DEPARTMENT OF ENERGY

"MODEL" FIRE PROTECTION PROGRAM

FORWARD

This Fire Protection Program may be applied to all U.S. Department of Energy (DOE) sites and operations. This program demonstrates acceptable methods and examples to assist each DOE site in meeting the fire protection objectives provided in DOE Order 5480.7A, "Fire Protection." The program may be used in full or in part for establishing new programs or for improving existing ones, and the examples may be used verbatim or tailored for specific site needs.

DOE site fire protection programs are not expected to follow the exact format of this program, but are expected to address, as a minimum, the items included in the Table of Contents as they apply to the specific sites. Where specific site areas are not covered in this program, other site fire protection programs would be expected to address those items to the same level of detail, as a minimum, as provided in this program.

This program is not intended to prevent the use of other systems or methods, provided the alternate approaches address the items to an equivalent level as in this Program.

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U.S. DEPARTMENT OF ENERGY
"MODEL" FIRE PROTECTION PROGRAM

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ACRONYMS

AC	Alternating current
AFFF	Aqueous film-forming foam
AGA	American Gas Association
AHJ	Authority having jurisdiction
BED	Building Emergency Director
BLEVE	Boiling liquid expanding vapor explosion
CHEMTREC	Chemical Transportation Emergency Center
CO_2	Carbon dioxide
CPR	Cardiopulmonary resuscitation
CTC	Canadian Transportation Commission
DC	Direct current
DOE	U.S. Department of Energy
DOE-HQ	U.S. Department of Energy-Headquarters
DOT	U.S. Department of Transportation
EMT	Emergency medical technician
EPSS	Emergency power supply system
ERG	Emergency Response Guidebook
ESRF	Embankment-support rubberized fabric
FACP	Fire alarm control panel
FDC	Fire department connection
FM	Factory Mutual
HAZMAT	Hazardous material
HEPA	High-efficiency particulate air
HVAC	Heating, ventilation, and air conditioning
IFSTA	International Fire Service Training Association
MCFL	Maximum credible fire loss
MPFL	Maximum possible fire loss
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
OS&Y	Outside screw and yoke
PA	Public address
PADI	Pocket alarm dosimeter instrument
PASS	Personal Alert Safety System
PCB	Polychlorinated biphenyls
PIV	Post indicator valve
PM	Preventive maintenance
SAR	Safety analysis report
SCBA	Self-contained breathing apparatus
SEPSS	Stored electrical energy emergency and standby power system
SFPE	Society of Fire Protection Engineers
SWP	Special work permit
T&S	Testing and Services
UL	Underwriters Laboratories

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1.0 SITE SPECIFIC FIRE PROTECTION OVERVIEW

1.1 SITE OVERVIEW

This section should include a brief overview of the site's operations and mission, and the fire protection program. It should include a short description of how the Fire Protection Engineering group operates, the emergency response services available to the site, the water supply to the site, who performs testing and maintenance activities for the fire protection systems, any major fire losses that have occurred in the past, and specifically, any fire protection systems or hazards that are considered unique to the site.

1.2 POLICY STATEMENT

This section should include a senior management policy statement regarding the goals of, and commitment to, the fire protection program. The statement should be dated and signed by senior management. {Reference DOE 5480.7A, Section 9.a.(1)(a) and (b)}

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2.0 MANAGEMENT AND ADMINISTRATION

2.1 MANAGEMENT RESPONSIBILITIES

This section should include management's responsibilities involving the site fire protection program and clearly define who is responsible for implementing the different parts of the program. Those with fire protection signature authority should also be identified. A statement concerning the need to resolve conflicts between these fire protection requirements and those of other disciplines should also be addressed. The following serves as an example: {Reference DOE 5480.7A, Section 9.a.(1)(a) and (b)}

Management shall:

1. Provide and maintain the necessary fire protection staff and resources to develop and maintain the fire protection program, and provide technical expertise to achieve the U.S. Department of Energy's (DOE) fire protection goals and requirements.

2. Minimize the potential for the occurrence of a fire or related perils.

3. Ensure that fire does not cause an unacceptable onsite or offsite release of hazardous material (HAZMAT) that will threaten the public health and safety or the environment.

4. Establish and define the requirements that will provide an acceptable degree of life safety to DOE, contractor personnel, and the public from fire in DOE facilities.

5. Ensure that vital DOE programs will not suffer unacceptable delays as a result of fire and related perils.

6. Ensure that property damage from fire and related perils does not exceed DOE established levels.

7. Provide fire protection technical assistance to DOE as requested.

Management is responsible for executing the procedures in this program and for adhering to the requirements of the fire protection program for the facilities and/or operations under their jurisdiction. Whenever the requirements cannot be met, management shall consult with a representative from the Fire Protection Engineering group and the Fire Department to determine the compensatory measures that must be implemented until compliance is achieved or an equivalent level of protection is provided.

If an exemption request is required, or an equivalent approach needed, the organization manager shall be responsible for preparing the request and submitting it to Fire Protection Engineering for review and concurrence.

Program managers are responsible for ensuring that funding is secured for correcting fire protection deficiencies in programs or facilities, and for consulting with Fire Protection Engineering for prioritization of the deficiencies.

Facility managers are responsible for ensuring that fire protection equipment in the buildings under their jurisdiction is in full operating condition, and for initiating corrective action when repairs or maintenance are required.

When there is a conflict between the requirements of this program and those of another discipline (e.g., security), the manager of Fire Protection Engineering and/or the fire chief, depending on the area involved, are responsible for resolving the conflict with the manager of the other discipline. If a resolution cannot be reached, the issue shall be escalated to the next level(s) of management until the issue is resolved.

2.2 CHARTER

A charter should be included that specifically identifies the responsibilities and authority of the Fire Protection Organization or those departments responsible for the site fire protection program. The following serves as an example for one organization, but the same approach should also be used to clearly identify the responsibilities and inter-department relationships between other organizations such as the Fire Department or Fire Systems Maintenance group. {Reference DOE 5480.7A, Section 9.a.(1)(c)}

Fire Protection Engineering is responsible for the development of the Fire Protection Program to meet the criteria and goals established by the DOE. Fire Protection Engineering shall assist the other departments and operations with the implementation of the Fire Protection Program, and provide interpretations and guidance to ensure compliance with DOE orders, standards, and codes affecting fire protection. In addition, Fire Protection Engineering responsibilities shall entail the following as a minimum:

1. Review and approve designs; specifications; modifications; fire system acceptance test procedures; fire system testing, inspection, and maintenance procedures; and fire equipment procurement.

2. Perform fire protection self-survey facility appraisals.

3. Assist in the prioritization of fire system repairs.

4. Prepare the annual fire protection report.

5. Perform fire protection program appraisals.

6. Perform NFPA 101 (Life Safety Code) evaluations.

7. Assist in fire investigations.

8. Develop Fire Protection Engineering requirements and implementing

procedures.

9. Exercise authority to stop work upon observing an imminent hazard.

10. Perform fire department operations

11. Perform HAZMAT response

12. Maintain a fire prevention program

13. Perform emergency medical response

14. Maintain prefire plans

15. Review and approve fire protection training programs.

16. Obtain fire protection equipment procurement approval.

2.3 ORGANIZATIONAL STRUCTURE

The purpose of this section is to provide a clear and concise chart, and/or description on how and where fire protection fits into the overall organization of the company. The following serve as examples. {Reference DOE 5480.7A, Section 9.a.(1)(c)}

EXAMPLE A

The Fire Protection Program is administered by two departments: Fire Protection Engineering and Fire Department Operations. Both department managers report to the manager of Safety, who reports to the director of Safety, Environment, and Health. The director reports to the company president.

President

Director,
Safety, Environment, and Health

Manager, Safety	Manager, Environment	Manager, Health

Manager,
Fire Protection Engineering

Manager (Chief),
Fire Department Operations

Manager,
Industrial Safety

Manager,
Radiological Safety

EXAMPLE B

The Fire Protection Program is administered by three departments: Fire Protection Engineering, Fire Department Operations, and Fire Protection Oversight and Assessment. Fire Protection Engineering reports to the director of Engineering, Fire Department Operations reports to the director of Safety and Support Services, and Fire Protection Oversight and Assessment reports to the director of Oversight and Assessment. Each director reports to the company president.

Fire Protection Oversight and Assessment performs independent reviews, establishes program criteria, and evaluates compliance with the Fire Protection Program as administered by Fire Protection Engineering and Fire Department Operations.

President

Director, Engineering	Director, Safety & Support Services	Director, Oversight & Assessment
Manager, Fire Prot. Engineering	Manager, Fire Department Operations	Manager, Engineering O&A
Manager, Chemical & Process Engineering	Manager, Security Operations	Manager, Safety O&A
Manager, Industrial Engineering	Manager, Industrial Safety & Health	Manager, Support Services O&A

2.4 STAFFING

The purpose of this section is to briefly describe the personnel that constitute the fire protection staff. This would include Fire Protection Engineering, fire departments or brigades, fire system maintenance and testing, and emergency response such as HAZMAT and medical staff if they are part of the fire department. The following serves as an example. {Reference DOE 5480.7A, Sections 8.i.(8) and 9.a.(1)(c)}

The fire protection staff include the following personnel. Fire Protection Engineering has one manager, five engineers, and one secretary. The fire department includes the chief, deputy chief, and four platoons each consisting of a captain, lieutenant, and five firefighters. In addition, there are three fire fighters specifically trained for HAZMAT response, three medical technicians, and two secretaries.

There are seven technicians that perform fire system testing, and they are part of Fire Department Operations. The fire system maintenance group has six craft people responsible for all maintenance activities on fire protection systems.

