ELEMENTS OF THE FIRE PROTECTION PROGRAM

INTRODUCTION

The 6000 series of the Fermilab Environment, Safety, and Health Manual chapters describe the organization and structure of the Laboratory Fire Protection Program, incorporates the requirements of DOE Order 420.1, and complies with applicable laws, regulations, and the Work Smart set of ES&H standards included in the DOE contract.

POLICY

This program is 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").

STANDARDS

The technical basis for an acceptable program is a body of policies, requirements, codes, standards, guidelines, and interpretations. The most recent version of the following are used as the primary design standards at the Laboratory:

International Fire Code (IFC) 2003
International Building Code (IBC) 2003
National Fire Protection Association
29 CFR 1910 (OSHA general industry standards)
29 CFR 1926 (OSHA construction standards)

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. Refer to Specific Fire Prevention Program Requirements. 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 (ES&H-FPE).

DEFINITIONS

International Code Council - 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.

Fire Protection Engineer (FPE) - highly trained and educated professional responsible for overseeing the overall implementation and development of the Fermilab fire protection systems.

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 Components, and Special Systems).

FIRUS - Facility Incident Reporting and Utility System - lab-wide system that monitors building fire alarm systems and provides alarms at the Communications Center in Wilson Hall.

Highly Protected Risk - 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 ES&H Fire Protection Engineer (ES&H-FPE). The form is presented in chapter 6010.1.

NFPA – National Fire Protection Association – organization dedicated to fire safety through creating consensus standards and codes

RESPONSIBILITIES

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.

Division/Section Heads

Heads of divisions and sections are responsible for the 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 Tripartite Assessment process) can be conducted 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 division/section 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 and Section personnel must periodically audit their fire protection systems through the Tripartite Assessment process.

Building Managers (BM)

The Building Managers assigned to specific buildings within each division or section are responsible for periodic inspections of fire protection system components in accordance with 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 ES&H-FPE directly for immediate assistance

Senior Safety Officer (SSO)

The SSO, or designee for each division or section, will review Fire Department Run Reports and investigate the incident as needed.

The SSO reviews the Building Fire Inspection Report issued by the FFD and aids in correcting any findings, as appropriate.

Accelerator Division (AD)

The Accelerator Division maintains the FIRUS system, including the hardware and software.

Facilities Engineering Services Section (FESS)

The Facilities Engineering Services Section engineering staff (FESS-ENG) provides design and consulting services, reviews shop drawing submittals, and oversees the installation and acceptance testing of fire protection systems for both new construction and modifications to existing facilities. "Turn key" purchases may occur in which case the Laboratory is purchasing these services from a vendor.

The FESS Fire Systems Maintenance (FSM) technicians are responsible for the inspection, testing and maintenance activities for all installed fire protection systems throughout the Laboratory as specified in Appendix A. They will issue Irregularity Reports, as required.

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

Environment, Safety and Health Section (ES&H)

The Environment, Safety, & Health Section Fire Protection Engineer (ES&H-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 Prevention 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. The ES&H-FPE is responsible for documenting these reviews.

The ES&H-FPE will assist FESS-ENG as requested during the installation, testing, and acceptance of fire protection systems.

The ES&H-FPE 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).

The ES&H-FPE monitors system operation, effectiveness, and failures (including the FIRUS system) found during routine testing via the Irregularity Report system and audits.

The ES&H-FPE reviews all Fire Department Run Reports.

The ES&H-FPE shall be notified by telephone, regardless of day or time, of all significant Fire Department Runs involving:

- Loss of water protection (i.e. broken water lines)
- Loss of electrical power resulting in Fire detection and/or FIRUS systems relaying on backup power.
- Any fire related event that results in physical damage to structures or equipment that had the potential for endangering personnel.
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Notification of the ES&H-FPE will be made by the Comm 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.

The Fermilab Fire Department (FFD) of the ES&H Section responds to fire emergencies.

The FFD assists the FESS FSM technicians by performing required testing of the fire protection systems, as specified in Appendix A. They will issue Irregularity Reports, as required.

The FFD generates a Fire Department Run Report, which documents the details of all responses to fire alarms and emergencies.

The FFD conducts a general fire inspection for all buildings semi-annually and issues a report of findings to the division/section SSO.

The FFD conducts a general inspection of all fire pump rooms monthly.

The FFD 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.

The Security Department of the ES&H Section (ES&H-SEC) oversees and directs the operation of the COM Center, including testing of FIRUS (see Appendix A).

The ES&H Section will periodically audit fire protection systems as part of the tripartite assessment process.

Other Organizations and Individuals

Fire protection responsibilities of organizations and individuals not specifically included in this chapter are:

- Fire Hazard Subcommittee / Chapter 1030 of this manual
- Subcontractors / Chapter 7010 of this manual
- Fermilab Fire Department (including Chief) / Chapter 2021 and the 6000 chapter series of this manual,
- Fermilab's Emergency Response Plan
- ES&H Emergency Management Procedure Manual
- Fermilab's Emergency Response Plan Appendix J, Emergency Wardens

RESPONSIBILITIES MATRIX:

	DIR	D/S	BM	SSO	AD	FESS	ESH-FPE	ESH-FFD	ESH-SEC
Overall Responsibility	X	X							
FPS Audit		X					X		
FPS Design		X				X	*		
FPS Installation		X				X	*		
FPS Testing		X				X	*		
FPS Acceptance		X				X	*		
FPS Code & Compliance Review							X		
FPS Maint/Test/ Inspection		X	X			X		X	
FIRUS Maint					X				X
COMM Center									X
Fire Incident Response								X	
FFD Run Reports				X			X	X	
Irregularity Reports						X	X	X	
HPR Assessments							X		

* review only

PROGRAM ELEMENTS

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 fire fighting 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.

Design of Fire Protection Systems

Fire Protection system designs undergo the review process detailed in FESHM Chapter 2010, PLANNING AND REVIEW OF ACCELERATOR FACILITIES AND THEIR OPERATIONS. In addition, the FESS Design and Construction Document Review and Distribution Procedures are used to review of 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" purchases from a vendor.

The ES&H-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 Prevention 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. The ES&H-FPE is responsible for documenting these reviews.

Experiment Reviews

The ES&H-FPE reviews all experiments to assure that a satisfactory level of protection is being provided and that the applicable fire protection provisions of the International Building Code, the International Fire Prevention Code, and National Fire Protection Association Standards (NFPA) are being met. The ES&H-FPE is responsible for documenting these reviews.

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. The frequency of inspection depends on the mission criticality of the facility to the Laboratory. The loss of those facilities that would have an adverse impact on the Laboratory would have a higher frequency of inspection. The inspection schedule ranges from annually to once every 5 years. The ES&H-FPE oversees the inspection process and maintains the inspection schedule.

Inspection and Maintenance of Fire Protection Systems (Irregularity Report system)

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 serous irregularities must notify the FSM Technicians of those conditions. FSM technicians (and FFD) must submit all irregularities (using the Irregularity Report System) that cannot be immediately corrected to the ES&H-FPE. The FSM technicians or ES&H-FPE will communicate with the affected division/section and suggest corrective strategies. The division/section must then document the deficiency in ESHTRK and make the needed corrections.

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 (COM Center), located on the ground floor of Wilson Hall. The COM Center also receives telephone calls reporting fires. The COM Center dispatches the FFD and security personnel. The Security Department of the ES&H Section oversees and directs the operation of the COM Center. Auxiliary (back-up) FIRUS terminals are also located in the Main Control Room and Security Headquarters, Site 52.

The FFD generates a Fire Department Run Report, which documents the details of all responses to fire alarms and emergencies. The ES&H-FPE and the affected division/section Senior Safety Officer reviews the Fire Department Run Reports and investigates as needed.

Response to Fire Emergencies

The FFD and Security will respond to all fire emergencies at all times. If needed, additional assistance will be provided by nearby municipal fire departments. Further details are located in the Fermilab Emergency Response Plan and ES&H Emergency Management Procedure Manual.

