appropriate and accurate call lists for all D/S buildings.
- Informs personnel on specified call lists referenced on received FIRUS messages.
- Provides timely status updates to the ESH&Q-FPE and Fire Department when reported FIRUS problems cannot be resolved in a timely manner.
- Provides timely status updates to the ESH&Q-FPE and Fire Department when unexpected issues arise with the FIRUS system.

### **3.9 Facilities Engineering Service Section (FESS) Engineering Department or Project**

- The Facilities Engineering Services Section engineering staff (FESS-Eng) or project staff provides design and consulting services, and oversees the installation and acceptance testing of fire protection systems for both new construction and modifications to existing facilities.

"Turn-key" services may occur in which case the Laboratory is purchasing these services from a vendor.

### **3.10 FESS Fire Systems Maintenance (FSM) Technicians**

- Responsible for the inspection, testing and maintenance activities for all installed fire protection systems throughout the Laboratory as specified in Technical Appendix A.
- They will issue Irregularity Reports, as required.

### **3.11 FESS Facility Management\Operations & Maintenance**

- FESS Operations personnel provide maintenance and testing for the underground water mains and fire hydrants, as well as other duties specified in Technical Appendix A.

### **3.12 FESS Services\Roads and Grounds**

- Maintains and implements the prescribed fire program as part of the land management program.

### **3.13 Division Safety Officer**

- The DSO, or designee for each division, will review Fire Department Run Reports and investigate the incident as needed.
- Reviews the Building Fire Inspection Report issued by the FFD and aids in correcting any findings, as appropriate.

### **3.14 Users/Experimenters (Everyone)**

- Monitors areas for fire safety. Call Facilities Engineering Services Section (FSM ext. 2924) regarding problems with fire protection systems.
- Provides information about unresolved fire safety problems to the ESH&Q-FPE.

### 3.15 Responsibilities Matrix

	DIR	D/S/P	BM	DSO	AD	FESS **	ESH&Q -FPE	FFD
<b>Overall Responsibility</b>	X	X						
<b>FPS Audit</b>		X					X	
<b>FPS Design/Review</b>		X				X	*	*
<b>FPS Installation</b>		X				X	*	*
<b>FPS Testing</b>		X				X	*	*
<b>FPS Acceptance</b>		X				X	*	*
<b>FPS Code &amp; Compliance Review</b>						X	X	*
<b>FPS Maintenance/Test/Inspection</b>		X	X			X		X
<b>FIRUS Maintenance</b>					X			
<b>Comm Center</b>								X
<b>Fire Incident Response</b>								X
<b>FFD Run Reports</b>				X			X	X
<b>Irregularity Reports</b>						X	X	X
<b>Fire Safety Inspections</b>								X
<b>HPR Assessments</b>							X	*
<b>Prescribe Fire Program</b>						X	*	X

\* *may participate*

\*\**may also be Project's Responsibility*

*FPS denotes Fire Protection System*

## 4.0 PROGRAM

The fire protection program encompasses all aspects of fire protection at the Laboratory. The program includes fire prevention practices and procedures, quality construction, protecting buildings and facilities with fixed fire detection and suppression systems, procedures for testing and maintenance of fire protection systems and equipment, providing firefighting devices as appropriate, providing adequate water supplies for fire control, a system of oversight that ensures that DOE orders and mandatory standards applicable to fire protection are met, a staffed and equipped fire department, and most importantly, participation by all personnel from the directorate level down to managers, scientists, engineers, technicians, and supporting employees.

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, Health, & Quality Section’s Fire Protection Engineer (ESH&Q-FPE).

### 4.1 Design of Fire Protection Systems

- Fire Protection system designs undergo the review process detailed in FESHM 2010. FESHM 2001 procedures are also used to review project design and drawings of both new construction



and modifications to existing facilities, including fire protection systems. These projects may be completed by subcontractors or may be "turn-key" services from a vendor.

- The ESH&Q-FPE reviews all fire protection system designs to assure that (1) a satisfactory level of protection is being provided, (2) the applicable fire protection provisions of the International Building Code, the International Fire Code, and National Fire Protection Association Standards (NFPA) are being met, (3) the installation plan is satisfactory, and (4) acceptance tests are adequate to assure proper operation of the fire protection systems. The ESH&Q-FPE is responsible for documenting these reviews.

#### **4.2 Users/Experimenters Reviews**

- The ESH&Q-FPE reviews experiments through the ORC/TSW process to assure a satisfactory level of protection is being provided and that the applicable fire protection provisions of the International Building Code, the International Fire Code, and National Fire Protection Association Standards (NFPA) are being met. The ESH&Q-FPE is responsible for documenting these reviews.
- Flammable liquids, gases and other hazardous materials are to be evaluated to ensure the safety of building occupants and documented and reviewed through the SAD and FHS Subcommittee, reference FESHM Chapters 2005, 2010, and 6020.3.

#### **4.3 Highly Protected Risk – Facility Inspections**

- Fermilab maintains facilities that are characterized as a “best protected” class of industrial risk (Highly Protected Risk), equipped with an appropriate level of fire protection.
- Inspection frequency depends on the mission criticality of a facility to Fermilab. The loss of those facilities that would have an adverse impact on the Laboratory would have a higher frequency of inspection. Inspection schedules range from annually to once every 5 years. The ESH&Q-FPE oversees the inspection process and maintains the inspection schedule.

#### **4.4 Inspection and Maintenance of Fire Protection Systems (Irregularity Report System)**

- Technical Appendix A specifies the schedule and responsibilities for the inspection, testing and maintenance activities for all installed fire protection systems throughout the Laboratory. Building Managers that detect serious irregularities must notify the FSM Technicians of those conditions. FSM technicians (and FFD) must submit all irregularities (using the Irregularity Report System) to the ESH&Q-FPE. The FSM technicians or ESH&Q-FPE will communicate with the affected division/section and suggest corrective strategies. The D/S must then document the deficiency in iTrack and make the needed corrections.