2.5 QUALIFICATIONS

The purpose of this section is to include any specific company qualification requirements as well as a short description of the qualifications of each of the fire protection staff members identified in the section above. A complete resume of each individual is not necessary, but the information should be sufficient so it is clear the individuals are qualified for the positions. The following serves as an example of company-specific qualifications as well as those for each individual. {Reference DOE 5480.7A, Section 8.i.(8)}

The Fire Protection Engineering staff shall have at least one individual with a bachelor of science degree in a engineering or related technical field. This person shall also meet the qualifications for member grade in the Society of Fire Protection Engineers (SFPE) or be a registered professional engineer in fire protection.

The fire department personnel shall meet or have a program in place enabling its staff to meet the requirements provided in the following National Fire Protection Association (NFPA) Standards where applicable:

NFPA 1001, "Fire Fighter Professional Qualifications"
NFPA 1002, "Fire Apparatus Driver/Operator Professional Qualifications"
NFPA 1021, "Fire Officer Professional Qualifications"
NFPA 1031, "Professional Qualifications for Fire Inspector"
NFPA 1033, "Fire Investigator Professional Qualifications"
NFPA 1041, "Fire Service Instructor Professional Qualifications"
NFPA 1501, "Fire Department Safety Officer"

The fire system testing and maintenance personnel shall receive a minimum of 40 hours training per year. The training shall be both general and specific to the fire systems installed at the site.

FIRE PROTECTION ENGINEERING

Name	Position	Experience	Education
AC Pile	Manager	15	M.A. Business Management B.S. Mechanical Engineering
JW Teets	Engineer	12	B.S. Fire Protection Engineering
MH Fish	Engineer	10	B.S. Civil Engineering
JJ Tire	Engineer	9	B.S. Mechanical Engineering
ST Sure	Engineer	5	B.S. Fire Protection Engineering
DF Comply	Engineer	2	B.S. Electrical Engineering

2.6 FIRE PROTECTION EXEMPTIONS

This section should include the specific requirements for processing an exemption request as required by DOE Orders 5480.4 and DOE 5480.7A. It should also include a list of all fire protection exemptions approved or awaiting disposition for the specific site. The following serves as an example. {Reference DOE 5480.7A, Section 8.i.(7)}

When compliance cannot be achieved with a non-statutory code, standard or DOE Order, an exemption request (temporary or permanent as applicable) shall be submitted to the DOE. The exemption shall be processed in accordance with DOE Order 5480.4 and include the following information as a minimum:

1. The specification of the standard from which the exemption is being requested.

2. Detailed statements as to why compliance with the requirement cannot be achieved.

3. A description of what measures will be implemented and maintained to provide equivalent protection to the requirement.

4. An analysis of the benefit gained or negative impact avoided by receiving the exemption vs. the worst probable incident that may occur under the exemption.

5. For temporary exemptions, a statement of when compliance will be achieved, and what actions have been and will be taken to meet compliance. A temporary exemption may be in effect for the time required to achieve compliance, but is not to exceed one year. In some cases, the exemption may be renewed.

The fire protection exemption requests approved for the ____ site include the following:

Date	Subject	Building/Program
10/83	Inspect. of control valves	Sitewide
1/85	Stairwell widths	221T
4/91	Potential property loss > $1M	735/Isolation Project

2.7 FIRE PROTECTION EQUIVALENCIES

This section should include the specific requirements for processing an equivalency request as required by DOE Order 5480.4. It should also include a list of all fire protection equivalencies approved or awaiting disposition for the specific site. The following serves as an example, but keep in mind it is always helpful to provide as much supporting documentation (drawings, analysis, documents, etc.) as possible when submitting the request. {Reference DOE 5480.7A, Section 8.i.(7)}

When compliance cannot be achieved with the required DOE orders or mandatory codes and standards, and an alternate method of compliance is needed or desired, the equivalency concept shall include the following information as a minimum and be processed in accordance with the criteria outlined below.

1. The specification of the standard for which the equivalency is being requested.

2. Detailed statements as to why compliance with the requirement cannot be achieved and why an alternate method is needed or desired.

3. A description of the alternate method and an explanation of how this method provides protection that is equivalent to the original requirement.

4. The equivalency concept shall be submitted to the DOE Field Office for approval.

5. The equivalency concept may be approved on a temporary or permanent basis.

The fire protection equivalencies approved for the ____ site include the following:

Date	Subject	Building/Program
12/80	Fire barrier sealant	324
1/84	Two means of egress	457
7/90	Excessive travel distance	951 Tunnels

2.8 FUNDING PRIORITIZATION OF FIRE PROTECTION ITEMS

The purpose of this section is to ensure funding is secured for fire protection deficiencies and projects of high priority. A priority matrix should be in place so deficiencies and projects can be evaluated based on the relative risk associated with each item. The idea is to prioritize projects as well as findings resulting from internal and external surveys, appraisals, and audits. This prioritization scheme is not intended to include maintenance type items, but it could probably be modified to serve both purposes if desired. There are other prioritization methods available, besides the example provided below that could also be used or adapted for this purpose. The main point is that a system be in place to address this issue. The following serves as an example of a scheme for projects and deficiencies only. {Reference DOE 5480.7A, Section 9.c.(2)}

A list of all open fire protection items (such as unfunded projects and findings from internal and external surveys, appraisals, and audits) shall be established and maintained. Each item shall be prioritized based on the potential risk to assist management in the budgeting process, and to ensure that higher risk items receive priority funding. The following prioritization levels shall be used to identify the importance of each item.

PRIORITY I: A deficiency that presents an imminent threat to personnel safety or the environment, and warrants immediate compensatory action and/or correction. Priority I issues should be conveyed to plant and DOE management upon discovery for immediate action.

PRIORITY II: A deficiency that may present a threat to personnel safety or the environment and must be corrected.

PRIORITY III: A deficiency that presents little threat to personnel safety or the environment, but, if corrected, would improve the effective implementation of the fire protection program.

3.0 FIRE PROTECTION ENGINEERING

3.1 FIRE PROTECTION CRITERIA AND REQUIREMENTS

The program should have a section that gives the baseline fire protection criteria for the program as well as for design, modifications, and quality control/assurance. The following serves as an example. {Reference DOE 5480.7A, Section 5}

The following documents are the baseline criteria of the Fire Protection Program. The program shall be administered to provide and maintain compliance with these requirements as a minimum. The fire protection related codes and standards in effect when facility design commences (code of record) shall remain in effect for the life of the facility.

When substantial upgrades or modifications are made, the current edition of the code shall apply to the upgrade or modification. Also, if there is a significant hazard that endangers building occupants, the public, or the environment as determined by the authority having jurisdiction (AHJ), the facility shall be upgraded to the requirements of the current edition of the code or standard.

1. DOE Order 5480.7A, *Fire Protection*

2. DOE Order 6430.1A, *General Design Criteria*

3. NFPA Codes and Standards

4. *Code of Federal Regulations*, Title 29, Parts 1910 and 1926 (29 CFR 1910 and 1926)

5. DOE/EP-0108, *Standard for Fire Protection of AEC Electronic Computer Data Processing Systems*

6. DOE/EV-0043, *Standard on Fire Protection for Portable Structures*

7. DOE Order 5480.4, *Environmental Protection, Safety, and Health Protection*

Designs for all new construction and modifications to existing facilities and systems shall be reviewed in accordance with the Design and Modification Reviews section of this program.

To ensure quality construction is provided for all fire protection work, all equipment installed shall be listed or tested by a nationally recognized laboratory for fire protection application. Acceptance test procedures shall also be performed for each new or modified fire protection system to ensure it functions as designed.

3.2 TECHNICAL LIBRARY

There is a definite need for a comprehensive technical library to assist the fire protection professional in accomplishing the goals of the fire protection program. Since many times technical resources are taken for granted by those unfamiliar with their need, the program should include a section which requires that such a library be maintained with at least the main fire protection codes and standards and DOE Orders. The following serves as an example:

Fire Protection shall maintain a current technical library that includes as a minimum the following resources:

1. DOE Order 5480.7A, *Fire Protection*
2. DOE Order 6430.1A, *General Design Criteria*
3. NFPA Codes and Standards
4. 29 CFR 1910 and 1926
5. DOE/EP-0108, *Standard for Fire Protection of AEC Electronic Computer Data Processing Systems*
6. DOE/EV-0043, *Standard on Fire Protection for Portable Structures*
7. Product directories of "Underwriters Laboratories," along with the periodic supplements
8. Factory Mutual Research Corporation Approval Guide
9. Other applicable DOE orders
10. DOE Fire Protection Resource Manual

Desired referenced material includes the following:

11. NFPA Handbooks
12. NFPA guides, manuals, and recommended practices
13. Factory Mutual Loss Prevention Data Sheets
14. SFPE Handbook
15. DOE *Explosives Safety Manual*, DOE/EV/06194
16. American Petroleum Institute Guidelines
17. Local and state fire protection criteria

3.3 DESIGN AND MODIFICATION REVIEWS

It is imperative that a review process be in place to ensure new designs and modifications to existing facilities, fire system testing and maintenance procedures, and other documents related to fire protection are evaluated for compliance. The purpose of this section is to document and explain how the review process operates at your specific site, and how fire protection interfaces with the process. Comments generated as part of the review process, and the resolution of those comments, should be documented and filed. Providing a matrix or flow chart illustrating the review process would also be appropriate. The following serves as an example for these aspects of the program. {Reference DOE 5480.7A, Section 8.i.(2)}

A documented design review program shall be in place to ensure designs; specifications; modifications; fire system acceptance test procedures; fire system testing, inspection, and maintenance procedures; and fire equipment procurement are reviewed and/or approved by Fire Protection Engineering.