Specific Fire Prevention Program Requirements

Additional elements of the Fire Protection Program and their associated chapter are:

6011 Periodic Testing of Emergency Lights
6012 Periodic Inspection of Fire Doors
6013 Facility Incident Reporting System (FIRUS)
6014 Fire Watch Protocols
6020.1 Placement of Portable Fire Extinguishers in Primary Beam Enclosures
6020.2 Use of Check Valves on Oxygen-Acetylene Cutting and Welding Equipment
6020.3 Storage and Use of Flammable Gasses
6020.4 Minimum Aisle and Doorway Widths for Safe Egress
6030 Fire Detection/Protection System Disablement
6040 Fire Construction Requirements
6040.1 Fire Retardant Coatings
6040.2 Interior Finish Materials
6040.3 Fire Stops for Cable Penetration

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:

NFPA 12	Standard on Carbon Dioxide Systems, 1998 edition
NFPA 12A	Standard on Halon 1301 Fire Extinguishing Systems, 1997 edition
NFPA 13	Standard for the Installation of Sprinkler Systems, 1996 edition
NFPA 14	Standard for the Installation of Standpipe and Hose Systems, 1996 edition
NFPA 15	Standard for Water Spray Fixed Systems for Fire Protection, 1996 edition
NFPA 17	Standard for Dry Chemical Extinguishing Systems, 1998 edition
NFPA 17A	Standard for Wet Chemical Extinguishing Systems, 1998 edition
NFPA 20	Standard for the Installation of Centrifugal Fire Pumps, 1996 edition
NFPA 24	Standard for the Installation of Private Fire Service Mains and Their Appurtenances, 1995 edition
NFPA 72	National Fire Alarm Code, 1999 edition
NFPA 25	Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, 1998 edition
NFPA 750	Standard on Water Mist Fire Protection Systems, 1996 edition
NFPA 2001	Standard on Clean Agent Fire Extinguishing Systems, 1996 edition

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

Abbreviations are as follows:

HPR – Highly Protected Risk
FSM - FESS Fire Systems Maintenance Group
FFD - Fermilab Fire Department
ES&H - ES&H Fire Protection Staff
COMM - Communications Center
BM - Building Manager

RECOMMENDED FREQUENCIES MATRIX - WATER BASED SYSTEMS

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
SPRINKLER SYSTEMS		NFPA 25		
Sprinkler head	Inspection	2-2.1.1	At same frequency as HPR assessment. (Floor-level visual examination of a representative sample.)	ES&H
Spare sprinkler head	Inspection	2-2.1.3	Annually	FSM
Sprinkler System Piping	Inspection	2-2.2	At same frequency as HPR assessment.	ES&H
Pipe hangers	Inspection	2-2.3	At same frequency that HPR facility assessment is required	ES&H
Gauges, wet pipe system	Inspection	2-2.4.1	FFD Quarterly, FSM Annually, BM Monthly (for condition and water pressure)	Building Manager; FFD and FSM during testing.
Gauges, dry pipe system	Inspection	2-2.4.2	FFD Quarterly, FSM Annually, BM Monthly (for condition and air and water pressure)	Building Manager; FFD and FSM during testing.
Buildings	Inspection	2-2.5	Annually, to assure adequate heat for wet pipe systems or dry pipe riser enclosures.	Building Manager
Hydraulic nameplate on sprinkler systems	Inspection	2-2.7	At same frequency as HPR facility assessment.	ES&H
Gauges	Test	2-3.2	During inspection or system test.	FFD and FSM
Antifreeze System Solutions	Test	2-3.4	Annually	FSM
Dry Pipe System Compressors & Air Dryers	Maintenance	2-4.2	Annually	FSM
STANDPIPE & HOSE SYSTEMS		NFPA 25 (NFPA 1962)		
Control Valves, locked or supervised	Inspection	3.1, Table 3-1	FFD Quarterly, FSM Annually BM Monthly	Building Manager, FFD and FSM
Piping	Inspection	3.1, Table 3-1	At same frequency as HPR facility assessment is required	ES&H
Hose Connections	Inspection	3.1, Table 3-1	Quarterly	FFD
Hose Connections	Maintenance	3.1, Table 3-1	As needed based on FFD inspection.	FESS Operations
Hose Cabinets	Inspection	3.1, Table 3-1	Bimonthly	FFD

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
Hose	Inspection	3.1, Table 3-(2-3.3)	Quarterly	FFD
Hose	Test	3.1, Table 3-1 (2-3.2)	After 5 yrs., then every 3 yrs.	FFD
Hose Nozzles	Inspection	3-2.1 (4-1.2)	Quarterly	FFD
Hose Nozzles	Test	3.1, Table 3-1	As needed.	FFD
Hose storage rack	Inspection	3.1, Table 3-1	N/A Not used	FFD
Hose storage rack	Test	3.1, Table 3-1	N/A Not used	FFD
Flow Test	Test	3.1, Table 3-1	5 Years	FESS/Engineering and FSM
PRIVATE FIRE SERVICE MAINS		NFPA 25		
Hydrants (dry barrel)	Inspection	4-2.1, Table 4-2.1	Monthly (Maintain current schedule)	FFD
Hydrants (dry barrel)	Test and Maintenance	4-3, Table 4-2.1	3x Annually for dead end. Maintain current schedule for raw water system.	FESS/Operations
Mainline Strainers	Inspection	4-2.1, Table 4-2.1	Monthly Maintain current schedule for raw water system.	FESS/Operations
Mainline Strainers	Maintenance	4-2.1, Table 4-2.1	Annually and after significant flow if inspection indicates need.	FESS/Operations
Piping (exposed)	Inspection	4-2.1, Table 4-2.1	Daily at pump house	FESS/Operations
Piping	Test	4-2.1, Table 4-2.1	5 years or after significant change.	FESS/Engineering
FIRE PUMPS		NFPA 25		
Pump House, heating	Inspection	5-1.1, Table 5-1.1	Weekly	FESS/Operations
Pump House, ventilating louvers	Inspection	5-1.1, Table 5-1.1	Weekly	FESS/Operations
Fire Pump System	Inspection	5-1.1,	Weekly	FESS/Operations

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
		Table 5-1.1		
Pump Operations, no flow condition	Test	5-1.1, Table 5-1.1	Weekly	FESS/Operations
Pump Operations, flow condition	Test	5-1.1, Table 5-1.1	Annually	FSM/Contractor
Electrical System	Maintenance	5-1.1, Table 5-1.1	Annually	FESS/Operations
Controller	Maintenance	5-1.1, Table 5-1.1	Annually	FESS/Operations
Motor	Maintenance	5-1.1, Table 5-1.1	Annually	FESS/Operations
WATER SPRAY FIXED SYSTEMS		NFPA 25		
Drainage, Inspection	Inspection	7-1.1, Table 7-3.1	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.	FSM
Pipe, Fittings, Hangers and Supports	Inspection	7-1.1, Table 7-3.1	At same frequency that HPR facility assessment is required.	ES&H
Nozzles	Inspection	7-1.1, Table 7-3.1	Annually (part of annual test)	FSM
Nozzles	Test	7-1.1, Table 7-3.1	Annually	FSM
Strainers	Inspection	7-1.1, Table 7-3.1	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	Test	7-1.1, Table 7-3.1	Annually	FSM
Strainers	Maintenance	7-1.1, Table 7-3.1	Domestic water source – every 3 yrs following the full flow trip test. Raw water source - annually, and after each operation of the system.	FSM
Manual Release	Test	7-1.1, Table 7-3.1	Annually	FSM

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
Water Spray System	Test	7-1.1, Table 7-3.1	Annually	FSM
Water Spray System	Maintenance	7-1.1, Table 7-3.1	Annually	FSM
VALVES AND FFD CONNECTIONS		NFPA 25		
Control Valves, locked or supervised	Inspection	9-1, Table 9-1	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	Test	9-1, Table 9-1	FFD - Monthly inspection only FESS/Ops - Annually (during annual ICW main flushing)	FFD, FESS/Ops
Control Valves, operation	Test	9-1, Table 9-1	Annually	FSM
Control Valves, supervisory	Test	9-1, Table 9-1	Annually (These valves are locked in the open position.)	FSM
Control Valves	Maintenance	9-1, Table 9-1	As needed Based on inspection and test.	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	Inspection	9-1, Table 9-1	As needed Based on inspections and tests of systems	FSM
Preaction/Deluge/Dry Pipe Valves, exterior	Inspection	9-1, Table 9-1	FSM - Annually (as part of the test) BM - Quarterly	FSM, Building Manager
Preaction/Deluge Valves interior	Inspection	9-1, Table 9-1	As needed.	FSM
Dry Pipe Valves, interior	Inspection	9-1, Table 9-1	Annually	FSM
Preaction/Deluge/Dry Pipe Valves priming water	Test	9-1, Table 9-1	Annually	FSM
Preaction/Deluge/Dry Pipe Valves low air pressure alarm	Test	9-1, Table 9-1	Annually	FSM