#### **4.5 Facility Incident Monitoring and Communication**

- The Facility Incident Reporting and Utility System (FIRUS), a proprietary supervising station system, monitors fire protection, security and utility systems at Fermilab. FIRUS system alarms are monitored in the Fermilab Communications Center (Comm Center), located on the ground floor of Wilson Hall. The Comm Center also receives telephone calls reporting fires. The Comm Center dispatches the FFD and security personnel. The Security Department

oversees and directs the operation of the Comm Center. The FFD generates a Fire Department Run Report, which documents the details of all responses to fire alarms and emergencies. The ESH&Q-FPE and the affected Division Safety Officer reviews the Fire Department Run Reports and investigates as needed.

#### 4.6 Response to Fire Emergencies

The FFD and Security will respond to all fire emergencies. If needed, additional assistance will be provided by nearby municipal fire departments.

### 5.0 REFERENCES

- 10 CFR 851 Worker Safety and Health Program
- 29 CFR 1910.164 and 1910.165 Other Fire Protective Systems
- 29 CFR 1926.24 Fire Protection and Prevention, 1926.34 Means of Egress
- US Department of Energy Standard 1066, Fire Protection, 2016 Edition
- International Building Code (IBC), 2015
- International Fire Code (IFC), 2015
- National Fire Protection Association (NFPA)
- ES&H Emergency Management Procedure Manual
- FESHM 2040 Emergency Management Program
- Fermilab's Facilities Engineering Services Section's Design Guides
- Fermilab's Facilities Engineering Services Section Fire System Maintenance Procedures
- Fermilab's Facilities Engineering Services Section Prescribe Fire (Burn Plan)

Additional Fire Protection Programs and their associated FESHM chapters are:

- 6011 – Periodic Testing of Emergency Lights, Exit Signage, & Site-wide Emergency Alert
- 6012 – Periodic Inspection of Fire Doors
- 6013 – Facility Incident Reporting Utility System (FIRUS)
- 6014 – Fire Watch
- 6015 – Highly Protected Risk Inspection Program
- 6016 – Hazard Map Program (Pre-Incident Planning)
- 6020.1 – Placement of Portable Fire Extinguishers in Primary Beam Enclosures
- 6020.2 – Welding, Burning, and Brazing (Welding, Burning, and Brazing Permit)
- 6020.3 – Storage and Use of Flammable Gases
- 6020.4 – Concepts of Egress
- 6020.5 – Flammable & Combustible Liquids
- 6030 – Disablement of Fire Protection Systems and Other Related Safety Systems
- 6040.1 – Fire Construction Requirements – Fire Retardant for Combustible Materials
- 6040.2 – Fire Construction Requirements – Interior Finish Requirements
- 6040.3 – Protection of Openings in Fire Rated Assemblies
- Highly Protected Risk, A Best Practice – Developed by EFCOG Fire Protection Task Group, October 24, 2017

## 6.0 TECHNICAL APPENDIX A: INSPECTION, TESTING AND MAINTENANCE OF FIRE PROTECTION SYSTEMS

The following matrices address the NFPA code requirements for inspection, testing and maintenance of fire protection systems installed at Fermilab. The requirements of the following standards are included:

AWWA M14 Distribution Valves Selection, installation, field testing and maintenance, 2006 edition

FM 2-81 Factory Mutual Global, Fire Protection System Inspection, 2012 edition

NFPA 12 Standard on Carbon Dioxide Systems, 2015 edition  
NFPA 12A Standard on Halon 1301 Fire Extinguishing Systems, 2015 edition  
NFPA 13 Standard for the Installation of Sprinkler Systems, 2016 edition  
NFPA 14 Standard for the Installation of Standpipe and Hose Systems, 2013 edition  
NFPA 15 Standard for Water Spray Fixed Systems for Fire Protection, 2012 edition  
NFPA 17 Standard for Dry Chemical Extinguishing Systems, 2013 edition  
NFPA 17A Standard for Wet Chemical Extinguishing Systems, 2013 edition  
NFPA 20 Standard for the Installation of Centrifugal Fire Pumps, 2013 edition  
NFPA 24 Standard for the Installation of Private Fire Service Mains & Their Appurtenances, 2013 edition  
NFPA 25 Standard for the Inspection, Testing, & Maintenance of Water-Based Fire Protection Sys., 2017  
NFPA 72 National Fire Alarm & Signaling Code, 2016 edition  
NFPA 80 Standard for Fire Doors and other Opening Protective, 2015 edition  
NFPA 90A Standard for the Installation of Air-Conditioning & Ventilating System, 2015 edition  
NFPA 101 Life Safety Code, 2015 edition  
NFPA 110 Standard for Emergency & Standby Power Systems, 2013 edition  
NFPA 204 Standard for Smoke and Heat Venting, 2015 edition  
NFPA 221 Standard for Fire Walls and Fire Barrier Walls, 2015 edition  
NFPA 750 Standard on Water Mist Fire Protection Systems, 2015 edition  
NFPA 1962 Standard for the Inspection, Care & Use of Fire Hose, Couplings & Nozzles, 2013 edition  
NFPA 2001 Standard on Clean Agent Fire Extinguishing Systems, 2015 edition

FESHM 6011 Periodic Testing of Emergency and Exit Lights

FESHM 6012 Periodic Testing of Fire Doors

FESHM 6013 Facility Incident Utility System (FIRUS)

The specific testing methods or inspection procedures can be obtained from the ESH&Q Fire Protection Engineer, the FESS Fire System Maintenance Group, or the Fermilab Fire Department.

Abbreviations are as follows:

HPR	Highly Protected Risk, reference FESHM 6015
FSM	FESS Facilities Management Department's Fire Systems Maintenance Group
FFD	Fermilab's Fire Department
ESH&Q	ESH&Q Fire Protection Staff
COMM	Communications Center
BM	Building Manager, reference FESHM 2050
DSO	Division Safety Officer, reference FESHM 2010
FESS-OPS	FESS Facilities Management Department's Operations Group