The program shall include a formal tracking system for comments made on all items reviewed to ensure comments are appropriately dispositioned. The form provided as Figure 3-1 must be used at the ____ site to record and track comments and their disposition.

The review process at the ____ site operates in the following manner and is documented in the site engineering manual.

All documents and packages are assigned an "impact level," which determines the significance of the package as related to safety in general. The impact level is assigned to the package by the engineer responsible for the package, whether it be a new project, a modification, or a test procedure. The impact levels range from 1 to 4 with 1 being the most significant and 4 being the least significant. All packages assigned an Impact Level 1, 2, or 3 are required to be reviewed by fire protection. Packages assigned a Level 4 are typically packages involving replacement of equipment with like kind or similar type work. These do not need a fire protection review.

The engineer responsible for the package and assigning the impact level is also responsible for distributing the package to the Central Document Review Office (Central Office). This office then transmits a copy of the package to the different disciplines for review based on a preestablished list. Once reviewed, the packages are returned to the Central Office with any comments. The engineer must resolve comments with the comment originators before the package will be officially released (Figure 3-2 and Table 3-1).

Figure 3-1

COMMENT REVIEW FORM

DATE_____________ REVIEW #_______________ PROJECT #______________

DOCUMENT #/TITLE PROGRAM/BUILDING #

---------------------------- -------------------------------

REVIEWER___________ LOCATION/PHONE___________________________

AGREEMENT WITH COMMENT DISPOSITION
REVIEWER____________________________
COGNIZANT ENGINEER_________________
DATE_______________

ITEM(S) CLOSED
REVIEWER_________________________
COGNIZANT ENGINEER______________
DATE_______________

ITEM#	COMMENT	DISPOSITION	STATUS
1.			
2.			

Figure 3-2. Review Process.

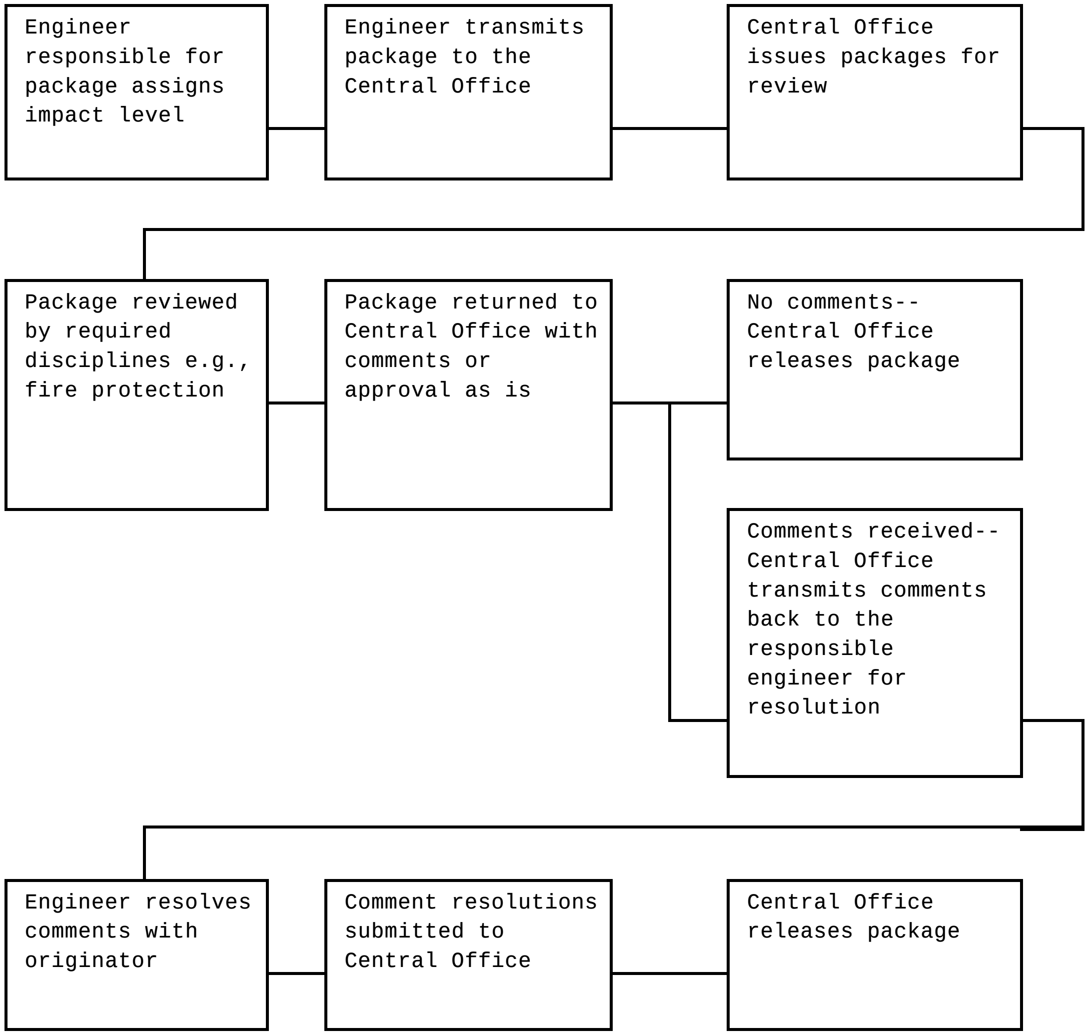

Table 3-1. Design and Package Review Discipline Matrix.
(sheet 1 of 2)

Subject	Fire Prot. Engineering	Industrial Safety	Industrial Hygiene	Fire Department	Environmental Protection	Security	Program Division
Site access	x			x		X	x
Flood control					x		
Emergency equipment deployment	x			x		x	
Exit design	x			x		x	x
Process equipment placement		x			x		x
Water supply	x			x			x
Fire water mains	x			x			
Hydrants	x			x			
Spill control	x			x	x		x
Gas distr. systems	x	x	x	x	x		x
Hazardous material traffic routes				x	x		
Fencing locations	x			x		x	x
Security control	x			x		x	x
Fire walls	x			x			x
Access ladders	x	x		x		x	x
Flammable/ combustible liq. storage	x		x	x			
Explosion equipment	x		x	x			
Fire exting.	x						
Automatic sprinklers	x			x			
Carbon dioxide, dry chemical, and foam systems	x		x	x	x		

Table 3-1. Design and Package Review Discipline Matrix.
(sheet 2 of 2)

Subject	Fire Prot. Engineering	Industrial Safety	Industrial Hygiene	Fire Department	Environmental Protection	Security	Program Division
Liquid run-off control	x			x	x		x
Fire/smoke dampers	x			x			
HVAC design*	x		x				
Fire alarm systems	x			x			
Emergency power	x	x		x		x	x
Electrical transformers	x			x	x		x
Exit signs and emergency lights	x			x			x
Gloveboxes	x	x	x				x
Inert systems	x		x	x	x		x

*HVAC = Heating, ventilation, and air conditioning.

The lists provided below may be used to ensure a thorough review is completed. The lists are not inclusive.

1. Site and site utility drawings

   a. Accessibility
   b. Flood control
   c. Emergency personnel and equipment deployment
   d. Environmental control
   e. Process, equipment, material spacings
   f. Water supplies
   g. Firewater mains
   h. Hydrants
   i. Flammable liquid spill control
   j. Gas distribution systems
   k. HAZMAT traffic routes
   l. Fencing locations
   m. Security control

2. Architectural drawings

   a. Building code compliance (fire protection)
   b. Roof drains
   c. NFPA 101 compliance

d. Storage (high piled, vital documents, computer tapes, etc.)
e. Fire walls (protected openings)
f. Access ladders
g. Security access control
h. Flammable and combustible liquid storage
i. Explosion relief
j. Fireproofing
k. Construction materials
l. Maximum possible and maximum credible fire loss potentials
m. Placement of portable fire extinguishers
n. Emergency response access
o. Classification of hazardous areas
p. Smoke venting
q. Combustible dust handling
r. Roof construction

3. Pipe drawings

a. Automatic sprinklers, water spray systems
b. Standpipe systems
c. Carbon dioxide (CO_2), foam, dry chemical systems
d. Chemical distribution systems
e Compressed gas distribution systems
f. Emergency venting
g. Tank car, truck loading, and unloading
h. Liquid runoff control
i. Piping identification

4. HVAC drawings

a. Fire and smoke dampers
b High temperature and smoke interlocks
c. Construction materials
d. Access ports
e. Fire protection coatings
f. Vapor removal systems
g. High-efficiency particulate air (HEPA) filter protection

5. Electrical drawings

a. "Classified Hazardous Areas"
b. Fire alarm and detection systems
c. Emergency evacuation systems
d. Accessibility of equipment
e. Emergency power (lights, critical equipment, etc.)
f. Lightning protection
g. Cable tray design
h. Critical equipment water shielding
i. Transformer protection and fluids
j. Placement of exit signs
k. Grounding and bonding

6. Other

   a. Fire water and criticality concerns
   b. Storage and operating tanks and vessels
   c. Material handling and identification
   d. Conveyor systems
   e. Monitoring systems
   f. Gloveboxes
   g. Mutual aid
   h. Inert systems
   i. Occupational Safety and Health Administration (OSHA) requirements

3.4 DESIGN SPECIFICATIONS

This section should include as a minimum, the basic design requirements for fire protection. When available, standard design specifications should be included in this section along with any site specific specifications. The following serves as an example. {Reference DOE 5480.7A, Section 8.i.(2)}

All fire protection designs shall use state-of-the-art equipment that has been tested by a nationally recognized testing laboratory for its intended use. All equipment components shall be compatible with existing equipment and installed as required by the applicable NFPA codes and standards.