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
Dry Pipe Valve Compressor Meters	Inspection	No code reference	Monthly These meters monitor compressor cycling to identify if systems have air leak problems.	Building Manager
Preaction/Deluge, full flow	Test	9-1, Table 9-1	Water Spray - Annual Deluge - 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). Full flow - minimum of 3 years.	FSM
Dry Pipe Valves/Quick Opening Devices, trip test	Test	9-1, Table 9-1	Annually	FSM
Dry Pipe Valves/Quick Opening Devices, full flow trip test	Test	9-1, Table 9-1	Every three years.	FSM
System Strainers, Filters, Orifices	Inspection	9-1, Table 9-1	Every three years after the Full Flow Trip Test	FSM
Pressure Relief Valves, sprinkler/standpipe	Inspection	9-1, Table 9-1	Annually, or when gage inspection indicates excessive pressure.	FSM
Pressure Relief Valves, Fire Pump	Inspection	9-1, Table 9-1	Weekly	FESS/Operations
Pressure Relief Valves, sprinkler systems	Test	9-1, Table 9-1	Annually	FSM
Fire Department Connections	Inspection	9-1, Table 9-1	FFD Monthly FSM Annually	FFD
Main Drain	Test	9-1, Table 9-1	Annually and after system disablement (including disablement of supply mains)	FSM
WATER MIST SYSTEMS		NFPA 750		
Water Tank, Supervised	Inspection	10-2, Table 10-2(a)	Annually	FSM
Water Tank	Maintenance	10-3.2, Table 10-3.2	Annually, including drain and refill	FSM
Air Pressure Cylinders, Supervised	Inspection	10-2, Table 10-2(a)	Annually	FSM

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
System Operating Components, Supervised	Inspection	10-2, Table 10-2(a)	Annually	FSM
Batteries, Control Panel, Interface Equipment	Inspection	10-2, Table 10-2(a)	Annually	FSM
Batteries	Test	10-2, Table 10-2(b)	Annually	FSM
Strainers and Filters	Inspection	10-2, Table 10-2(a)	Annually	FSM
Strainers and Filters	Maintenance	10-3.2, Table 10-3.2	After system operation	FSM
Control Equipment, Supervised	Inspection	10-2, Table 10-2(a)	Annually	FSM
Control Equipment, Supervised	Test	10-2, Table 10-2(b)	Annually	FSM
Piping, Fittings, Nozzles, Hangers, tubing	Inspection	10-2, Table 10-2(a)	At same frequency that HPR facility assessment is required. Also after operation.	ES&H FSM after operation
Pressure Relief Valve	Test	10-2, Table 10-2(b)	Annually	FSM
Water Level Switch	Test	10-2, Table 10-2(b)	Annually	FSM
Release Mechanisms	Test	10-2, Table 10-2(b)	Annually	FSM
Control Unit/Program Logic Control	Test	10-2, Table 10-2(b)	Annually	FSM
Water	Test	10-2, Table 10-2(b)	Annually. This is an analysis of the water content.	FSM
System, Flow Test	Test	10-2, Table 10-2(b)	Annually.	FSM
System, Flushing	Maintenance	10-3.2, Table 10-3.2	Annually	FSM
Pressure Cylinders	Test	10-2, 10-2.4 , Table 10-2(b)	Before recharge if >5 yrs. From last test - 12 yrs max.	FSM/Contractor
Automatic Nozzles	Test	10-2, Table 10-2(b)	20 yrs.	FSM/Contractor

RECOMENDED FREQUENCIES MATRIX - FIRE ALARM COMPONENTS

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
CONTROL EQUIPMENT (Monitored)		NFPA 72		
Function	Test	7-3.2, Table 7-3.2	Annually	FSM
Fuses	Insp. & Test	7-3.1, Table 7-3.1 7-3.2, Table 7-3.2	Annually	FSM
Interface Equipment	Insp. & Test	7-3.1, Table 7-3.1 7-3.2, Table 7-3.2	Annually	FSM
Lamps & LED's	Insp. & Test	7-3.1, Table 7-3.1 7-3.2, Table 7-3.2	Annually	FSM
Primary Power Supply	Insp. & Test	7-3.1, Table 7-3.1 7-3.2, Table 7-3.2	Annually	FSM
Transponders	Test	7-3.2, Table 7-3.2	Annually	FSM
ENGINE DRIVEN GENERATORS		NFPA 72		
	Test	7-3.2, Table 7-3.2	Weekly	FESS/Operations
BATTERIES - FIRE ALARM SYSTEM		NFPA 72		
Battery, Sealed Lead-Acid	Inspection	7-3.1, Table 7-3.1	Semiannual for Dorados. Annual for all others (they are remotely monitored).	FSM
Battery, Sealed Lead-Acid	Replacement	7-3.2, Table 7-3.2	Every 4 years	FSM
Charger	Test	7-3.2, Table 7-3.2	Annually	FSM

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
Discharge, Sealed Lead-Acid	Test, 30 min.	7-3.2, Table 7-3.2	Annually	FSM
Load Voltage, Sealed Lead-Acid	Test	7-3.2, Table 7-3.2	Annually	FSM
TRANSIENT SUPPRESSORS		NFPA 72		
	Inspection	7-3.1, Table 7-3.1	Annually. Supervised for operation.	FSM
CONTROL PANEL TROUBLE SIGNALS		NFPA 72		
	Inspection	7-3.1, Table 7-3.1	Annually. Supervised for operation.	FSM
	Test	7-3.2, Table 7-3.2	Annually	FSM
EMERGENCY VOICE/ALARM COMMUNICATIONS EQUIPMENT		NFPA 72		
	Inspection	7-3.1, Table 7-3.1	Annually. Also observed during waterflow tests.	FSM/ES&H
	Test	7-3.2, Table 7-3.2	Annually	FSM
REMOTE ANNUNCIATORS		NFPA 72		
	Inspection	7-3.1, Table 7-3.1	Annually	FSM
	Test	7-3.2, Table 7-3.2	Annually	FSM
INITIATING DEVICES		NFPA 72		
Air Sampling	Inspection	7-3.1, Table 7-3.1	Annually. Systems are remotely supervised.	FSM
Air Sampling	Test	7-3.2, Table 7-3.2	Annually	FSM
Duct Detectors	Inspection	7-3.1, Table 7-3.1	Annually Systems are remotely supervised.	FSM

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
Duct Detectors	Test	7-3.2, Table 7-3.2	Annually	FSM
Electromechanical Releasing Devices	Inspection	7-3.1, Table 7-3.1	Annually	FSM
Electromechanical Releasing Devices	Test	7-3.2, Table 7-3.2	Annually	FSM
Fire Suppression System Switches	Inspection	7-3.1, Table 7-3.1	Annually. Systems are remotely supervised.	FSM
Fire Suppression System Switches	Test	7-3.2, Table 7-3.2	Annually	FSM
Fire Alarm Boxes	Inspection	7-3.1, Table 7-3.1	Annually	FSM
Fire Alarm Boxes	Test	7-3.2, Table 7-3.2	Annually	FSM
Heat Detectors	Inspection	7-3.1, Table 7-3.1	Annually. Systems are remotely supervised.	FSM
Heat Detectors	Test	7-3.2, Table 7-3.2	Annually	FSM
Radiant Energy Fire Detectors	Inspection	7-3.1, Table 7-3.1	Annually. Currently None on site.	FSM
Radiant Energy Fire Detectors	Test	7-3.2, Table 7-3.2	Annually. Currently None on site.	FSM
Smoke Detectors	Inspection	7-3.1, Table 7-3.1	Annually. Systems are remotely supervised.	FSM
Smoke Detectors, Functional	Test	7-3.2, Table 7-3.2	Annually	FSM
Smoke Detectors, Sensitivity	Test	7-3.2, Table 7-3.2	Annually Done only on systems capable of giving a Sensitivity report, otherwise just a functional test and cleaning.	FSM
Fire-Gas and Other Detectors	Test	7-3.2, Table 7-3.2	Annually	Other Div/Sections
Supervisory Signal Devices	Inspection	7-3.1, Table 7-3.1	Annually. Systems are remotely supervised.	FSM
Supervisory Signal Devices, except valve tamper	Test	7-3.2, Table 7-3.2	Annually. Systems are remotely supervised.	FSM