*\*Frequency or method deviates from Code or Standard*

### RECOMMENDED NFPA TESTING FREQUENCIES MATRIX - WATER BASED SYSTEMS

ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
<b>SPRINKLER SYSTEMS NFPA 25</b>				
Sprinkler head	5.21	Inspection	<i>At same frequency as HPR assessment. (Floor-level visual examination of a representative sample)*</i>	ESH&Q
Spare sprinkler head	5.2.1.3	Inspection	<i>At same frequency as HPR assessment*</i>	FSM
Sprinkler Head	5.3.1	Testing	<i>Sample tests: Standard sprinkler 50 years, or quick response 20 years, dry pendent/sidewall 10 years</i>	FSM
Sprinkler System Piping	5.2.2	Inspection	<i>At same frequency as HPR assessment*</i>	ESH&Q
Pipe hangers	5.2.3	Inspection	<i>At same frequency as HPR assessment*</i>	ESH&Q
Gauges, wet pipe system	Table 5.1.1.12	Inspection	FFD Quarterly, FSM Annually	Building Manager; FFD and FSM during testing.
Gauges, dry pipe system	13.2.7.13.2	Inspection	FFD Quarterly, FSM Annually	Building Manager; FFD and FSM during testing.
Hydraulic nameplate on sprinkler systems	5.2.5	Inspection	<i>At same frequency as HPR assessment*</i>	ESH&Q
Antifreeze System Solutions	5.3.3	Test	Annually	FSM
Dry Pipe System Compressors & Air Dryers	5.4.2 5.4.2.4	Maintenance	Annually	FSM
<b>STANDPIPE &amp; HOSE SYSTEMS NFPA 25 and NFPA 1962</b>				
Control Valves, locked or supervised	Table 13.1.1.2	Inspection	FFD Quarterly, FSM Annually BM Monthly	Building Manager, FFD and FSM
Piping	Table 6.1 6.2.1	Inspection	<i>At same frequency as HPR assessment*</i>	ESH&Q
Hose Connections, Non-restricting	13.6.1	Inspection	Quarterly	FFD
Hose Connections, Non-pressure reducing attached to Sprinkler System	13.4.6.2.2.1	Test	Every three years – (This only applies to Class III hose connections, Fermilab has Class I	Not applicable

ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
			hose services installed in NuMI Tunnel & Wilson Hall	
Hose Connections, Non-pressure reducing	13.6	Maintenance	As needed based on FFD inspection	FSM
Hose (Valve) Connections, Pressure restricting	13.6.1	Inspection	Annual Exercise – See NFPA Interpretation normal valve – FMS has documentation	FSM
Hose Connections, Pressure reducing	13.5.2	Test Full Flow	Every five years	Not applicable
Hose Connections, Pressure reducing	13.5.3	Test Partial Flow	Annually	Not applicable
Hose Connections, Pressure reducing	13.5.3.2.1	Maintenance	As needed based on FFD inspection	FSM
Hose	Table 6.1.1.2	Not Applicable	Not Applicable	All Class III hoses from cabinets have been removed
Hose Nozzles	6.2.6	Not Applicable	Not Applicable	All Class III hoses from cabinets have been removed
Hose storage	6.2.7	Not Applicable	Not Applicable	All Class III hoses from cabinets have been removed
Flow Test	6.3.1	Test	5 Years	FESS/Engineering and FSM
Main Drain Test	6.3.1.6	Test	Annually	FSM
<b>PRIVATE FIRE SERVICE MAINS NFPA 25</b>				
Hydrants (dry barrel)	7.2.2.4	Inspection	Monthly	FFD
Hydrants (dry barrel)	7.3.2, 7.4.2 Table 7.5.1	Flush and Maintenance	Annually	FESS/Operations
Mainline Strainers	7.2.2.3	Inspection	<i>Monthly 16-inch strainers at Casey's, configured with automatic backwash*</i>	FESS/Operations
Mainline Strainers	Table 7.5.1	Maintenance	<i>Annually and after significant flow if inspection indicates need*</i>	FESS/Operations
Piping (exposed)	Table 7.1.1.2	Inspection	<i>Daily at pump house*</i>	FESS/Operations
Piping	Table 7.1.1.2	Flow Test	5 years or after significant change	ESHQ-FPE
<b>FIRE PUMPS NFPA 25</b>				

ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
Pump House, heating	8.2.2(1)	Inspection	Weekly	FESS/Operations
Pump House, ventilating louvers	8.2.2(1)	Inspection	Weekly	FESS/Operations
Fire Pump System	8.2.2(2)	Inspection	Electric Monthly, Diesel Weekly (Based on NFPA 25 2011 Edition)	FESS/Operations
Pump Operations, no flow condition	8.3.1	Test	Weekly	FESS/Operations
Pump Operations, flow condition	8.3.3.1	Flow Test	Annually – Except churn test to be conducted every 3 years – Reference Schirmer Engineering’s Letter on file with FMS	FSM/Contractor
Electrical System	8.5	Maintenance	Annually	FESS/Operations
Controller	8.5	Maintenance	Annually	FESS/Operations
Motor	8.5	Maintenance	Annually	FESS/Operations
<b>WATER SPRAY FIXED SYSTEMS NFPA 25</b>				
Drainage, Inspection	10.2.8	Inspection	<i>Annually – The presence or lack of adequate drainage will not affect the ability of the system to extinguish fire; it is a secondary effect only, with possible environmental impact*</i>	FSM
Pipe	10.2.3.1	Inspection	<i>At same frequency that HPR facility assessment is required*</i>	ESH&Q
Fittings	10.2.3.1	Inspection	<i>At same frequency that HPR facility assessment is required*</i>	ESH&Q
Hangers	10.2.3.2	Inspection	<i>At same frequency that HPR facility assessment is required*</i>	ESH&Q
Supports	10.2.3.2	Inspection	<i>At same frequency that HPR facility assessment is required*</i>	ESH&Q
Nozzles	10.2.4	Inspection	Annually (part of annual test)	FSM
Nozzles	10.3.3	Test	Annually	FSM
Strainers	10.2.6	Inspection	Domestic water source – every 3 yrs. following the full flow trip test Raw water source - annually, and after each operation of the system	FSM
Strainers	10.2.6.1	Test	Annually	FSM
Strainers	10.2.6.3 and 10.2.6.4	Maintenance	Domestic water source – every 3 yrs. following the full flow trip test	FSM

ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
			Raw water source - annually, and after each operation of the system	
Manual Release	10.3.5	Test	Annually	FSM
Water Spray System	10.3, Chapter 13	Test	Annually	FSM
Water Spray System	10.2.1,4, Chapter 13	Maintenance	Annually	FSM
<b>VALVES AND FD CONNECTIONS NFPA 25</b>				
Control Valves, locked or supervised	Table 13.1 13.3.2.1.1	Inspection	FFD – Monthly, Post Indicator Valves FFD – Quarterly, Outside Screw & Yoke FSM – Annually, Outside Screw & Yoke	PIVs – FFD OS&Y's – FFD and FSM during testing.
Post Indicator Valves, position	Table 13.1 13.3.3	Test	FFD - Monthly inspection only FESS/Ops - Annually (during annual ICW main flushing)	FFD, FESS/Ops
Post Indicator Valves, position	Table 13.1 13.3.2	Inspection	FFD - Monthly inspection only FESS/Ops - Annually (during annual ICW main flushing)	FFD, FESS/Ops
Valve Box (Buffalo Box)	AWWA M14 & NFPA 25 13.3.3.1	Test	Annually (DWS & ICW)	FESS Opss
Control Valves, operation	Table 13.1	Test	Annually	FSM
Control Valves, supervisory	Table 13.1 13.3.3.5	Test	Annually (These valves are locked in the open position)	FSM
Control Valves	Table 13.1	Maintenance	<i>As needed</i> <i>Based on inspection and test*</i>	FSM FESS/Operations
Alarm Valves			See Check Valves	All alarm valves on site have been converted to simple check valves - no alarm functions
Check Valves, interior	Table 13.1	Inspection	<i>As needed</i> <i>Based on inspections and tests of systems*</i>	FSM
Preaction/Deluge/Dry Pipe Valves, exterior	Table 13.1 13.4.3.1.6 13.4.4.1.4	Inspection	FSM - Annually (as part of the test) BM – Quarterly	FSM, Building Manager
Preaction/Deluge Valves interior	13.4.3.1.7.1	Inspection	<i>As needed*</i>	FSM
Dry Pipe Valves, interior	Table 13.1	Inspection	Annually	FSM
Preaction/Deluge/Dry Pipe Valves priming water	Table 13.1	Test	Annually	FSM

ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
Preaction/Deluge/Dry Pipe Valves low air pressure alarm	Table 13.1	Test	Annually	FSM
Dry Pipe Valve Compressor Meters	No code reference	Inspection	Monthly  These meters monitor compressor cycling to identify if systems have air leak problems	BM
Preaction/Deluge, full flow	Table 13.1 13.4.3.2.2	Test	<i>Water Spray (Deluge)</i>  <i>Annual (use test valve to isolate system where available if raw water source or high value or if access to system drains is not available due to accelerator operation)</i>  <i>Full flow - minimum of 3 years*</i>	FSM
Dry Pipe Valves/Quick Opening Devices, test	Table 13.1 13.4.4.2.4	Test	Quarterly	FSM
Dry Pipe Valves/Quick Opening Devices, trip test	Table 13.1 13.4.4.2.2	Test	Annually	FSM
Dry Pipe Valves/Quick Opening Devices, full flow trip test	Table 13.1 13.4.4.2.2.2	Test	<i>Every three years*</i>	FSM
Dry Pipe Systems, air leak test	13.4.4.2.9	Test	Every three years	In-Lieu of testing, counter boxes have been installed and tested annually by FSM. In addition, air compressors are monitored by FIRUS
System Strainers, Filters, Orifices – Preaction/Deluge/Dry Pipe Valves	Table 13.1 13.4.3.1.8 13.4.1.6	Inspection	<i>Every three years after the Full Flow Trip Test*</i>	FSM
Pressure Reducing and Relief Valves, sprinkler/standpipe (Sprinkler Relief Valves)	Table 13.1 13.5.1.1	Inspection	<i>Annually, or when gage inspection indicates excessive pressure*</i>	FSM
Pressure Relief Valves, Fire Pump	13.5.6.1.2 13.5.6.1.1 13.5.6.2.1	Inspection	Weekly	FESS/Operations



ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
Pressure Relief Valves, sprinkler systems	13.5.1.3	Test	Annually	FSM
Fire Department Connections	13.7.1	Inspection	FFD Monthly FSM Annually	FFD
Main Drain	Table 13.1 13.3.3.4	Test	<i>Annually and after system disablement (including disablement of supply mains)*</i>	FSM
<b>WATER MIST SYSTEMS NFPA 750</b>				
Water Tank, Supervised	12.2.2	Inspection	<i>Annually*</i>	FSM
Water Tank	12.2.2	Maintenance	Annually, including drain and refill	FSM
Air Pressure Cylinders, Supervised	12.2.2	Inspection	<i>Annually*</i>	FSM
System Operating Components, Supervised	12.2.2	Inspection	Annually	FSM
Batteries, Control Panel, Interface Equipment	12.2.2	Inspection	Annually	FSM
Batteries	12.2.2	Test	Annually	FSM
Strainers and Filters	13.4.3.1.8	Inspection	Annually	FSM
Strainers and Filters	12.2.2	Maintenance	After system operation	FSM
Control Equipment, Supervised	NFPA 72	Inspection	Annually	FSM
Control Equipment, Supervised	NFPA 72	Test	Annually	FSM
Piping, Fittings, Nozzles, Hangers, tubing	12.2.2	Inspection	<i>At same frequency that HPR facility assessment is required. Also after operation*</i>	ESH&Q FSM after operation
Pressure Relief Valve	13.5.6.2.2	Test	Annually	FSM
Water Level Switch	12.2.2	Test	Annually	FSM
Release Mechanisms	12.2.2	Test	Annually	FSM

ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
Control Unit/Program Logic Control	12.2.2	Test	Annually	FSM
Water	12.2.2	Test	<i>Annually. This is an analysis of the water content*.</i>	FSM
System, Flow Test	10.1	Test	Annually.	FSM
System, Flushing	12.2.2	Maintenance	Annually	FSM
Pressure Cylinders	12.2.2	Test	Before recharge if >5 yrs. From last test - 12 yrs. max.	FSM (Sub-Contracted)
Automatic Nozzles	12.2.2	Test	20 yrs.	FSM (Sub-Contracted)
Backflow Prevention Device	Table 12.2.2	Test	<i>Annually – Illinois Plumbing Code, Cross Connection Control Device Inspector</i>	FSM/FESS-Operations