Written acceptance test procedures shall be prepared and executed for all new fire protection system installations or modifications to verify that fire protection systems perform as required. Any deficiencies noted during the tests shall be documented and tracked until resolved or corrected.

When site-specific guides or design specifications exist, they shall be included in all fire protection design packages as applicable. All fire protection specifications shall be reviewed by the fire protection site staff.

3.5 OPERABILITY REQUIREMENTS

The operability requirements in Appendix A are examples of procedures that may be implemented to ensure fire protection systems are maintained in operational readiness. {Reference DOE 5480.7A, Section 9.c.(4)}

3.6 EQUIPMENT PROCUREMENT APPROVAL

The purpose of this section is to include requirements that ensure all equipment purchased for fire protection has been tested or approved for its intended use by a nationally recognized testing laboratory. In any case, all fire protection equipment purchases, except exact replacements, should be approved by Fire Protection Engineering. The following serves as an example. {Reference DOE 5480.7A, Section 8.i.(2)}

All equipment procured for fire protection application must be tested or approved for its intended use by a nationally recognized laboratory. Fire Protection Engineering shall approve all purchase requisitions for fire protection equipment, except exact replacement items.

3.7 FIRE PROTECTION SYSTEMS TESTING, INSPECTION, AND MAINTENANCE

The purpose of this section is to identify the testing, inspection, and maintenance frequency requirements for fire protection equipment based on the applicable NFPA requirements, e.g. NFPA 25, NFPA 72H, etc. A list should be generated which identifies the frequencies being followed at each site. In several areas, NFPA does not include frequency requirements, but only suggested frequencies are given in the code appendixes. The NFPA standards should be reviewed since they provide additional "notes" and points of clarification which may be useful if included in the frequency schedule.

The actual frequencies may vary depending on the specific sites and contractual agreements. In some cases, sites may have received exemptions to the NFPA frequencies and be implementing a modified schedule. In these situations, the modified schedule for the site should be listed in this section.

In Appendix B examples of testing and maintenance procedures for various fire systems and components are presented. Specific procedures tailored to each fire protection system for testing, maintenance, and inspections should be developed. When developing this part of the fire protection program, DOE Order 4330.4A, "Maintenance Management Program" should also be consulted. {Reference DOE 5480.7A, Section 9.b.(5)}

3.8 INSPECTION, TESTING, AND MAINTENANCE PROCEDURES

A complete listing of these procedures is found in Appendix B.
{Reference DOE 5480.7A, Sections 9, 9.b.(5), and 9.c.(1)}

3.9 MAINTENANCE PRIORITIZATION SCHEME

A maintenance prioritization scheme ensures that fire protection items requiring repair or maintenance are attended to in a timely manner. The scheme should include different priority levels so the severity or importance of the items can be designated. This scheme is particularly useful when there is a backlog of items, but should not be considered irrelevant when a backlog does not exist. The following serves as an example. {Reference DOE 5480.7A, Sections 9 and 9.b.(5)}

A maintenance prioritization scheme shall be in place so all fire protection items requiring repair or maintenance are appropriately prioritized regarding their significance. The prioritization levels shall be defined as follows.

PRIORITY I: An impairment to a fire protection system that creates an imminent hazard to employees, property, or the potential for an environmental release in excess of allowed limits. Priority I items are considered an emergency condition.

PRIORITY II: An impairment to a fire protection system that reduces the protection to employees, property, or the environment, but is not an imminent hazard.

PRIORITY III: An impairment to a fire protection system that must be corrected, but does not directly reduce the protection to employees, property, or the environment.

3.10 CORRECTIVE ACTION TRACKING SYSTEM

A formal corrective action tracking system should be in place at each site for all findings or recommendations resulting from internal and external appraisals and audits. As a minimum, the tracking system should include the information provided in the example below. {Reference DOE 5480.7A, Section 9.c.(2)}

All findings resulting from fire protection facility and program appraisals, both internal and external, shall be placed on a corrective action tracking system until resolved or completed. The tracking system shall include the following input data as a minimum:

1. The finding text
2. The structure, building, or area affected
3. The date of the appraisal
4. Name of the appraiser
5. Name of the person responsible for corrective action
6. Corrective action due date
7. The interim compensatory measures required
8. Priority level of the finding
9. Closure date.

3.11 PROPERTY LOSS CRITERIA

The baseline property loss criteria required by the DOE Orders should be included in this section. It would also be appropriate to include any additional criteria that is site specific. The following serves as an example. {Reference DOE 5480.7A, Section 9.b.(3),(4),(6),(8), and 9.c.(3)}

1. Apply the following criteria to reduce the potential property loss from a fire. Additional criteria are located in DOE Order 5480.7A, *Fire Protection*, and DOE Order 6430.1A, *General Design Criteria*. Provide and install complete automatic fire suppression systems per the applicable NFPA standards for

   a. All new structures over 5,000 ft^2

   b. All structures having a maximum possible fire loss (MPFL) in excess of $1 million, or where the maximum credible fire will result in the loss of a vital structure for a period longer than that specified as acceptable by the program senior official.

2. Provide a redundant fire protection system, when the MPFL exceeds $50 million, to limit the loss to this figure. *Reference DOE 5480.7A for the definition of a redundant fire protection system.*

3. Provide a redundant fire protection system and a 3-hour rated fire barrier or physical separation, when the MPFL exceeds $150 million, to limit the loss to this figure.

4. Construct all new structures over 5,000 ft^2 of noncombustible or fire resistive materials.

5. The water supply for fire protection shall have a minimum supply duration of 2 hours. Facilities having a MPFL in excess of $50 million shall have an additional independent source of fire protection water.

   A combined fire and process or domestic water system shall be able to supply the fire demand plus the maximum daily domestic demand for the required duration.

6. Maintain a watchman service or fire watch whenever a fire protection system is out of service. Determine the frequency of the service or watch based on the importance of the facility and program it supports, the potential property loss, and the potential impact to the environment. In no case shall the watch frequency be less than once every 2 hours.

3.12 FIRE INVESTIGATIONS AND REPORTS

The purpose of this section is to identify the requirements on how fire investigations and reports must be conducted and written. Specific guidance may be provided to the extent needed to ensure compliance is achieved. The following serves as an example.

Prepare and perform fire investigations and reports in accordance with DOE Order 5484.1, *Environmental Protection, Safety, and Health Protection Information Reporting Requirements*, and DOE Order 5000.3A, *Occurrence Reporting and Processing of Operations Information*.

In addition, perform all field reporting in accordance with NFPA 902M and NFPA 904Ml. See Section 6.0, "Fire Department Operations and Emergency Response."

3.13 ANNUAL REPORT

This section identifies the requirement for preparing an annual property loss report per DOE Order 5484.1, and the specific topics that should be *included in the report. The following example includes the topic areas that should be addressed, as a minimum, to the extent that they apply to the site.*

Prepare and submit the "Annual Industrial Summary of Fire and Other Property Damage" report to the DOE Operations Office each year per DOE Order 5484.1. The summary shall include the following information as a minimum:

1. Loss experience analysis
2. Losses of interest
3. Replacement property values
4. Recurring fire protection costs
5. CY xx major fire protection accomplishments
6. CY xx major fire protection objectives, planned improvements, and construction activities
7. Appraisal program
8. Extinguishing system performance
9. Items of interest
10. Notable personnel actions
11. Major third party (DOE Headquarters [DOE-HQ], Tiger Team, etc.) fire protection appraisal findings and recommendations for the reporting year.

3.14 FIRE PREVENTION PROCEDURES AND PRACTICES

The purpose of the fire prevention, fire protection, and special hazard procedures is to provide requirements for first level management to implement and to assist in maintaining a fire protection program consistent with the goals of DOE Order 5480.7A. The procedures are primarily intended to ensure specific existing programs and systems are maintained in excellent operation. In some cases, design criteria is included depending on the subject of the procedures. {Reference DOE 5480.7A, Section 9.c.(1)}

The list of procedures in Appendix C are not inclusive, but are considered the areas that should be addressed at each site as a minimum, *where applicable. Depending on the specific sites, additional procedures may be warranted. For example, procedures for "Safe Shutdown Protection," "Hot Cells," "Anechoic Chambers," and "Accelerators" would be appropriate for some sites and would be expected to be included in their program.*

3.15 FIRE PROTECTION PROCEDURES AND PRACTICES

A complete listing of these procedures is found in Appendix D. *{Reference DOE 5480.7A, Section 9.c.(1)}*

3.16 SPECIAL HAZARDS PROTECTION PROCEDURES AND PRACTICES

A complete listing of these procedures is found in Appendix E. *{Reference DOE 5480.7A, Section 9.c.(1)}*

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4.0 ENVIRONMENTAL AND PUBLIC PROTECTION

4.1 FACILITY OPERATING PROCEDURES

The purpose of this section is to require the operating procedures of major facilities, or facilities with special or unique processes, to address the fire protection limitations in their operating procedures. Fire protection systems and features are usually in place to ensure safe operations, protect the environment, and enhance personnel safety. If these systems or features are out-of-service or breached, compensatory measures are usually needed to maintain safe operations. These aspects of, and limitations in, operations should be part of a facility's operating procedures or technical specifications. The following serves as an example for this requirement. {Reference DOE 5480.7A, Section 9.c.(4)}

Facility operating procedures or technical specifications shall address the fire protection features of the facility that are required for safe operation and mitigating potential fire hazards and damage. When a facility's fire protection feature is out-of-service or damaged, compensatory measures shall be implemented until the system or equipment is restored to service. The operating procedures shall specifically define the compensatory measures to be implemented consistent with the significance of the impairment.