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
Supervisory Signal Devices, valve tamper	Test	7-3.2, Table 7-3.2	Annually. Systems are remotely supervised and valves are locked.	FSM
Waterflow Devices	Inspection	7-3.1, Table 7-3.1	Annually, during test	FSM
Waterflow Devices	Test	7-3.2, Table 7-3.2	FFD Quarterly, FSM Annually Maintain current frequency based on water quality and past history of failures during testing.	FFD and FSM
INTERFACE EQUIPMENT		NFPA 72		
	Inspection	7-3.1, Table 7-3.1	Annually	FSM
	Test	7-3.2, Table 7-3.2	Annually	FSM
SPECIAL HAZARD EQUIPMENT		NFPA 72		
Abort switch, release solenoid, cross-zone circuit, etc.	Test	7-3.2, Table 7-3.2	Annually	FSM
ALARM NOTIFICATION APPLIANCES - Supervised		NFPA 72		
	Inspection	7-3.1, Table 7-3.1	Annually	FSM
	Test	7-3.2, Table 7-3.2	Annually	FSM
SUPERVISING STATION FIRE ALARM SYSTEM		NFPA 72		
Transmitter	Inspection	7-3.1, Table 7-3.1	Annually	FSM
Transmitter	Test	7-3.2, Table 7-3.2	Annually	FSM
Receivers	Inspection	7-3.1, Table 7-3.1	Semiannually	COMM
Receivers	Test	7-3.2, Table 7-3.2	Monthly	FSM/COMM

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
SPECIAL PROCEDURES		NFPA 72		
Alarm Verification	Inspection	7-3.1, Table 7-3.1	Annually. Systems are remotely supervised.	FSM
Multiplex Systems	Test	7-3.2, Table 7-3.2	Annually	FSM

RECOMMENDED FREQUENCIES MATRIX - SPECIAL SYSTEMS

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
CARBON DIOXIDE SYSTEMS		NFPA 12		
System, Condition	Inspection	1-10.1	Monthly	FFD
System, Operation	Insp. & Test	1-10.3.2	Annually	FSM
Hoses	Test	1-10.2.1	Replace hose every 5 Years.	FSM
High Pressure Cylinders	Weighing	1-10.3.5	Semiannually. (There are no gages on the CO_2 cylinders.)	FSM
HALON 1301 SYSTEMS		NFPA 12A		
System	Inspection	4-1.1	Monthly	FFD
System	Test	4-1.1	Annually	FSM
Cylinders	Inspection	4-2.2	Annually Maintain current procedure to inspect at annual test or after a discharge	FSM - Contractor if Discharge
Cylinders	Test	4-2.1	When Discharged	FSM/Contractor
Hose	Test	4-3	Replace hose every 5 Years.	FSM
Protected Enclosure	Inspection	4-4	Same frequency that HPR facility assessment is required.	ES&H
Protected Enclosure	Integrity Test	4-4	As indicated.	FESS/Contractor
DRY CHEMICAL		NFPA 17		

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
SYSTEMS				
System	Inspection	9-2.1	Monthly	FFD
Protected Hazard	Inspection	9-3.1(a)	At same frequency that HPR facility assessment is required.	ES&H
System Components	Maintenance	9-3.1(b)	Annually	FSM
Dry Chemical	Inspection	9-3.1(d)	Every 6 years	FSM
System, including Releasing Devices	Test	9-3.1(f)	Annually	FSM
Fixed-temperature Fusible metal alloy temperature sensors	Replacement	9-3.2	Annually	FSM
Other fixed-temperature sensors	Maintenance	9-3.3	Annually	FSM
Cylinders	Hydro Test	9-5	12 years	FSM/Contractor
Hose	Hydro Test	9-6	Replace hose every 12 Years.	FSM
WET CHEMICAL SYSTEMS		NFPA 17A	None Currently on Site - Proposed for Hood/Duct Systems	
System	Inspection	5-2.1	Monthly	FFD
Protected Hazard	Inspection	5-3.1(a)	Semiannually	FSM/Contractor
System Components	Maintenance	5-3.1(b)	Semiannually	FSM/Contractor
System, including Releasing Devices	Test	5-3.1(e)	Semiannually	FSM/Contractor
Fixed-temperature Fusible metal alloy temperature sensors	Replacement	5-3.2	Annually	FSM/Contractor
Other fixed-temperature sensors	Maintenance	5-3.3	Annually	FSM/Contractor
Cylinders	Hydro Test	5-5	12 years	FSM/Contractor
Hose	Hydro Test	5-5	Replace hose every 12 years.	FSM
CLEAN AGENT SYSTEMS		NFPA 2001		
System	Inspection	4-1.1	Monthly	FFD
System	Insp. & Test	4-1.1	Annually	FSM
Agent Quantity	Inspection	4-1.3	Annually	FSM

ITEM	ACTIVITY	CODE REFERENCE	FREQUENCY	RESPONSIBILITY
Refillable Container Pressure	Inspection	4-1.3	Semiannually when accessible.	FSM
Cylinders	Inspection	4-2.2	Annually Maintain current procedure to inspect at annual test or after a discharge	FSM - Contractor if Discharge
Cylinders	Test	4-2.1	When discharged if over 5 years from last test	FSM/Contractor
Hose	Inspection	4-3.1	Annually	FSM
Hose	Test	4-3.2	Replace hose every 5 Years.	FSM
Protected Enclosure	Inspection	4-4	At same frequency that HPR facility assessment is required.	ES&H
Protected Enclosure	Integrity Test	4-4	As indicated.	FESS/Contractor

Technical Appendix B
Hazard Map Program

INTRODUCTION

This appendix provides the criteria necessary for developing Hazard Maps for selected facilities at FNAL. This Technical appendix takes the original Hazard Map tasking document and formally incorporates it into FESHM 6010 as part of the Fire Protection Program.

POLICY

This program is to provide a level of pre-fire planning in order to facilitate response by the responding Fire Department(s) to emergencies. Having knowledge of the facility and its contents has proven useful during emergency response sufficient to help minimize losses from fire and related emergencies.

STANDARDS

Expert input has been drawn upon from Senior Safety Officers, ES&H Fire Protection Engineer, Fire Department personnel, Emergency Responders, NFPA and others. Their valuable input helped develop the hazard communication tool discussed here.

Each building/structure excluding residential units, are required to have a basic Hazard Map consisting of key information in a standardized and manageable format.

RESPONSIBILITIES

The Laboratory Director is responsible for

- Overall responsibility for the fire protection program
- Assuring that adequate resources are available to carry out the elements of the fire protection program as delineated in this chapter.

The ES&H is responsible for

- Act as project coordinator/overseer.
- Reviewing and approving initial maps, developed by the Divisions/Sections.
- Promulgate standards and guidelines for hazard maps.
- Establish and maintain map templates and icon database.
- Communicate any format or usage changes.
- Assist Division/Section in map preparation, answer questions.

The Division/Section Head is responsible for

- Designate personnel --- one primary and one backup --- to participate in the project, and to maintain the program's integrity.
- Develop the plan for data collection, production, review and issuance of Hazard Maps to designated locations.
- Responsible for assigned property utilized by other tenants.
- Obtain approval of the ES&H on initial maps.
- Issue three copies of the completed and approved maps to Fire Department.
- Post a copy of the completed maps at fire alarm panels.
- Provide for internal distribution of maps, as deemed necessary.
- Develop an internal inspection program to check the accuracy of the HazMaps on a periodic basis.
- Resolve the known/reported deficiencies in a prompt manner.

The Senior Safety Officer (SSO) is responsible for

- Facilitating the Hazard Map Program within their Division/Section.
- Facilitating updates to maps based on time, usage change or requests from the Fire Department or Emergency Planning.

The Fermilab Fire Department (FFD) is responsible for

- Educate MABAS members and other off-site responders on how to use maps as appropriate.
- Post completed maps in Fire Department Response Map three-ring binder.
- Carry completed maps in Fermilab Fire Department's primary response vehicles.
- One set of HazMaps to be maintained at the Fermilab Fire Station for the availability and use of an off-site fill-in company.
- Conduct random checks of the HazMaps accuracy during regularly scheduled FFD inspections of the facilities/building
- Report HazMap program deficiencies to the respective Senior Safety Officers and a copy to the ES&H Emergency Management Department Head

PROGRAM ELEMENTS

The purpose of this document is to establish criteria that lead to a uniform method of identifying and communicating hazard information in Fermilab buildings and structures.

Chemicals, flammable gases, cryogenic fluids, and radioactive materials are some of the hazards that exist at Fermilab. Emergency responders must be aware of a variety of hazards.

Obsolete information in an emergency can be fatal. Hazards must be conveyed in a brief, graphic manner. Verbal communication during odd hours and wordy documents are too risky when time is crucial. Hazards must be understood at a glance. Emergency responders need "instant knowledge."