**RECOMENDED NFPA TESTING FREQUENCIES MATRIX - FIRE ALARM SYSTEMS**

ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
<b>CONTROL EQUIPMENT (Monitored) NFPA 72</b>				
Function	Table 14.4.2.2	Test	Annually	FSM
Fuses	Table 14.3.1 Table 14.4.2.2	Insp. & Test	Annually	FSM
Interface Equipment	Table 14.3.1 Table 14.4.3.2	Insp. & Test	Annually	FSM
Lamps & LED's	Table 14.3.1 Table 14.4.3.2	Insp. & Test	Annually	FSM
Primary Power Supply	Table 14.3.1 Table 14.4.3.2	Insp. & Test	Annually	FSM
Transponders	7-3.2, Table 7-3.2	Test	Annually	FSM
<b>ENGINE DRIVEN GENERATORS NFPA 110</b>				
Appurtenant components (batteries, fuel Level, etc.)	8.4.1	Inspection	Weekly	BM
Emergency standby power (Diesel Generator)	8.4.2	Test	Monthly Exercise with Load	FESS/Operations
<b>BATTERIES - FIRE ALARM SYSTEM NFPA 72</b>				
Battery, Sealed Lead-Acid	14.3.1	Inspection	<i>Semiannual for Dorados. Annual for all others (they are remotely monitored)*</i>	FSM
Battery, Sealed Lead-Acid	14.4.3.2	Replacement	<i>Every 4 years*</i>	FSM
Charger	14.4.3.2	Test	<i>Annually*</i>	FSM
Discharge, Sealed Lead-Acid	14.4.3.2	Test, 30 min.	<i>Annually*</i>	FSM
Load Voltage, Sealed Lead-Acid	14.4.3.2	Test	<i>Annually*</i>	FSM
<b>TRANSIENT SUPPRESSORS NFPA 72</b>				
	14.3.1	Inspection	<i>Annually. Supervised for operation*</i>	FSM
<b>CONTROL PANEL TROUBLE SIGNALS NFPA 72</b>				
LEDs Indicating lights	14.3.1	Inspection	<i>Annually. Supervised for operation*</i>	FSM
LEDs Indicating lights LCD Screens	14.4.3.2	Test	Annually	FSM

ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
<b>EMERGENCY VOICE/ALARM COMMUNICATIONS EQUIPMENT NFPA 72</b>				
Speakers	14.3.1	Inspection	<i>Annually</i>	FSM/ESH&Q
Speakers/Amplifiers	14.4.2.2	Test	<i>Annually</i>	FSM
<b>REMOTE ANNUNCIATORS NFPA 72</b>				
Keypad Annunciator	14.3.1	Inspection	<i>Annually*</i>	FSM
Keypad/CPU Annunciator	14.4.2.2	Test	<i>Annually</i>	FSM
<b>INITIATING DEVICES NFPA 72</b>				
Air Sampling	14.3.1	Inspection	<i>Annually. Systems are remotely supervised*</i>	FSM
Air Sampling	14.4.2.2	Test	<i>Annually</i>	FSM
Duct Detectors	14.3.1	Inspection	<i>Annually Systems are remotely supervised*</i>	FSM
Duct Detectors	14.4.2.2	Test	<i>Annually</i>	FSM
Electromechanical Releasing Devices	14.3.1	Inspection	<i>Annually*</i>	FSM
Electromechanical Releasing Devices	14.4.2.2	Test	<i>Annually</i>	FSM
Fire Suppression System Switches	14.3.1	Inspection	<i>Annually Systems are remotely supervised*</i>	FSM
Fire Suppression System Switches	14.4.2.2	Test	<i>Annually</i>	FSM
Fire Alarm Boxes	14.3.1	Inspection	<i>Annually*</i>	FSM
Fire Alarm Boxes	14.4.2.2	Test	<i>Annually</i>	FSM
Heat Detectors	14.3.1	Inspection	<i>Annually Systems are remotely supervised*</i>	FSM
Heat Detectors	14.4.2.2	Test	<i>Annually</i>	FSM
Radiant Energy Fire Detectors	14.3.1	Inspection	<i>Annually Currently None on site*</i>	FSM
Radiant Energy Fire Detectors	14.4.3.2	Test	<i>Annually Currently None on site*</i>	FSM
Smoke Detectors	14.3.1	Inspection	<i>Annually Systems are remotely supervised*</i>	FSM
Smoke Detectors, Functional	14.4.3.2	Test	<i>Annually</i>	FSM

ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
Smoke Detectors, Sensitivity	14.4.3.2	Test	<i>Annually Done only on systems capable of giving a Sensitivity Report, clean-environments, such as residential and offices, every 3<sup>rd</sup> year clean, all other areas clean annually. Perform functional test annually</i>	FSM
Fire-Gas and Other Detectors	14.4.3.2	Test	Annually	Reference FESHM 6013
Supervisory Signal Devices	14.3.1	Inspection	<i>Annually Systems are remotely supervised*</i>	FSM
Supervisory Signal Devices, except valve tamper	14.4.3.2	Test	Annually Systems are remotely supervised.	FSM
Supervisory Signal Devices, valve tamper	NFPA 25, 13.3.5.1	Test	<i>Annually Systems are remotely supervised and valves are locked*</i>	FSM
Waterflow Devices	14.3.1	Inspection	<i>Annually, during test*</i>	FSM
Waterflow Devices	14.4.3.2	Test	FFD Quarterly, FSM Annually Maintain current frequency based on water quality and past history of failures during testing	FFD and FSM
<b>INTERFACE EQUIPMENT NFPA 72</b>				
Elevator recall, HVAC Shut-down, etc.	14.3.1	Inspection	<i>Annually*</i>	FSM
Elevator recall, HVAC Shut-down, etc.	14.4.3.2	Test	Annually	FSM
<b>SPECIAL HAZARD EQUIPMENT NFPA 72</b>				
Abort switch, release solenoid, cross-zone circuit, etc.	14.4.2.2	Test	Annually	FSM
<b>ALARM NOTIFICATION APPLIANCES – Supervised NFPA 72</b>				
Audible & Visual Devices	14.3.1	Inspection	<i>Annually*</i>	FSM
Audible & Visual Devices	14.4.2.2	Test	<i>Annually*</i>	FSM
<b>SUPERVISING STATION FIRE ALARM SYSTEM NFPA 72</b>				
Transmitter	14.3.1	Inspection	<i>Annually*</i>	FSM
Transmitter	14.4.2.2	Test	Annually	FSM

ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
Receivers	14.3.1	Inspection	Semiannually	COMM
Receivers	14.4.2.2	Test	Monthly Reference FESHM 6013	FSM/COMM
<b>SPECIAL PROCEDURES NFPA 72</b>				
Alarm Verification	14.3.1	Inspection	<i>Annually. Systems are remotely supervised*</i>	FSM
Multiplex Systems	14.4.2.2	Test	Annually	FSM

### RECOMMENDED NFPA TESTING FREQUENCIES MATRIX – SPECIAL FIRE SUPPRESSION SYSTEMS

ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
<b>CARBON DIOXIDE SYSTEMS NFPA 12</b>				
System, Condition	4.8.1	Inspection	Monthly	FFD
System, Operation	4.8.1	Insp. & Test	Annually	FSM
Hoses	4.8.2.2	Test	Replace hose every 5 Years.	FSM
High Pressure Cylinders	4.8.3.5.1	Weighing	Semiannually (There are no gages on the CO <sub>2</sub> cylinders)	FSM
<b>HALON 1301 SYSTEMS NFPA 12A</b>				
System	6.1	Inspection	<i>Monthly*</i>	FFD
System	6.1	Test	<i>Annually*</i>	FSM
Cylinders	6.2.1	Inspection	<i>Annually Maintain current procedure to inspect at annual test or after a discharge*</i>	FSM – Sub-Contracted if Discharge
Cylinders	6.2.1	Test	<i>When Discharged*</i>	FSM (Sub-Contracted)
Hose	6.3.1	Test	<i>Replace hose every 5 Years*</i>	FSM
Protected Enclosure	6.4.1	Inspection	<i>Same frequency that HPR facility assessment is required*</i>	ESH&Q
Protected Enclosure	6.4.1	Integrity Test	As indicated	FESS (Sub-Contracted)
<b>DRY CHEMICAL SYSTEMS NFPA 17</b>				
System	11.2.1	Inspection	Monthly	FFD
Protected Hazard	11.3.1.1	Inspection	<i>At same frequency that HPR facility assessment is required*</i>	ESH&Q
System Components	11.3.1	Maintenance	<i>Annually*</i>	FSM
Dry Chemical	11.3.1.2	Inspection	Every 6 years	FSM
System, including Releasing Devices	11.3.1	Test	Annually	FSM
Fixed-temperature Fusible metal alloy temperature sensors	11.3.2.1	Replacement	Annually	FSM
Other fixed-temperature sensors	11.3.3	Maintenance	Annually	FSM
Cylinders	11.5.1	Hydro Test	12 years	FSM (Sub-Contracted)
Hose	11.5.2	Hydro Test	Replace hose every 12 Years	FSM
<b>WET CHEMICAL SYSTEMS NFPA 17A</b>				
System	7.2.1	Inspection	Monthly	FFD
Protected Hazard	7.2.2	Inspection	Semiannually	FSM (Sub-Contracted)

ITEM	CODE REFERENCE	ACTIVITY	FREQUENCY	RESPONSIBILITY
System Components	7.2.2	Maintenance	Semiannually	FSM (Sub-Contracted)
System, including Releasing Devices	7.2.2	Test	Semiannually	FSM (Sub-Contracted)
Fixed-temperature Fusible metal alloy temperature sensors	7.3.3.2	Replacement	<i>Annually*</i>	FSM (Sub-Contracted)
Other fixed-temperature sensors	7.3.4	Maintenance	<i>Annually*</i>	FSM (Sub-Contracted)
Cylinders	7.5.1	Hydro Test	12 years	FSM (Sub-Contracted)
Hose	7.5.1	Hydro Test	Replace hose every 12 years	FSM
<b>CLEAN AGENT SYSTEMS NFPA 2001</b>				
System	7.1.1	Inspection	<i>Monthly*</i>	FFD
System	7.1.1	Insp. & Test	<i>Annually</i>	FSM
Agent Quantity	7.1.3	Inspection	<i>Annually*</i>	FSM
Refillable Container Pressure	7.1.4	Inspection	Semiannually when accessible.	FSM
Cylinders	7.2.2	Inspection	<i>Annually Maintain current procedure to inspect at annual test or after a discharge*</i>	FSM – (Sub-Contracted if Discharge)
Cylinders	7.2.2	Test	<i>When discharged if over 5 years from last test*</i>	FSM (Sub-Contracted)
Hose	7.3.1	Inspection	<i>Annually</i>	FSM
Hose	7.3.2.1	Test	Replace hose every 5 Years	FSM
Protected Enclosure	7.4.1	Inspection	<i>At same frequency that HPR facility assessment is required*</i>	ESH&Q
Protected Enclosure	7.4.1	Integrity Test	As indicated	FESS (Sub-Contracted)
<b>EMERGENCY LIGHTING/EXIT SIGNAGE NFPA 101</b>				
Emergency Lighting	7.8 & 7.9	Testing	Reference FESHM 6011	BM
Exit Lighting	7.8 & 7.9	Testing	Reference FESHM 6011	BM
<b>FIRE BARRIER ASSEMBLIES NFPA 80, NFPA 204, NFPA 221</b>				
Penetrations	NFPA 221, 4.4.4	Inspection	<i>Same frequency that HPR facility assessment is required*</i>	ESH&Q
Smoke Partitions	NFPA 221, 4.4.4	Inspection	In accordance with FESS/Engineering Project No. 13-1-48	Not applicable
Fire/Smoke Vents	NFPA 204, 12.3.2.2	Inspection	<i>Annually</i>	FESS
Doors	NFPA 80, 5.2.1	Inspection	<i>Annually, Reference FESHM 6012</i>	BM
Fire/Smoke Dampers	NFPA 80, 19.4.1.1	Inspection	<i>Annually per FESS/Engineering Project No. 13-1-48</i>	FSM



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## **7.0 TECHNICAL APPENDIX B: OVERVIEW OF SITE SPECIFIC PROGRAM**

### **Fire Protection Program Site Specific Summary**

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- 1.1 Site Description
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- 1.3 Alarm and Communication
- 1.4 Environmental Management