4.2 SAFETY ANALYSIS REPORTS

Safety analysis reports (SAR) typically address fire risks from a radiological standpoint and fail to review the fire protection features of a facility consistent with the goals and criteria of DOE Order 5480.7A. This section provides requirements to ensure the SARs evaluate the fire protection features of a facility in accordance with DOE Order 5480.7A. One way to accomplish this is to require that a Fire Hazard Analysis be performed as part of the SAR, using the criteria from DOE Order 5480.7A. The following serves as an example. {Reference DOE 5480.7A, Section 9.a.(3)}

All SARs shall include a Fire Hazard Analysis that addresses, as a minimum, the items identified in Section 4.3, "Fire Hazard Analysis." The SAR shall also identify the fire protection features that are required for safe operation and mitigating potential fire hazards and damage, as well as the compensatory measures required if a system is impaired or damaged (see Section 4.1, "Facility Operating Procedures").

4.3 FIRE HAZARD ANALYSIS

Until the reissue of DOE Order 5480.7A, there was no guidance within the DOE for performing fire hazard analysis. With the requirements now established in this order, site fire protection programs should include them to improve awareness and promote consistency in this area. The following serves as an example of how this could be addressed in a site fire protection program. {Reference DOE 5480.7A, Section 9.a.(3)}

All new facilities shall have a Fire Hazard Analysis. Each facility required to have a SAR shall include a Fire Hazard Analysis as part of that report. A list shall be maintained of all facilities required to have a Fire Hazard Analysis, which shall address the following items as a minimum:

1. Description of construction
2. Essential safety class systems
3. Fire protection features
4. Description of fire hazards
5. Life safety considerations
6. Critical process equipment
7. High value property
8. Damage potential: MPFL and maximum credible fire loss (MCFL)
9. Fire department and brigade response
10. Recovery potential
11. Potential for a toxic, biological, and/or radiological incident due to fire
12. Emergency planning
13. Security and safeguards considerations related to fire protection
14. Natural hazards (earthquake, flood, wind) impact on fire safety
15. Exposure fire potentials.

4.4 FACILITY CONTAINMENT AND CONFINEMENT

Many sites have facilities that require special ventilation protection to preclude the potential for an offsite release of hazardous material. DOE Order 6430.1A has requirements and general guidance in this area, but due to its importance, the area should be further addressed in site fire protection programs when applicable. It would also be appropriate to reference the DOE Filter Plenum Fire Protection Criteria *for further guidance in this area. The* *following serves as an example. {Reference DOE 5480.7A, Section 9.b.(12)}*

Facility ventilation systems and structures shall be protected against fire to preclude the release of radioactive, toxic, or other hazardous materials above established limits. Alternatives to consider for accomplishing this goal may include the following:

- Use of sand filters
- Automatic water spray systems with demisters
- Fire screens
- High temperature HEPA filters.

In addition, the "Filter Plenum Fire Protection Criteria" shall be used to assist in determining the level of protection needed.

4.5 LIQUID RUN-OFF CONTROL

Specific requirements for liquid run-off control have not been developed within the DOE due to the variation in conditions on this subject. Nevertheless, the subject should still be addressed in the site fire protection program. There has been several criteria used for determining liquid run-off control measures, and these should be considered when evaluating each condition.

For example, the Uniform Fire Code, Article 80, requires the containment to be sized based on the design flow rate or system design area for a period of 20 minutes. DOE Order 6430.1A, Section 1540, requires a collection system to be sized based on the maximum amount of water that would be collected in fighting the design basis fire. DOE Order 5480.7A requires controls to be developed after consulting with the DOE fire protection engineer. The following example includes the wording from DOE Order 5480.7A. {Reference DOE 5480.7A, Section 9.b.(10)}

Natural or artificial means of controlling liquid run-off from a credible fire shall be provided so that contaminated or polluting liquids will not escape the site, including potentially contaminated water resulting from firefighting operations. The amount of fire water that must be controlled and the design of the containment system shall be determined on a case by case evaluation.

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5.0 APPRAISAL PROGRAM

5.1 FIRE PROTECTION SELF-SURVEY FACILITY APPRAISALS

DOE Order 5480.7A requires sites to have a self-survey appraisal program in place to ensure their facilities meet the DOE fire protection goals and requirements. The following is an example that tracks closely with the requirements of DOE Order 5480.7A. When addressing this part of the Fire Protection Program, consideration should also be given to developing a site building list that includes the survey frequency required for each building. {Reference DOE 5480.7A, Section 9.a.(2)(b) and (c)}

Perform Fire Protection Program facility appraisals on each facility based on the following frequencies:

- Annually--Appraise facilities plus equipment valued at $50 million or more, or where classified as a moderate or high hazard facility per DOE Order 5480.1B, or where classified as Category 1 or 2 per DOE 5480.23.

- Every 2 years--Appraise facilities plus equipment valued at $10 million to $50 million.

- Every 3 years--Appraise facilities plus equipment valued less than $10 million.

The appraisal report shall address the following items as a minimum, and appraisal findings shall be placed on the tracking system with the expected completion date until resolved.

(a) Fire protection of safety class systems
(b) Life safety
(c) Vital programs
(d) Fire protection of high value property
(e) Inspection, testing, and maintenance reports
(f) Suppression equipment
(g) Water run-off
(h) Prefire plans
(i) Fire apparatus accessibility
(j) Administrative controls
(k) Temporary protection and compensatory measures
(l) Completeness of fire hazards analysis
(m) Fire barrier integrity
(n) Fire loss potentials (MPFL and MCFL)
(o) Suppression system tests, water supplies
(p) Maintenance procedures for maintaining systems
(q) Status of findings from previous survey
(r) New findings resulting from the current survey.

Based on the above criteria, the appraisal frequency required for the site facilities is as follows:

	Annual	2 Years	3 Years
Bldg.	203	564	234
	153	125	974
	645	867	298

5.2 FIRE PROTECTION PROGRAM APPRAISALS

DOE Order 5480.7A also requires sites to have a self-appraisal performed on their fire protection programs to ensure compliance with the DOE fire protection goals and requirements. The following is an example that tracks closely with the requirements of DOE Order 5480.7A. In some cases, it may be appropriate to include additional site-specific areas for review. {Reference DOE 5480.7A, Section 9.a.(2)(b)}

Perform an annual appraisal of the Fire Protection Program that evaluates the following areas as a minimum:

- Comprehensiveness of the Fire Protection Program
- Procedures for engineering design and review
- Procedures for maintenance, testing, and inspection of fire protection equipment and systems, including water supplies
- Fire protection engineering staff (number, qualifications, training)
- Fire suppression organization (personnel and training)
- Fire suppression mutual aid agreements
- Management support
- Exemptions and documented equivalencies
- Inspection, testing, and maintenance reports
- Adequacy of facility appraisal reports
- Administrative controls
- Temporary protection and compensatory measures
- Status of previous appraisal findings
- New appraisal findings.

5.3 LIFE SAFETY CODE EVALUATIONS

DOE facilities must comply with the NFPA 101 Life Safety Code. The best way to demonstrate compliance is to perform an evaluation on the facilities. The evaluations could be included as part of the self-survey facility appraisals or performed as a separate review. In any case, there are specific areas that should be reviewed. The following serves as an example. {Reference DOE 5480.7A, Section 9.b.(2)}

Conduct NFPA 101 evaluations for all facilities. The evaluations may be included in the fire protection self-survey facility appraisals or completed as a separate report. The following areas should be addressed as a minimum (as they apply to the occupancy) when performing the evaluations:

- Exit capacity
- Exit enclosures and discharge
- Arrangement of exits
- Travel distance to exits and common path of travel
- Dead-end corridors
- Exit markings and illumination
- Emergency lighting
- Protection for special and high hazard areas
- Vertical openings and penetrations
- Fire alarm systems
- Interior finish
- Security and locking arrangements.

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6.0 FIRE DEPARTMENT OPERATIONS AND EMERGENCY RESPONSE

All fire protection programs should address the professional, manual firefighting capabilities available at their site. The purpose of this section is to give examples of the areas that should be discussed. The type of manual firefighting resources varies significantly across the DOE complex. For example, some sites have their own fully staffed fire departments, others have contract agreements with local city departments or other government agencies, and still others only have the need for small onsite fire brigades. Whatever the arrangement may be, the areas should be addressed as applicable.

Each fire department and emergency response organization should have internal operating procedures. Provided below is a list of some of the most common procedures that one would expect to find within an organization. Examples are provided for items c, h, k, and l in Appendix F. {Reference DOE 5480.7A, Sections 9, 9.a.(1)(c) and 9.b.(7)}

6.1 OPERATING PROCEDURES

A. Officer Assignments
B. Firefighter Assignments
C. Periodic Responsibilities and Duties
D. Uniforms and Bunker Gear
E. Uniform Laundry and Repairs
F. Protective Clothing Inspections
G. Grooming Standards
H. Notification of Absences
I. Building Tours
J. Fire Protection System Impairments
K. Emergency Response Procedure
L. Facility Control in Emergency Situations
M. Firefighting in Radiation Zones
N. Call-In of Off-Duty Personnel

6.2 EMERGENCY EQUIPMENT

The purchase of suppression equipment should comply with DOT requirements, applicable NFPA standards, e.g., NFPA 1901, and site specific needs. There are many pieces of equipment required for firefighting operations, and these items should be inspected and evaluated to ensure they will meet the demanding needs when required. Provided below are a few examples of procedures that address several pieces of equipment. Each department should determine what equipment should have specific procedures developed to address these aspects of application and use. {Reference DOE 5480.7A, Sections 9, 9.a.(1)(c) and 9.b.(7)}

6.2.1 Life Safety Rope, Harnesses, and Hardware

The following guidelines should be observed to provide a reasonable degree of safety for life safety rope, harnesses, and hardware used to support fire service personnel and civilians during rescue, firefighting, and other emergency operations; during training maneuvers; and to comply with NFPA 1983 standards.