Since its inception, the Hazard Map was viewed as a method to convey hazards at a glance. Standard symbols (icons) are adopted to speed production, quick recognition of hazard type, aid interpretation and above all, provide uniformity.

Icons chosen for this task stem from internationally recognized symbols. Only certain icons are required on the HazMaps. To protect the integrity of the program, any modification of the icon/symbols is strictly forbidden. Usage of any new symbols must be pre-approved by ES&H Emergency Planning.

Principal Components of the Basic Hazard Map

The basic hazard map is a simple near scale drawing made to fit in a standard three-ring binder. The example in Appendix A, represents a map on a 8-1/2" x 11" page. An 11" x 17" drawing may also be used, but is considered the maximum useful size. Fundamental components of the map include:

1. The basic structure.
2. Building information: name, location, and FIMS numbers
3. Overall dimensions
4. The orientation of the map with an arrow pointing north.
5. Entrance and exit points, walkways.
6. Key utilities and controls (shut off points, fire suppression controls.)
7. Hazards and emergency response information.
8. Location of nearest road and fire hydrant.
9. Use of standardized symbols.

10. Preparer's initials and date map was approved for posting.

Scales and Measures

The scales and measures system that is to be used in the basic hazard map program will be the United States Units of Measurement (foot, pounds, and seconds). Given the probability that off-site emergency responders will use these maps, it is necessary to ensure everyone understands the values, measures and quantities associated with each item.

Map Uniformity

Uniformity is essential to this project. Therefore, the following criteria must be followed. A detailed document layout with coordinates of key components is attached in Appendix C.

Drawing Size

8-1/2" x 11" document to fit in a standard three-ring binder (an 11" x 17" folded, will also work, but is the maximum useful size). The left 11 inch border of the document will be used to secure the map into the binder.

Text Size and Font

Times or similar font. 6 or 7 pt, depending on available space.

Scale

Scale should provide best mix between a useful level of detail and available drawing area. Some diagrams may not fit on one page. In these instances, the diagram should be divided at sensible locations and so indicated with match lines. Every attempt should be made to fit the sections on one page, but this isn't always possible. When it's not, and more than one page is necessary, the "Page x of x" keys located at the top and bottom of each page shall indicate the page and numbers of pages to the HazMap.

Orientation

Utilize the available drawing space to optimize the drawing. Use an arrow oriented to reflect north. Ensure the nearest road is identified on the drawing. If drawn on an 11" x

17" sheet, the legend keys will be placed along the right hand border of the map, this to maintain uniformity and so the sheet can be folded to fit in a standard three-ring binder.

Hazard Communication

The sole purpose of this program is to produce a near-scale drawing of a building identifying key controls, processes and hazards within the area. This map is NOT to reflect non-hazard information (i.e. FIRUS connection, emergency light, tornado shelter, etc.

In addition to the information on the map being current, the Emergency Responders need some sense of the "age" of this information. Place at the bottom right hand corner of the map, the Preparer's initials and date the map was approved.

As a general rule of thumb, control icons are to reflect significant control points. It is from this location the emergency responder has the ability to control the item. It is the natural gas valve on the outside of the building that is to be identified on the map and not the gas valves located at individual water heaters and furnaces.

Standardized icons shall be placed on the map at a location corresponding to their position in the building. For hazardous materials, the icon, chemical name, DOT UN number and quantity are added to the Hazardous Materials key. The DOT UN numbers aid emergency responders in determining how to approach an emergency situation involving this material. The UN number may be obtained from the MSDS sheet or from the current DOT Emergency Response Guidebook (2004).

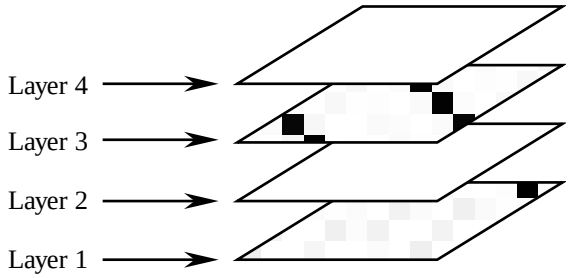
Only authorized symbols will be used. Do NOT invent Icons or abbreviations for inclusion on the Hazard Map.

Computer/Software Requirements

Any computer and drawing software may be used to meet the requirements of this program, provided that the final product adheres to the requirement for layout and authorized icons.

It has been found that software programs that permit "layering" of information provides for the maximum versatility of efforts. In effect rather than drawing a map for the HazMap Program, another for desk assignments, etc. It was found that drawing the building and using it as a foundation, layers can be added or removed based on the intent of the map.

Information is "layered" in each HazMap file. A layer is similar to a transparency, and can be placed on top of another. The more layers, the more information is contained in the file:



Information stored on one layer can be changed without affecting data on others. Additional layers can be added or hidden from view as desired. This way effort spent on creating the HazMap is further leveraged as it becomes the basis for other uses like *e*scape maps, ethernet diagrams, or VESDA maps.

Hazard Map Information

Layer 1: Document Layout Layer (illustrated in Appendix C)
Contains all information necessary to construct a HazMap.

Layer 2: Structural Layer
Contains General Information key, building structure, system controls, equipment and attached fixtures.

Layer 3: Hazard Layer
Contains only the required hazard information.

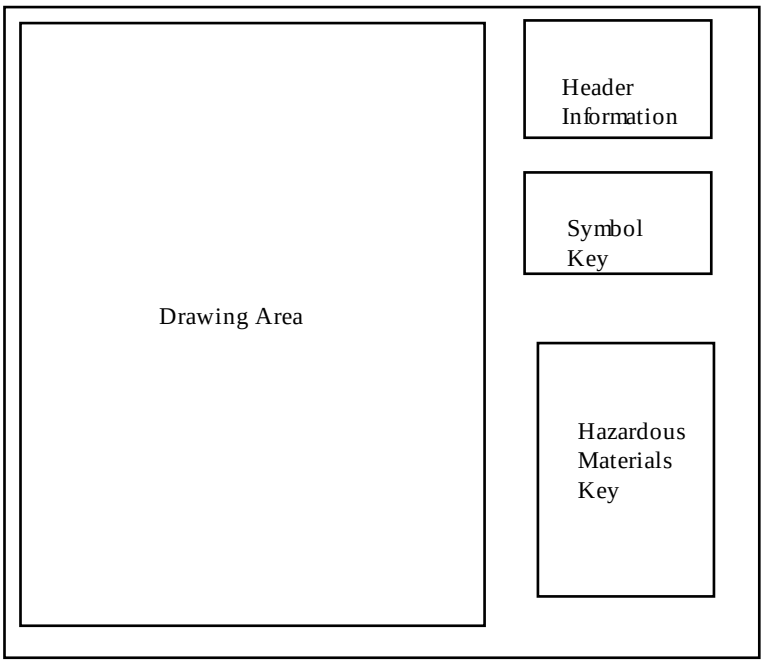
For In-house Administrative use only-not to be included on the Hazard Map

Layer 4: Building Manager Layer
Reserved for information specific to building management needs.

Layer 5: E S & H Layer
Reserved for ES&H information, like fire detection equipment, etc.

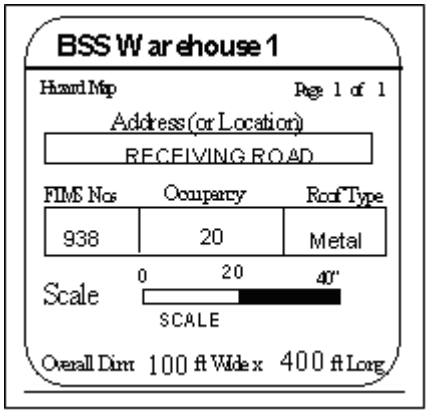
Other Layers:
May be added as needed for locally generated information maps.
NOTE: Most of the building sketches are available from FESS.

Hazard Map Outline



Refer to Appendix A for detailed drawing example.