#### **2.0 Fire Protection Program**

- 2.1 Fire Protection Engineering
- 2.2 Fire Protection Inspection, Maintenance, & Testing

#### **3.0 Fire Department/Emergency Response**

- 3.1 Fire Department/Emergency Response Procedures

## **1.0 Overview**

The Fermilab Environment, Safety, and Health Manual (FESHM 6000 series) outlines the requirements of the Fire Protection Program. The Fire Hazard Subcommittee (FHS) of the Fermilab ES&H Committee (FESHCom) is responsible for updating these chapters and providing guidance to the laboratory related to fire and life safety. The Fire Protection Program has been developed to provide a level of fire protection sufficient to minimize losses from fire and related hazards consistent with the best protected class of industrial risks, and is in accordance with 10 CFR 851 Worker Safety and Health Program, Part 851.24 and Appendix A, Chapter III part 2 entitled Fire Protection.

### **1.1 Site Description**

Fermi National Accelerator Laboratory (Fermilab) is owned by the Department of Energy and is operated and managed by Fermi Research Alliance (FRA). FRA is a limited liability company and is a joint partnership of the University of Chicago and the Universities Research Association. Fermilab is located on approximately 6,800 acres of land owned by the Department of Energy from the State of Illinois. There are over 350 buildings, comprising approximately 2.6 million gross square feet.

### **1.2 Water Supply**

Fermilab's main site fire protection water supply is from the Industrial Cooling Water (ICW) system, with approximately 24 miles of underground piping. The ICW system is non-potable and comes from an open pond reservoir with approximately 36-million-gallon capacity and can be supplemented from a pumping station located on the Fox River in Kane County. The Fermilab Village fire protection water supply is from City of Warrenville and is a potable water source.

### **1.3 Alarm and Communications**

Fermilab uses a custom-developed Facility Information Reporting Utility System (FIRUS), which is on a secure network and monitors fire, security, and utility sensors throughout the laboratory. The Accelerator Division (AD) maintains, tests, and ensures the reliability of FIRUS. In an alarm or trouble event, FIRUS signals Fermilab's Communication Center (Comm Center) which is staffed with operators 24/7. The Comm Center dispatches the appropriate emergency response personnel. Individual fire alarm systems monitor all manual pull stations, smoke detectors, heat detectors, sprinkler water flow alarm detectors, valve supervisory switches, and other fixed fire suppression systems. All alarms are transmitted to the Comm Center.

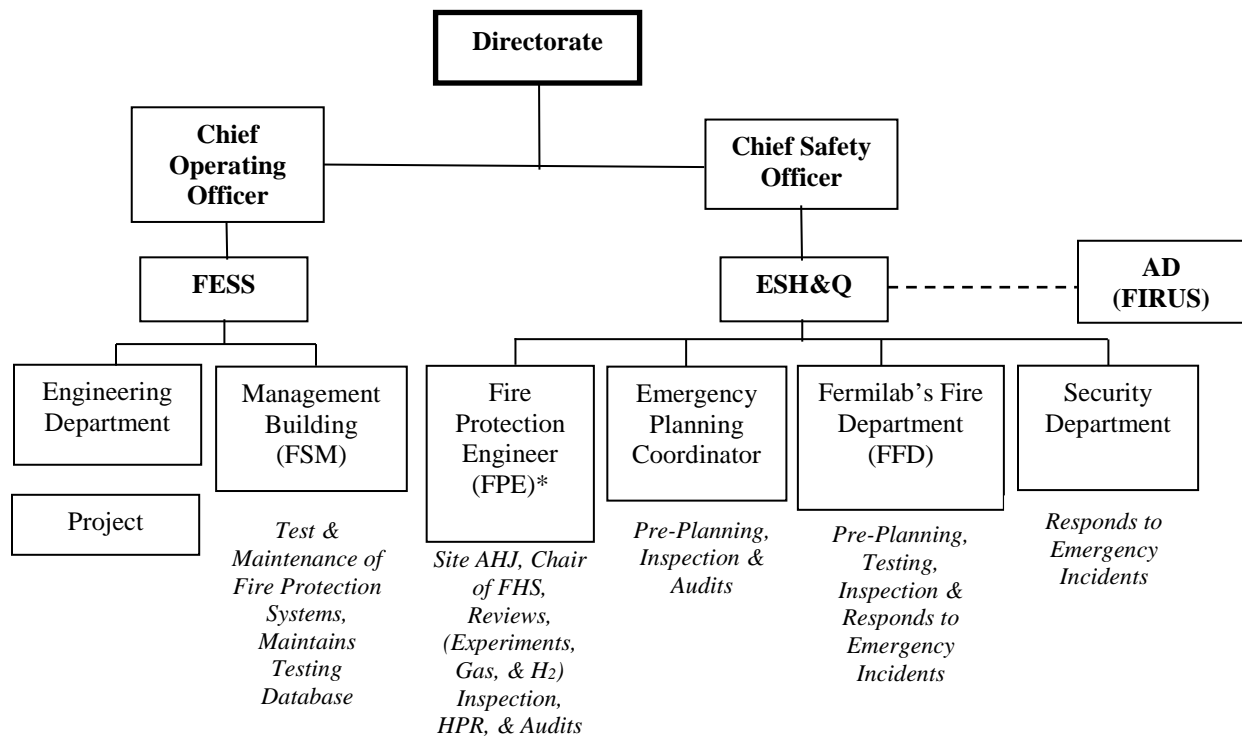
### **1.4 Environmental Management**

The Facilities Engineering Services Section, Roads and Grounds Department manages the prescribed burn of Fermilab's prairies. This involves pre-planning and oversight from the Fermilab's Fire Department, is covered under a permit with the Illinois Environmental Protection

Agency, and incorporates guidelines from NFPA 1144, Standard for Protection of Life and Property from Wildfire.