6.2.1.1 Life Safety Rope

1. Use life safety rope to support the weight of members and/or other persons during rescue, firefighting, other emergency operations, and during training maneuvers.

2. Remove and destroy life safety rope that is used for any other purpose.

3. Use new, unused life safety rope for rescue at fires or other emergency incidents and destroy it after it is used.

4. Designate life safety rope used for training maneuvers as training rope. It may be reused if inspected before and after each such use in accordance with the manufacturer's instructions.

   a. Destroy training ropes if subjected to impact loading or if signs of weakness or wear are detected. Maintain records of each life safety rope used for training.

5. Dispose life safety rope per battalion commander instructions.

6. Ordinary, unmarked working rope (not life rope) will be used for all other fire ground and training tasks.

6.2.1.2 Life Safety Harness

1. Life safety harnesses shall conform with NFPA 1983.

2. Use harnesses only in accordance with manufacturer's instructions.

3. Inspect harnesses after each use in accordance with manufacturer's instructions.

4. Replace harnesses only in accordance with manufacturer's instructions.

6.2.1.3 Hardware

1. Inspection, maintenance, and retirement criteria shall follow the manufacturer's requirements.

6.2.2 Fire Hose

6.2.2.1 Testing Fire Hose

Inspect and service test all fire hose as specified in NFPA 1962. Testing should be conducted as specified by Fire Department procedures. Hose testing responsibilities are also spelled out in these procedures. A record of hose tested, including hose numbers, must be turned into the platoon station officer in charge of hose records.

All hose on apparatus and storage racks should be laid out in lengths of 300 ft or less and tested to 250 lb pressure for 5 minutes. Tests will include the use of a gate valve to prevent a pressure surge from a broken hose.

Each shift should test, rack, and roll its own hose. In addition, any shift performing testing on hose from hose boxes is responsible for rolling the hose and returning it to the boxes. Hose hung in the tower after testing should be marked to identify the shift performing the testing.

After testing, each section of hose should be marked as tested by writing the year of the test on the hose with an indelible marker. This information should be written on both ends of the hose as near to the couplings as possible.

New hose should be marked with the appropriate year and also should have a line drawn along the hose even with the coupling. This line will aid in determining if the coupling is slipping off the hose. New hose without such markings should not be placed in service.

Metal couplings should be wire brushed and the female coupling lubricated with graphite before the hose is stored in the racks. All damaged couplings should be repaired or replaced.

6.2.3 Ladder Inspections

The Fire Department is responsible for inspecting all ladders carried on fire apparatus. In addition, all fixed and portable ladders in the stations must be inspected on a regular basis. These inspections are made to ensure that all ladders are in a safe and serviceable condition. In addition, inspections should ensure that all joints are tight, all hardware is securely attached, and all moveable parts operate freely, without binding or play.

Anyone using a ladder is responsible for making a visual inspection before each use. Defects discovered must be brought to the attention of an officer immediately, and the ladder should be tagged out of service.

Ladder inspection assignments are specified by Fire Department procedure. Inspection periods are also spelled out in procedures. Each Fire Department member should visually inspect the ladders on his assigned apparatus during the morning equipment check. Aerial ladders must be inspected for hydraulic leaks and for obvious external structural damage.

Test all ladders to NFPA standards on an annual basis. A third party will be used to test aerial ladders. Ground ladders will be tested by the Fire Department officers who have been trained and certified in the testing procedures.

When inspecting ladders, the inspection form must be filled out. These forms are kept in a three-ring binder in the captain's office, with a separate form for each ladder. After a ladder is inspected, the sticker on the beam of the ladder should be initialed and dated. If this sticker is missing, one should be attached.

6.3 PERSONNEL PROTECTIVE EQUIPMENT

Personnel protective equipment must comply with the applicable NFPA standards, e.g., NFPA 1971, 1972, 1973, 1974, 1975, and 1500. The equipment must also be inspected regularly to confirm its condition for use. Provided below is an example of a procedure and inspection form for accomplishing this task. {Reference DOE 5480.7A, Sections 9, 9.a.(1)(c) and 9.b.(7)}

6.3.1 Protective Clothing Inspections

Protective clothing must be inspected monthly to ensure that it is in serviceable condition and to identify protective clothing or equipment items requiring repair or replacement. This monthly inspection must be documented to meet NFPA standards.

Inspection of protective equipment should be conducted jointly by the responsible firefighter and station officer. The inspection is to be conducted on the first duty day of each month.

Helmets--including all components, shells, suspensions, head bands, sweat bands, and any accessories--should be inspected for signs of dents, cracks, penetration, or any damage due to impact, rough treatment, or wear that might reduce the degree of protection originally provided. Any helmet that requires repair or replacement of any damaged or worn part should be removed from service until the condition of wear or damage has been corrected. The label containing the manufacturer's name, address, country of manufacture, size, and fibre content must be intact. All fasteners must be intact and not broken or damaged.

All seams on protective clothing must be intact. Torn or worn seams reduce the protection of the garment. Rips or tears, if small in size, may be repaired; if large, the garment should be replaced. Certain types of soiling, such as soot and oils, greatly reduce the protection of the garment. Follow the manufacturer's instructions on the label for cleaning. Should cleaning fail to remove soils, such as soot or oil, the garment should be replaced. Garments must be complete, including shells, moisture barriers, and liners (winter and summer).

Gloves must be in good condition, with no tears or ripped seams, and not saturated with oils or other substances.

Protective footwear must have a label in place stating the name of the manufacturer, country of manufacture, size, width, model or stock number, and lot or serial number. Check to be certain no holes, punctures, or tears have occurred, seams are intact, no leaks exist, and that the sole traction treads are not worn down. (Bunker boots should be removed from the bunker trousers for this visual inspection.) The inside of the boots should be checked visually and by hand (feel) to ensure the liner is complete and intact. Hoods must also be inspected.

Prompt replacement of damaged items must be requested using the procedure listed above. Inspection forms (Figure 6-1) must be retained by the shift officer in the employee's field file for 1 year.

6.4 TRAINING

The training program for firefighters and emergency personnel must be consistent with the applicable NFPA standards and be tailored to meet the specific requirements unique to the site hazards. Training records should be maintained in accordance with NFPA 1401. The following training program serves as an example to satisfy the training requirements. {Reference DOE 5480.7A, Sections 9, 9.a.(1)(c) and 9.b.(7)}

This publication shall provide basic minimum standards for all firefighters who provide fire protection and rescue services for DOE facilities. The qualification program is based on NFPA 1001.

The Illinois Office of the State Fire Marshall Standards and Education Division has had a program similar to this in place for over 10 years. The majority of the material in Appendix B is based on the Illinois program.

With the decade of the nineties has come an acute awareness of HAZMAT. The firefighter is often the first emergency responder on the scene of a HAZMAT incident. Because of this, the 40-hour HAZMAT First Responder training (Appendix C) is the second part of the DOE Firefighter Certification.

Since all DOE facilities have site specific hazards and restrictions, it is recommended that at least 40 hours of structured site specific training be provided as part of the DOE Basic Firefighter Program.

This means that the DOE Basic Firefighter Certification consists of three separate and distinct parts:

- NFPA Firefighter II Certification
- HAZMAT First Responder Certification
- Structured Site Special training.

This publication is the first edition of the Basic Firefighter Certification Program. As firefighting technology and techniques improve, the material shall be revised. This dynamic document is for all of us. If you note any problems, additions, updates, or corrections that should be made; please submit them as soon as practicable to DOE ________________________ Attention ____________________________________. Updates and replacement pages for this publication shall be sent to all DOE Facilities in a timely manner.

Figure 6-1

Protective Clothing Monthly Inspection Form

DATE OF INSPECTION________________
EMPLOYEE NAME___________________

1. **HELMET**

Visually inspect for complete assembly including shell, liner, face shield, chin strap, head band, etc. Check to see that helmet is free of damage--dents, cracks, penetrations, etc.

	Yes	No
Assembly complete		
Free of damage		
Maintenance/replacement required		

2. **BUNKER COAT AND PANTS**

Visually inspect for complete assembly, shell, liner, suspenders, etc. Check garment for tears, rips, torn stitching, soiled - especially oils or soot, all fasteners present and intact.

	Yes	No
Assembly complete		
Free of damage		
Soiled		
Maintenance/replacement required		

3. **GLOVES**

Visually inspect for damage, tears, ripped seams, liner in place, not soaked with oil or soot, etc.

	Yes	No
Free of damage		
Soiled		
Maintenance/replacement required		

4. **BOOTS**

Visually inspect to see there are no holes, tears, separation, etc.