Header Information



Division/Section and Name of Building
Page 1 of X

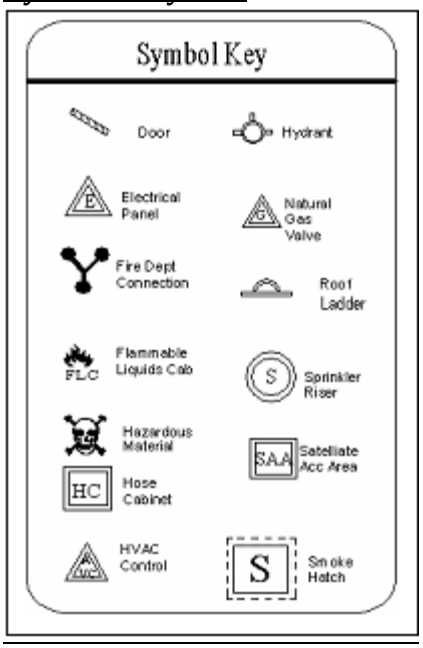
Common Address of Building

FIMS number; Average Occupancy; Type of Roof

Scale used on this drawing

Overall dimensions of this building

Symbol Key Box



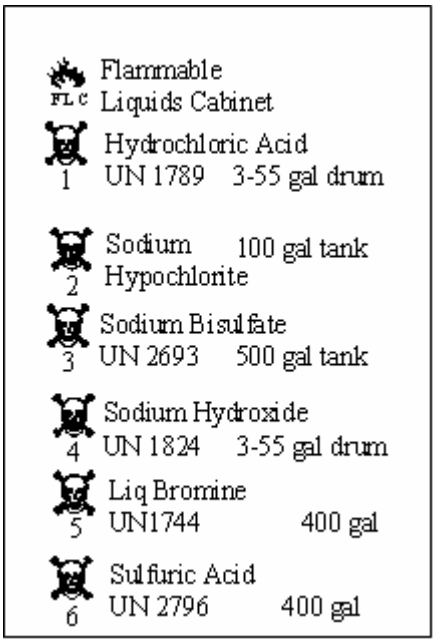
This box is used to identify the generic icons used on this drawing.

Starting in the upper left hand corner, arrange the icons in aphetically order Top to bottom, left to right.

Based on the number of generic and hazard icons used,

This box may be one or two columns in width

Hazardous Materials Box



Within the Hazard Box, the selected hazard icon, the Common Name for this material, DOT UN number and the quantity of material present at the specific location. In some cases the product will not have a UN number.

Scientific annotations are NOT to be used.

For buildings that do not have any special hazards, then the word "NONE" is to be typed into the Hazard Legend Box in large, bold font.

Icon Placement Rules

--NOTE--
DO NOT invent your own symbol and acronym
--NOTE—

Icons are used to identify the "item of interest" to the emergency responder. The use and placement of an icon will identify its location and provide generic information. In the case of a hazardous material, the icon is used to provide specific information about the material to the responder.

A complete list of all the icons is located in Appendix C of this document. These are the only authorized icons for use on a Hazard Map.

Icon Within the Drawing Area

There are three icons that may be used in this area, the basic icon, the icon with attached subscript number or the icon requiring an explanatory acronym.

Example: Basic Icon

To identify the location of a Flammable Liquids Cabinet the 

symbol is to be used.

Example: Hazardous Material Icon with Subscript

A hazardous material has been identified and it does not appear on the Icon List.

--NOTE--
DO NOT invent your own symbol and acronym
--NOTE—

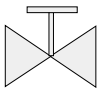
Select the Hazardous Materials icon  and place a subscript number underneath.

1

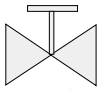
This will now stand for Methyl Ethyl Bad Stuff and represent 1 drum on this drawing alone. Where ever this Icon is used on this drawing this product and quantity is present.
If there is a radical difference in quantity (1 drum Vs 10 drums) of this material in the building then a second icon with another subscript will be required.

2 This icon will now represent Methyl Ethyl Bad Stuff on this drawing and will represent 10 drums.

Example: Icon requiring an explanatory acronym

Valves  are the most likely candidate for an explanatory acronym.

DWSV	Domestic Water Shut-off
ICWSVS	ICW Supply
ICWSVR	ICW Return
LCWSVS	LCW Supply
LCWSVR	LCW Return



DWSV Domestic Water Shut-off

Icon Within the Symbol Key

This key gives a quick overview of the items identified on the map.

Use only the generic icon and the written definition of the icon. An example is use of the Flammable symbol and word flammable to identify that flammable icons are in use in the map.

Icon Within the Hazard Key

This key is to provide emergency responders with specifics on the hazards identified on the map. Here specific icons are required in addition to the product name, UN number (if applicable) and quantity information.

Single Product Location

- Place the icon within the drawing area.
- In the Symbol Key use only the generic symbol for this product.
- In the Hazardous Materials Key use the same icon as in the drawing area. Fill in the technical information (name, UN number) and quantity.

Generic Icon with Multiple Products

This technique is used whenever a generic icon is used to reflect a variety of products that may belong to this chemical family.

Example, the facility contains barrels of Nitric Acid, Sulfuric Acid, and Hydrochloric Acid. The icon that should be used is the generic hazardous materials (skull and crossbones).

- Identify the location of each product and place a sequential number in parenthesis beneath the icon.

- In the Symbol Key use only the generic symbol for this product.

- In the Hazardous Materials Key position each icon used in the drawing area to include the attached number. Fill in the technical name, quantity, series numbers and description.

Multiple Locations for a Single Product

If all details of the material are identical.

- Place the icon within the drawing area, underneath each icon place in parenthesis a sequential number.

- In the Symbol Key use only the generic symbol for this product.

- In the Hazardous Materials Key use the same icon as in the drawing area. Fill in the technical information (name, UN number) and quantity.

Normal Office/household/User level quantity of material

Products fitting this description will NOT be reflected on the HazMap. The intent of the HazMap is to reflect dangers that are of an immediate life/health concern to the Emergency Responder.

Examples:
Window cleaner, white out, cleaning supplies, etc.

Products Stored or Used from Type Accepted Storage Cabinet

Products utilized in this manner will be reflected as the storage method and not the component parts.

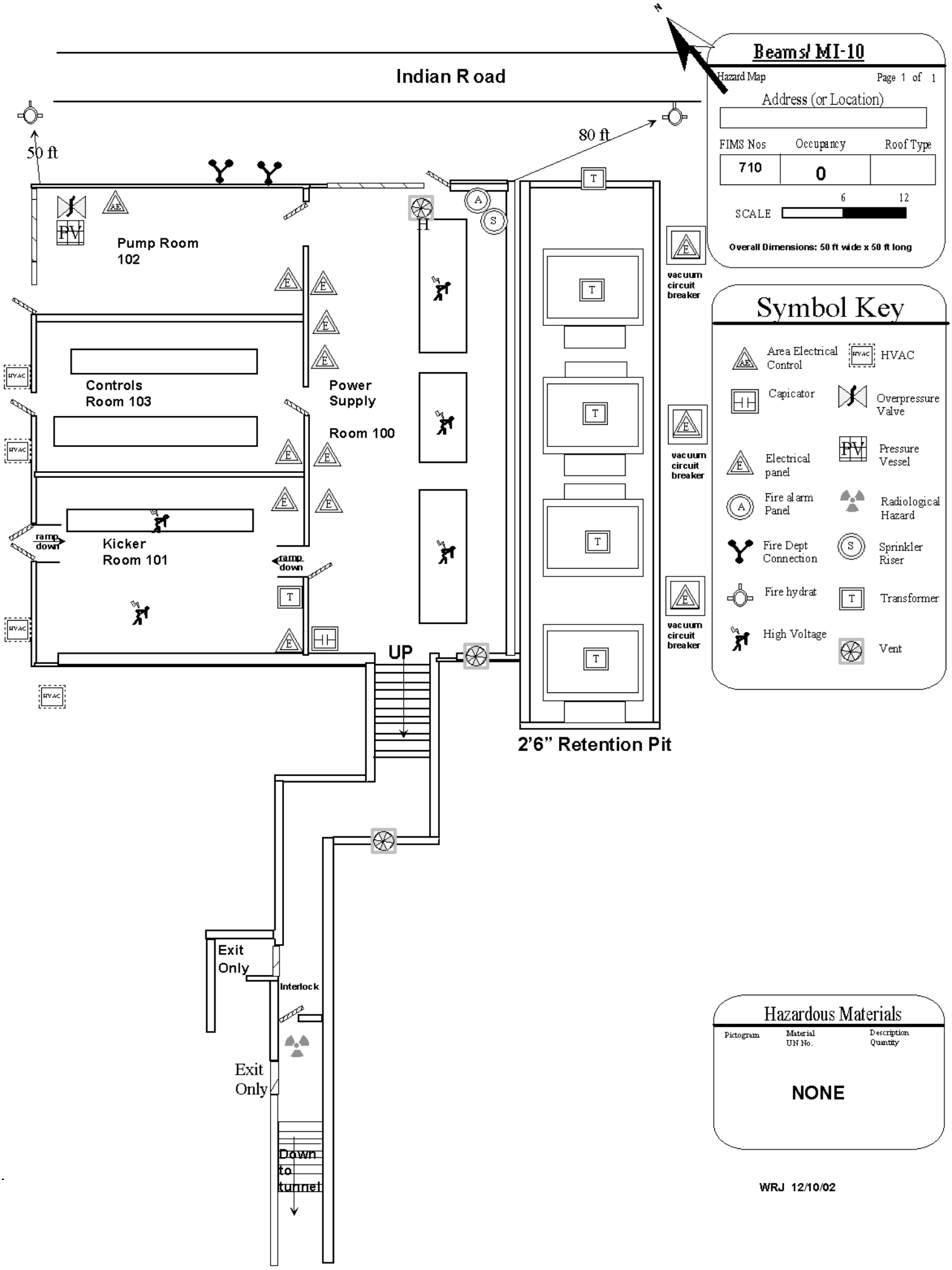
Example:
Paint, thinners, solvents stored/used from a flammable liquids cabinet will be reflected as a FLAMMABLE LIQUIDS CABINET utilizing the FLC icon.