## 2.0 Fire Protection Program

Line management is responsible for facility and employee safety, including fire safety, under the Directorate. There is a cross-organizational management approach to Fermilab's fire protection program. Facilities Engineering Services Section (FESS) executes the modifications, construction, and testing, maintenance, and repairs of the fire safety systems as delineated in Technical Appendix A of FESHM Chapter 6010. Fermilab's Fire Department performs quarterly sprinkler water flows tests, periodic building inspections, and is involved in the approval process of Hazard Maps, as delineated in FESHM Chapter 6016. Environment, Safety, Health, and Quality (ESH&Q) Fire Protection Engineer (FPE) performs Highly Protected Risk (HPR) inspections as delineated in FESHM Chapter 6015. The ESH&Q FPE is also the site Authority Having Jurisdiction (AHJ) and reviews/approves experiment as well as facility fire safety designs.



*\*Denotes: ESH&Q-FPE is the site Authority Having Jurisdiction*

## 2.1 **Fire Protection Engineering**

Fermilab ESH&Q Department has two qualified individuals. One is a licensed Illinois professional fire protection engineer who also received a PhD in Nuclear Fire Protection Engineering and the other is a Certified Fire Protection Specialist and NICET certified in Water-based Fire Suppression Layout (Level IV), Fire Alarm Systems (Level III), and Special Hazards Suppression. Both are also professional members of the Society of Fire Protection Engineers (SFPE). Facilities Management fire system maintenance technicians are certified by NICET for inspection, testing, and maintenance and or fire alarm system ranging from Level II to Level III. Fermilab Fire Department qualifications can be found in the Baseline Needs Assessment.

In its designs, FESS Engineering and/or Project uses both the International Building Code and NFPA 101, Life Safety Code. In addition, Fermilab follows NFPA 30 in lieu of the quantities and limitations set forth by IBC and IFC. For subterranean spaces, Fermilab follows NFPA 520 and DOE 1066, 2016 Edition. For Conceptual Design Reports (CDR) involving new beam-line enclosures and/or new buildings, the fire safety criteria is established and reviewed with ESH&Q, reference Table 1.

Team	Governance	PROJECT STAGE			Operation
		Concept	Design	Construction	
User/Experimenter requirements	DP-18 & DP-36, FESHM 6011, 6012, 6013, 6020.3, 6040.3 & 5000 series, Engineering Manual	Close collaboration to understand operational goals; work with FESS to develop project plan and conceptual design report	The user liaison communicates any operational implications to FESS	Collaboration to verify operation readiness	Safety Assessment Document (SAD) Accelerator – Readiness Review, inspection & testing
Facilities Engineering Services Section (FESS) – Engineering Department or Project	FESHM 1070, 2010, 8012, 8023, 8050 & 8070, Engineering Manual, & FESS Engineering Design Guides,	Understand & develop design requirements; develop conceptual design report including plans and fire strategy approach	Review plans, for compliance with fire strategy criteria. If fire protection systems are designed in-house, then will be reviewed by fire protection consultant.	Site inspections and system commissioning	
FESS-Engineering’s A/E Firm or Project A/E Firm	FESS-Engineering’s A/E Handbook& FESS Engineering Design Guides	Assists in developing the fire strategy	Incorporate conceptual design report into bid design documents	Responds to requests for information and/or revisions to design document	
FESS-Facility Management (Fire Systems Maintenance)	FESHM 6010		Review plans for maintainable fire protection systems	Witnessing system commissioning, provides training to FFD on building FP systems	Inspection, testing, & maintenance of fire protection systems
(FESS-Engineering) Construction Management Office (CMO)	FESHM 2020, 2060, 6014, 6020.2, 6040.1, 7010, 7030, 7040, & 7050, Engineering’s Procedure Manual			Verifies enforcement of the subcontractor’s safety plan during construction	
Environment Safety Health & Quality Section (ESH&Q)-Fire Protection Engineer	FESHM 2050, 6010, & 6015	Assists and Agree on fire strategy (Sign-Off Authority)	Review plans, communicates with design team (Sign-Off Authority)	May be involved in witnessing system commissioning	Highly Protected Risk Inspection program, Experiment Reviews & Approvals
(ESH&Q) - Fermilab’s Fire Department	Emergency Management Procedure Manual, FESHM 6010, 6016	Agree and participants in the development of the fire strategy	Review plans, communicates with design team	Participant in walkthroughs and provided overview/training of the fire protection systems	User/Experimenter develops Haz Map and reviewed/input from Fire Department. Periodic walkthrough / inspections

0 Table 1 – Fire Safety Process Qualitative Design Review

## 2.2 Fire Protection Maintenance

All fire detection and suppression systems are tested, inspected, and maintained by FESS Fire Systems Maintenance (FSM) group, a group within the FESS Management, Building & Building Support Department. FESS has the responsibility to test, repair, and maintain the various fire protection/detection systems and is summarized in Figures 1 and 2 below.

<b>Fire Sprinkler Systems</b>		<b>Special Suppression Systems</b>	
Wet Type	116	CO <sub>2</sub> High Pressure	3
Dry Type	12	Dry Chemical	3
Pre-action Type	8	FM-200	4
Anti-Freeze Type	1	Halon	20
Fixed Water (Deluge)	2	Water Mist	8
Standpipe	2	Wet Chemical	3
	<b>Total = 141</b>		<b>Total = 41</b>

Figure No. 1

<b>Fire Alarm System Components</b>	
Fire Alarm Control Panels	435
Air Sampling Smoke Detection	62
Spot Type Smoke Detectors	2,684
Spot Type Heat Detectors	864
Manual Pull Stations	1,211
Sprinkler Control Valves	453
Line Type Heat Detection	16

Figure No. 2

## 3.0 Fire Department/Emergency Response

Fermilab's Fire Department is a member of the Mutual Aid Box Alarm System in Illinois, which provides assistance and has auto-aid agreements for both on site and off site with the City of Batavia and Warrenville Fire Departments. Fermilab's Fire Department also administers the Welding, Burning, Brazing Permit per FEHSM Chapter 6020.2, fall rescue, and is notified of entry into confined spaces, via the Confined Space Permits found in FESHM Chapter 5063.

### 3.1 Fire Department/Emergency Response Policies and Procedures

ESH&Q has the set of operational policies and procedures that are maintained by the Fire Department and Emergency Planning Coordinator. ESH&Q inspects and maintains the 1,350 portable fire extinguishers, inspects the fire rated assemblies, and updates the Baseline Needs Assessment.