	Yes	No
Inside of liner		
Tears, holes, leaks		
Replacement/repair required		

ACTION REQUIRED:

______________________ ______________________
Employee Signature Officer's Signature

7.0 REFERENCES

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NFPA 10, "Portable Fire Extinguisher"
NFPA 11, "Low Expansion Foam and Combined Agent Systems"
NFPA 11A, "Medium - and High Expansion Foam Systems"
NFPA 12, "Carbon Dioxide Extinguishing Systems"

NFPA 12A, "Halon T30T Fire Extinguishing Systems"
NFPA 12B, "Halon 1211 Fire Extinguishing Systems"
NFPA 13, "Installation of Sprinkler Systems"
NFPA 13A, "Inspection, Testing and Maintenance of Sprinkler Systems"
NFPA 14, "Standard for the Installation of Standpipe and Hose Systems"
NFPA 15, "Water Spray Fixed Systems"
NFPA 16, "Installation of Deluge Foam-Water Sprinkler Systems and Foam-Water Spray Systems"
NFPA 17, "Dry Chemical Extinguishing Systems"
NFPA 17A, "Wet Chemical Extinguishing Systems"
NFPA 20, "Installation of Centrifugal Pumps"
NFPA 22, "Water Tanks for Private Fire Protection"
NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances
NFPA 25, "Water Based Fire Protection Systems"
NFPA 30, "Flammable and Combustible Liquids Code"
NFPA 33, "Spray Application Using Flammable and Combustible Materials"
NFPA 43A, "Storage of Liquid and Solid Oxidizers"
NFPA 43B, "Storage of Organic Peroxide Formulations"
NFPA 43C, "Storage of Gaseous Oxidizing Materials"
NFPA 45, "Fire Protection for Laboratories Using Chemicals"
NFPA 50, "Bulk Oxygen Systems at Consumer Sites"
NFPA 50A, "Gaseous Hydrogen Systems at Consumer Sites"
NFPA 50B, "Liquefied Hydrogen Systems at Consumer Sites"
NFPA 51, "Design and Installation of Oxygen-Fuel Gas Systems for Welding Cutting and Allied Processes"
NFPA 51A, "Acetylene Cylinder Charging Plants"
NFPA 51B, "Cutting and Welding Processes"
NFPA 52, "Compressed Natural Gas Vehicular Fuel Systems"
NFPA 54, "National Fuel Gas Code"
NFPA 58, "Storage and Handling of Liquefied Petroleum Gases"
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NFPA 69, "Explosion Prevention Systems"
NFPA 70, "National Electrical Code"
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NFPA 72, "Installation, Maintenance, and Use of Protective Signaling Systems"
NFPA 72E, "Automatic Fire Detectors"
NFPA 72H, "Testing Procedures for Local, Auxiliary, Remote Station and Proprietary Protective Signaling Systems"
NFPA 75, "Standard for the Protection of Electronic Computer/Data Processing Equipment"
NFPA 77, "Static Electricity"
NFPA 80, "Fire Doors and Windows"
NFPA 90A, "Installation of Air Conditioning and Ventilating Systems"
NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems"
NFPA 91, "Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying"
NFPA 96, "Installation of Equipment for the Removal of Smoke and

Grease-Laden Vapors from Commercial Cooking Equipment"
NFPA 101, "Safety to Life from Fire in Buildings and Structures" (Life Safety Code)
NFPA 110, "Emergency and Standby Power Systems"
NFPA 110A, "Stored Electrical Energy Emergency and Standby Power Systems"
NFPA 220, "Types of Building Construction"
NFPA 231, "General Storage"
NFPA 231C, "Rack Storage of Materials"
NFPA 232, "Protection of Records"
NFPA 232AM, "Archives and Record Centers"
NFPA 241, "Construction, Alteration, and Demolition Operations"
NFPA 303, "Marinas and Boat Yards"
NFPA 306, "Control of Gas Hazards on Vessels"
NFPA 307, "Marine Terminals, Piers and Wharves"
NFPA 318, "Clean Rooms"
NFPA 325M, "Fire Hazard Properties of Flammable liquids, Gases, and Volatile Solids"
NFPA 327, "Cleaning or Safeguarding Small Tanks and Containers"
NFPA 385, "Tank Vehicles for Flammable and Combustible Liquids"
NFPA 386, "Portable Shipping Tanks"
NFPA 395, "Storage of Flammable and Combustible Liquids on Farms and Isolated Construction Projects"
NFPA 407, "Aircraft Fuel Servicing"
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NFPA 415, "Aircraft Fueling Ramp Drainage"
NFPA 472, "Professional Competence of Responders to Hazardous Materials Incidents"
NFPA 480, "Storage, Handling, and Processing of Magnesium"
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NFPA 491M, "Hazardous Chemical Reactions"
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NFPA 496, "Purged and Pressurized Enclosures for Electrical Equipment in Hazardous (classified) Locations"
NFPA 497A, "Classification of Class I Hazardous Locations for Electrical Installations in Chemical Process Areas"
NFPA 497B, "Classification of Class II Hazardous (classified) Locations for Electrical Installations in Chemical Process Areas"
NFPA 497M, "Classification of Gases, Vapors, and Dusts for Electrical Equipment in Hazardous Locations"
NFPA 498, "Explosive Motor Vehicle Terminals"
NFPA 651, "Manufacture of Aluminum and Magnesium Powder"
NFPA 704, "Identification of the Fire Hazards of Materials"
NFPA 902M, "Fire Reporting Field Incident Manual"
NFPA 904M, "Incident Follow-up Report Guide"
NFPA 910, "Libraries and Library Collections"
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NFPA 1021, "Fire Officer Professional Qualifications"

NFPA 1031, "Professional Qualifications for Fire Inspector"
NFPA 1033, "Fire Investigator Professional Qualifications"
NFPA 1041, "Fire Service Instructor Professional Qualifications"
NFPA 1231, "Water Supplies for Suburban and Rural Firefighting"
NFPA 1401, "Fire Protection Training Reports and Records"
NFPA 1500, "Fire Department Occupational Safety and Health Program"
NFPA 1521, "Fire Department Safety Officer"
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NFPA 1962, "Care, Use, and Service Testing of Fire Hose Including Connections and Nozzles"
NFPA 1971, "Protective Clothing for Structural Fire Fighting
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APPENDIX A

OPERABILITY REQUIREMENTS

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CONTENTS

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[1]Halon is a trademark of Allied Chemical Corporation.

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11 - WET PIPE SPRINKLER SYSTEM

1.0 COMMITMENT

The wet pipe sprinkler system is operable when the following are established:

A. The system control valve is in the open position.

B. There is an adequate quantity of water and pressure available from the plant water system to supply the system at its required minimum design conditions.

C. All piping, fittings, hangers, sprinklers, and other components are in required locations and in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The system is filled with water.

B. The control valve is open.

C. The waterflow alarm is operable.

D. Sprinkler operating fusible links are operable and located in all required locations.

E. Fire sprinkler heads are not obstructed.

F. There is adequate water pressure and volume available.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 13, and NFPA 25.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following:

A. Post a sign at the fire department connection (FDC) and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a test of the main drain to verify that the control valve is open.

C. Conduct a test using the inspector's test connection to verify that the system local audible alarm and/or alarm signal to the monitoring service will operate within the required time.

D. Hydrostatic test any repaired parts of the system before returning to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 <u>REFERENCES</u>

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 13

D. NFPA 25

8.0 <u>BASIS</u>

The operability of the wet pipe fire sprinkler system ensures that adequate fire suppression capability is available to contain fires occurring in the protected facility in accordance with its design parameters. It also ensures that the life safety provisions of the facility are maintained during all anticipated operations.

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12 - DRY PIPE SPRINKLER SYSTEM

1.0 COMMITMENT

The dry pipe sprinkler system is operable when the following are established:

A. The system control valve is in the open position.

B. There is an adequate quantity of water and pressure available from the water system to supply the system at its required minimum design conditions.

C. There is an adequate source of air to maintain the minimum required quantity of air pressure to keep the dry pipe valve from tripping when small piping leaks occur. (Less than the cross- sectional area of one sprinkler head orifice opening).

D. All piping, fittings, hangers, sprinklers, and other components are in required locations and in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The system is filled with pressurized air or nitrogen at the required minimum pressure.

B. Control valves are open.

C. The waterflow alarm is operable.

D. The sprinkler head operating fusible links are in operable condition and located in all required locations.

E. Fire sprinkler heads are not obstructed.

F. There is adequate water pressure and volume available.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 13, and NFPA 25.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed

schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following:

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a test of the main drain to verify that the control valve is open.

C. Conduct a test using the alarm bypass connection to verify that the system local audible alarm and/or alarm signal to the monitoring service will operate within the required time.

D. Hydrostatic and flush test any repaired parts of the system before returning to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 13

D. NFPA 25

8.0 BASIS

The operability of the dry pipe fire sprinkler system ensures that adequate fire suppression capability is available to contain fires occurring in the protected facility in accordance with its design parameters. It also ensures that the life safety provisions of the facility are maintained during all anticipated operations.

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13 - DELUGE SPRINKLER SYSTEM

1.0 COMMITMENT

The deluge sprinkler system is operable when the following are established:

A. The system control valve is in the open position.

B. There is an adequate quantity of water and pressure available from the water system to supply the system at its required minimum design conditions.

C. The deluge system fire detection subsystem is in service and connected to the deluge valve activation device.

D. All piping, fittings, hangers, sprinklers, and other components are in required locations and in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The system control valve is open.

B. The waterflow alarm is operable.

C. Sprinkler heads are in operable condition and located in all required locations.

D. Sprinkler heads are not obstructed.

E. The fire detection subsystem is connected to the deluge valve activation device.

F. There is adequate water pressure and volume available.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 13, NFPA 25, NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following:

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a test of the main drain to verify that the control valve is open.

C. Conduct a test using the alarm bypass connection to verify that the system local audible alarm and/or alarm signal to the monitoring service will operate within the required time.