Radioactive sources used for testing/calibration but are stored in a secured cabinet will be reflected as RADIOACTIVE SOURCE CABINET utilizing the RADSC icon.

Multiple products in a Confined Area

To prevent congestion, place one icon in its use location. Then place the other icons beyond the immediate area with a connecting line and arrow to its actual use location.

Appendix A
Sample Drawing


Indian Road
50 ft
80 ft
Pump Room
102
Controls
Room 103
Power
Supply
Room 100
Kicker
Room 101
ramp down
ramp down
UP
vacuum circuit breaker
vacuum circuit breaker
vacuum circuit breaker
2'6" Retention Pit
Exit
Only
Interlock
Exit
Only
Down
to
tunnel
Beams/ MI-10
Hazard Map
Page 1 of 1
Address (or Location)
FIMS Nos
Occupancy
Roof Type
710
0
SCALE
6
12
Overall Dimensions: 50 ft wide x 50 ft long
Symbol Key
Area Electrical Control
HVAC
Capicator
Overpressure Valve
Electrical panel
Pressure Vessel
Fire alarm Panel
Radiological Hazard
Fire Dept Connection
Sprinkler Riser
Fire hydrat
Transformer
High Voltage
Vent
Hazardous Materials
Pictogram
Material
UN No.
Description
Quantity
NONE
WRJ 12/10/02

APPENDIX B
Approved Icons

CONTROL ICONS

Automated External Defibrillator

Electrical Panel 480V

Gas Valve (natural gas)

Electrical Panel 480V

Experiment Flammable Gas Valve

Area Ventilation Control

Overhead Crane Disconnect

Smoke Hatch

Equipment Hatch

Roof Hatch Personnel


Standpipe Dry


Standpipe Wet


Fire Dept Connection

Satelliate Acculumation Area


Control Valve

Domestic Shut off = DWSV
ICW Sply = ICWSVS
ICW Rtn = ICWSVR
LCW Sply = LCWSVS
LCW Rtn =LCWSVR


Overpressure Relief Valve

Pressure Vessel > 6" dia

Vacuum Vessel > 12" dia

Vacuum Window


Vent Location

Duress Alarm


Fire Hydrant

Fire Alram Panel

Sprinkler Riser


Halon Abort Switch

Halon Bottle Storage

Halon Activation Switch

Inergen Abort Switch

Inergen Activation Switch

Inergen Bottle Storage

Carbon Dioxide Abort Switch

Carbon Dioxide Activation Switch

Carbon Dioxide Bottle Storage

North


Ladder

Fence


Gate Oriented dir of travel


Door Oriented dir of travel

HAZARD ICONS


Flammable Material

Argon Ethane Mixture

Ethane
UN 1035

Flammable Gas System

Flammable Liquids Cabinet

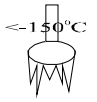
Hydrogen
UN 1049

Hydrogen Target

Isobutane
UN 1969

Propane
UN 1075

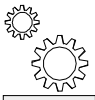

Laser Class 3+

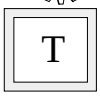


Cryogenic Material


Compressed Gas Bottles

Inert Gas Bottle


Mechanical Hazard



Transformer


Capacitor


High Voltage


Confined Space

UPS unit

Hazardous Material

Beryllium
UN 1566

Cyanide Plating Mtrl

Chemical Storage Cabinet

Ethylene Glycol
UN 1153

Mercury
UN 2809

Lithium
UN 1415

Methylal
UN 1234

Methanol
UN 1230

Lead
UN 2291

PCB's
UN 2315

Triethylamine
UN 1296

Trimethylamine

1,2,4 Trimethlbenzine

Scintillation Oil

Uranium


Radioactive Hazard

Radioactive Material

Radioactive Water System

Radioactive Source Cabinet

Radioactive Source

APPENDIX C

Layout

Div/Sec / Bldg Name

Hazard Map

Page 1 of

Address (or Location)

FIMS Nos	Occupancy	Roof Type

SCALE

Overall Dimensions: ft wide x ft long

Symbol Key

This box may be expanded or contracted as needed.

Hazardous Materials

Icon	Material Name UN No.	Description Quantity

This box may be expanded or contracted as needed.

Preparers Initial and Date of Map

APPENDIX D

Hazardous Material Reporting Thresholds

This Appendix is a reference guide in determining which products, under what storage, usage and quantity conditions should be reflected on the HazMap. This in turn reduces the burden on HazMap developers while ensuring appropriate information is obtained for emergency responders. This document does not supersede any regulatory requirements concerning hazardous material storage or usage.

This document provides additional guidance to HazMap developers that should be used when applying Appendices B or D of the Hazard Map Project. Appendices B and D identify hazards and hazardous materials that are typically encountered at the lab.

Quantities of hazardous materials equal to or in excess of the following reporting thresholds in one area should be included on the HazMaps for products used or stored outside of approved storage cabinets other than for dispensing purposes. Household items (window cleaner, toilet bowl cleaner, etc.) are reportable if they exceed the limits listed below and are stored in bulk quantities (cases, pallets, etc) outside of metal cabinets. These reporting thresholds are not required by any specific regulation. They serve to inform emergency responders of the potential hazards that may be encountered in a work area.

Materials having an NFPA 704 Identification of Fire Hazards of Materials rating of 3 or 4 in any of the following categories: Health Hazard, Flammability Hazard, Reactivity Hazard or having a Special Hazard of OX or ~~W~~ will be reflected on the Hazard Map. Exception to this rule is if the product is stored in an approved storage cabinet or the quantity of the product falls below the reporting thresholds listed below.

To use the following table, find the hazard characteristic of the material in the first column, then find the associated decision level in the second column. If the quantity of material exceeds the level shown in the third column then the material must be listed on the HazMap., provided other storage or use conditions have not been previously met, i.e. product stored in an authorized cabinet. All units shown on the HazMaps should be expressed in U.S. standard units.

Hazard Characteristic	Decision Level	Reporting Threshold
Ignitability	Flammable / Combustible liquids, flashpoint < 200 ^{O}F (Class 1 A -III-A) (NFPA 2-4)	≥ 1 gallon Note: If used continuously or stored outside approved flammable liquid storage cabinets
	Combustible Liquid≥ 200 ^{O}F <300 (Class III-B) (NFPA 1)	≥ 5 gallons Note: If used continuously or stored outside approved flammable liquid storage cabinets
	Combustible Liquid> 300 F (NFPA ≥ 3)	> 30 gallons
Corrosivity	pH ≤ 2 or pH ≥ 12.5 (NFPA ≥ 3)	≥ 32 ounces
Reactivity	Normally unstable, reacts violently with water, or forms potential explosive mixture with water. See 40 CFR 261.23 (NFPA ≥ 3)	≥ 8 ounces
Hazard Characteristic	Decision Level	Reporting Threshold
Health	NFPA ≥ 3	≥ 8 ounces
	NFPA > 2	≥ 64 ounces
	NFPA ≥ 1	≥ 1 gallons
Radioactivity	Any radioactive material	Class 1 or greater Note: If used continuously or stored outside approved radiation source storage cabinets

All approved storage cabinets for flammable liquid, corrosive material, toxic substances, and radioactive materials should be shown on the HazMaps regardless of the quantity of material that is stored in the cabinet. All high pressure gas (≥ 2000 psig) flammable gas and cryogenic systems, and storage areas should be identified on the HazMaps. A chemistry laboratory having numerous small quantities of chemicals present, which collectively poses a danger to the Responder should be described by the generic icon of the most likely danger; flammable, hazardous materials or radioactive) and the phrase

Chemistry Lab . In the Hazard Description describe the chemicals as "assorted chemicals".

If a material does not meet the above listed criteria and in your opinion poses a significant hazard to employees or emergency responders, by all means, include it on the map using the procedures described within the HazMap guidance document.

APPENDIX E

Frequently Asked Questions

Follow on Guidance/Clarification's

The field application of the HazMap program has resulted in the need for additional guidance, clarification of stated procedures or the introduction of new information requirements.

Placement of Hazard Maps: Hazard maps are to be placed next to building fire alarm panel. Building not having a fire alarm panel, post map at primary entrance to the building.

Multiple page maps may be consolidated into a single notebook/folder and placed/posted next to the buildings alarm panel. For these maps it is best to have a basic cover sheet of the entire facility which references specific details maps

Aisle ways: as best as practical, indicate aisle ways. Building shall be drawn to scale / near scale.

Doors and gates "open" in the direction of travel. Overhead doors drawn to scale. All doors indicated with "slanted hash-mark" pattern: 

Gates and fences indicated with shaded line:

Stairways indicate "up" or "down." With a arrow and word (up or down) relative to where reader is standing.

Hidden stairs drawn with dashed line.

HVAC units (or other large devices) may be found mounted on the roof, hung from the ceiling or mounted on the ground. Beneath the HVAC symbol place the letter "R" for units mounted on the roof of the facility, "H" for units suspended from the ceiling or "F" for units mounted on the floor.

Fire Department connection "Y" should have the upper (double) wings facing away from the building, the stem will be attached to the building.

Compressed (Inert/Flammable) Gas Bottles

For Inert compressed gases:

If there are a few bottles in the area and can be specifically identified, then do so if it does not overwhelm the map.

Identification will include the use of the inert icon, with an underscore number for each material identified in the drawing area. The Inert icon will be placed in the symbol legend and the phrase inert gas will be used. In the Hazard key each icon identified with a subscript number will include: specific product name, UN number and quantity of material.

For more than 2 bottles-in a small area, use inert bottle icon in the drawing. In the symbol key insert the inert bottle icon and the phrase inert gases. In the hazard legend include the icon, the phrase INERT and number of bottles in the area.

For Flammable compressed gas

If there are a few bottles in the area and can be specifically identified, then do so if it does not overwhelm the map. Identification will include the use of the flammable icon, an underscore number (as appropriate) in the drawing area. The flammable icon will be placed in the symbol legend, and the phrase flammable gas. In the Hazard key position the icon with the specific product name, UN number and quantity of material.

If the flammable gas product is not specified on R list use the flammable icon with an underscore number (as appropriate). If there are a few bottles in the area, then specifically identify the product if it does not overwhelm the map. Identification will include the use of the icon in the drawing area. The icon and phrase flammable material, specific name, UN and quantity of material.

If there is large number of bottles, of same flammable family in small area use flammable icon, with underscore number to identify the location of the product. Use this icon in the symbol key with the phrase flammable material. In the hazard key position the icon and identify the product as flammable compressed gases and number of bottles present.

Partitions, wall lockers forming walls/ individual cubicles/work areas are to be reflected on the Hazard Map.

The triangle AVC icon: represents any switch, lever, knob used to turn on or off the HVAC. This icon is not to be used for thermostats. If a circuit breaker inside of an electrical panel is the control, use the AVC icon. Underneath the AVC icon, identify the unit being controlled (HVAC, VLOC, etc). Beneath this line, using the times font, size 5 or 6, identify the panel and circuit breaker by number ((PHP NL6 Ckt. 20). A small shaded box reflecting the actual position of the electrical panel is to be positioned in the drawing area.

Vents/fans: 18+ inches in diameter should be reflected on the map. These are considered to be MAJOR air handling devices. Small fans found in bathrooms or are a couple of inches in diameter are not considered major and will not be reflected on the Hazard Maps.

Capacitor Bank Icon should be used to reflect a single capacitor or a bank of capacitors.

Relay Racks. If the rack contains a dangerous item (i.e. high voltage) it must be identified on the map. If the racks form a permanent or near permanent wall and it does not overwhelm the map, identifying the racks on the map is authorized.

Listing of icons should be in alphabetical order within the symbol key, starting in the top left and working down the left column, returning to the top right as required. To use the work area most effectively, it is preferred to use two columns whenever possible.

Buildings without a fire alarm panel will post the facility Hazmap on the interior wall at the main entrance of the building which is adjacent to the nearest road and fire hydrant.

Oxygen (compressed gas) bottle is classified by DOT as an oxidizer. This product promotes the combustion process, may cause instantaneous combustion when combined with oils, solvents, etc. Further, this product is a cryogenic. For the purpose of the HazMap program, compress gas bottles of oxygen should be reflected using the hazardous materials icon using a subscript number and providing detailed information in the description column of the hazard key.

Shielding blocks should be shaded using a light shading pattern. This will ensure that these blocks are not mistaken for cubicles, lockers, walls, etc.

Ramps should not have shading and the word “ramp” displayed within the rectangle. A direction arrow and orientation (up/down) of the ramp should also be included.

Interior, non roof ladders are identified by the word ladder with an arrow pointing to its location.

Use plain English to identify location and elevation difference. At a location where there is a radical change of elevation, annotate with: (5 foot drop)

RAD Materials Icon is to be used for special or designated areas where non-restrictive access is permitted the symbol of be used at the designated locations where such material is stored.

RAD Hazard icon is to be used for restricted areas (i.e. enclosures). This symbol will be place at the entrances to the facility.

Floor grates be treated and drawn as part of the standard floor, without any special notice or treatment.

Identify/draw experiments, beam lines, or other items which hinder movement in a facility must be reflected on the Hazard Map.

Exit Only Doors: Doors that are used exclusively for exiting in an emergency will be identified using the door icon, modified to a closed position. Adjacent to the closed door the phrase "EXIT ONLY" in bold caps will be positioned.

Area Electrical Switch is a device which shuts off ALL power to a given area.

Experiments that have flammable gas, the Experiment Flammable Gas icon is to be used. The guidelines for using the Natural Gas icon will be used anytime a gas line has a regulator and shut off valve and it enters a building or serves multiple HVAC units outside a building.

Hand Rails: Use a dotted or slashed line to indicate hand rails on a mezzanine. Other hand rails are indicated by a solid line. Both types require text stating "hand rail" and an indication of "fall" elevation.

Sliding Doors/Gates are to be presented in the "closed" position with an arrow indicating the direction that the door/gates slide to open.

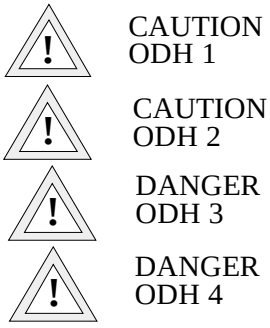
Telephone Locations: Only as specifically requested by the Fire Department, identify telephone location and extension. Normally this request will be made for underground enclosures. Place the generic telephone icon in alpha/numeric order in the symbol key of the map legend. At the appropriate location on the

map place the telephone icon. Underneath the phone icon, in a larger and bold type, list the extension number. If the area is congested, or the placement of the icon would interfere with the understanding of the map, it is permissible to offset the icon having a direction line/arrow specifying the phone's location.

Uninterrupted Power Supply (UPS) Units: Identify significantly large or large number of clustered UPS units (i.e. racks). This is not intended for the single UPS associated with individual units or components. Icon is a box with the letters UPS.

Duress Alarm: Upon the request of the Fire Department, Fixed Duress Alarms are to be noted at the appropriate location using the capital letter "D" in at least a 15 point font in bold. Within the legend column of the map, this icon and the description "Duress Alarm" is to be placed.

Oxygen Deficient Hazards (ODH) These areas are not to be reflected on the HazMap. For other maps for use within a division/section it is recommended that the appropriate icon



be used in accordance with FESHM 5064 in describing these areas.

Partitions, Devices or other Obstructions as a general rule of thumb for partitions, devices or other obstructions, they should be reflected on the hazmap as they would impede the movement of emergency responders. Partitions should be drawn using a gray line. A solid black line would indicate a fixed wall assembly.

Automated External Defibrillators (AED) Upon the request of the Fire Department, Automated External Defibrillators (AED) are to be noted at the appropriate location using the international icon (heart with lightning bolt) over the letters AED. Within the symbol key include this icon and the description "Automated External Defibrillator". Additionally, visible signage will be used to mark the location for the maximum visibility.