D. Hydrostatic and flush test any repaired parts of the system before returning to service.

E. Test the activation system to verify that all of the fire detectors are in place and will operate the deluge valve.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 13

D. NFPA 25

E. NFPA 72

F. NFPA 72E

8.0 BASIS

The operability of the deluge fire sprinkler system ensures that adequate fire suppression capability is available to contain fires occurring in the protected facility in accordance with its design parameters. It also ensures that the life safety provisions of the facility are maintained during all anticipated operations.

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14 - PRE-ACTION SPRINKLER SYSTEM

(WITH SUPERVISORY AIR PRESSURE)

1.0 COMMITMENT

The pre-action sprinkler system is operable when the following are established:

A. The system control valve is in the open position.

B. There is an adequate quantity of water and pressure available from the water system to supply the system at its required minimum design conditions.

C. The pre-action system fire detection subsystem is in service and connected to the deluge valve activation device.

D. The piping is pressurized by a maximum of 1.5 psi air or nitrogen pressure (systems over 20 heads).

E. All piping, fittings, and hangers are in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The system is filled with pressurized air or nitrogen.

B. Control valves are open.

C. The waterflow alarm is operable.

D. Sprinkler heads are in operable condition and located in all required locations.

E. Fire sprinkler heads are not obstructed.

F. The fire detection subsystem is connected to the deluge valve activation device.

G. There is adequate water pressure and volume available.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 13, NFPA 25, NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a test of the main drain to verify that the control valve is open.

C. Conduct a test using the alarm bypass connection to verify that the system local audible alarm and/or alarm signal to the monitoring service will operate within the required time.

D. Hydrostatic and flush test any repaired parts of the system before returning to service.

E. Test the activation system to verify that all of the fire detectors are in place and will operate the deluge valve.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 13

D. NFPA 25

E. NFPA 72

F. NFPA 72E

8.0 BASIS

The operability of the supervised pre-action fire sprinkler system ensures that adequate fire suppression capability is available to contain fires occurring in the protected facility in accordance with its design parameters. It also ensures that the life safety provisions of the facility are maintained during all anticipated operations.

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15 - PRE-ACTION SPRINKLER SYSTEM

1.0 COMMITMENT

The pre-action sprinkler system is operable when the following are established:

A. The system control valve is in the open position.

B. There is an adequate quantity of water and pressure available from the water system to supply the system at its required minimum design conditions.

C. The pre-action system fire detection subsystem is in service and connected to the deluge valve activation device.

D. All piping, fittings, hangers, sprinklers, and other components are in required locations and in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The system is filled with air.

B. Control valves are open.

C. The waterflow alarm is operable.

D. Sprinkler heads are in operable condition and located in all required locations.

E. Fire sprinkler heads are not obstructed.

F. The fire detection subsystem is connected to the deluge valve actuation device.

G. There is adequate water pressure and volume available.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 13, NFPA 25, NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed

schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following:

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a test of the main drain to verify that the control valve is open.

C. Conduct a test using the alarm bypass connection to verify that the system local audible alarm and/or alarm signal to the monitoring service will operate within the required time.

D. Hydrostatic and flush test any repaired parts of the system before returning to service.

E. Test the activation system to verify that all of the fire detectors are in place and will operate the deluge valve.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 13

D. NFPA 25

E. NFPA 72

F. NFPA 72E

8.0 BASIS

The operability of the pre-action fire sprinkler system ensures that adequate fire suppression capability is available to contain fires occurring in the protected facility in accordance with its design parameters. It also ensures that the life safety provisions of the facility are maintained during all anticipated operations.

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16 - FOAM-WATER EXTINGUISHING SYSTEM

1.0 COMMITMENT

The foam-water extinguishing system is operable when the following are established:

A. The system control valve(s) is in the open position.

B. The system is connected to a water supply with an adequate quantity of water and pressure available to supply the system at its required minimum design conditions.

C. The system is connected to a foam concentrate supply with an adequate quantity of concentrate to satisfy the system at its required minimum design conditions.

D. The system is piped to an appropriate proportioner(s) to satisfy the system's foam and water concentration design criteria. The proportioner valves are in the normal operating positions.

E. The system's discharge appliances (open or closed sprinkler heads, monitor nozzles, discharge lines, mixing chambers) are in the required positions and in good repair.

F. The system fire detection subsystem is in service and connected to the deluge valve activation device.

G. All piping, fittings, and hangers are in required locations and in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The foam-water extinguishing system is operable with control valves in the open position.

B. The system piping is filled with air or priming water.

C. The foam concentrate tank is filled with the appropriate amount of concentrate.

D. Proportioner valves are in their operational positions.

E. The waterflow alarm is operable.

F. Supervisory signals are operable.

G. Discharge devices are operable, in the required locations, aligned properly, and unobstructed.

H. Fire detection subsystem is in service and connected to the deluge valve activation device.

I. Adequate water pressure and volume is available.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 11, NFPA 13, NFPA 16, NFPA 25, NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a test of the main drain to verify that the control valve is open.

C. Conduct a test using the alarm bypass connection to verify that the system local audible alarm and/or alarm signal to the monitoring service will operate within the required time.

D. Consult the AHJ to determine whether or not a full flow test should be conducted on the repaired system.

E. Hydrostatic and flush test any repaired parts of the system before returning to service.

F. Test the fire detection subsystem to verify that all of the fire detectors are in place and will operate the deluge valve.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 11

D. NFPA 13

E. NFPA 16

F. NFPA 25

G. NFPA 72

H. NFPA 72E

8.0 BASIS

The operability of the foam-water extinguishing system ensures that adequate fire suppression capability is available to contain fires occurring in the protected area in accordance with its design parameters.

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21 - WET STANDPIPE SYSTEM

1.0 COMMITMENT

The wet standpipe sprinkler system is operable when the following are established:

A. The system control valve is in the open position.

B. Hose valves are operable and in the closed position, or hose outlets are capped.

C. There is an adequate quantity of water and pressure available from the water system to supply the system with its minimum design conditions.

D. Piping, fittings, and hangers are in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The system is filled with water.

B. Control valves are open.

C. Hose connection valves are operable and capped.

D. There is adequate water pressure and volume available.

E. The water flow alarm is operable.

F. The system hose valves are in required locations and located in such a manner that hose can be connected.

G. The system's piping, fittings, and hangers are in good repair.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 14, and NFPA 25.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 <u>CORRECTIVE ACTION</u>

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following:

A. Place a tag at the FDC and hose valves indicating what portions of the system are out of service.

B. Stop all hazardous operations, or

C. Provide an alternate means to protect the hazardous operations.

D. Begin repair operations within 24 hours. The AHJ shall decide if B and/or C shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Hydrostatic test any repaired portions of the system.

C. Flush test any repaired piping before returning the system to service.

6.0 <u>RECORDS</u>

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 <u>REFERENCES</u>

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 14

D. NFPA 25

8.0 BASIS

The operability of the wet standpipe system ensures that adequate water is available for manual fire suppression to contain fires occurring in the protected facility in accordance with its design parameters.

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22 - DRY STANDPIPE SYSTEM

1.0 COMMITMENT

The dry standpipe system is operable when the following are established:

A. FDC is operable.

B. An adequate quantity of water and pressure are available from the fire department pumper(s) to supply the system with the required volume and pressure.

C. Hose valves are operable and in the closed position, or hose connections are capped.

D. All piping, fittings, and hangers are in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The FDC is available for connection to the source of water and in good repair with pumper hose valves closed and operable.

B. There is adequate water volume and pressure available.

C. The system hose valves are in required locations and located in such a manner that hose can be connected.

D. The system's piping, fittings, and hangers are in good repair.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 14, and NFPA 25.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Place a tag at the FDC and hose valves indicating what portions of the system are out of service.

B. Stop all hazardous operations, or

C. Provide an alternate means to protect the hazardous operations.

D. Begin repair operations within 24 hours. The AHJ shall decide if B and/or C shall be required until repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Hydrostatic test any repaired portions of the system.

B. Flush test any repaired piping before returning the system to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 14

D. NFPA 25

8.0 BASIS

The operability of the dry standpipe system ensures that adequate water is available for manual fire suppression to contain fires occurring in the protected facility in accordance with its design parameters.

23 - MANUAL WATER SPRAY SYSTEM

1.0 COMMITMENT

The manual water spray system is operable when the following are established:

A. The system control valve is in the closed position.

B. There is an adequate quantity of water and pressure available from the water system to supply the system at its require minimum design conditions.

C. Nozzles with an appropriate pattern, velocity, water particle size, and density are used with an appropriate alignment to satisfy the design requirements.

D. In prepriming systems, blow-off plugs are installed properly on all nozzles.

E. All piping, fittings, and hangers are in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The control valve is closed.

B. The waterflow alarm is operable.

C. Nozzles are in operable condition, unobstructed in all required locations, and aligned properly.

D. There is adequate water pressure and volume available.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 15, and NFPA 25.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Stop all hazardous operations, or

B. Start a recorded fire watch within 1 hour of the outage, or

C. Provide an alternate means to protect the hazardous operations.

D. Begin repair operations within 8 hours or A or B or C shall be required until the repairs are complete.

E. Post an impairment tag at the control valve when a system is out of service.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Hydrostatic and flush test any repaired parts of the system before returning to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 15

D. NFPA 25

8.0 BASIS

The operability of the water spray system ensures that adequate fire suppression capability is available to contain fires occurring in the protected facility in accordance with its design parameters.

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31 - HALON 1301 (TOTAL FLOODING)

1.0 COMMITMENT

The Halon 1301 fire extinguishing system is operable when the following are established.

A. There is an adequate quantity of containers filled with Halon 1301 fire extinguishing agent.

B. There are Halon 1301 discharge nozzles in place, aligned properly, and unobstructed, to distribute the Halon at its minimum design conditions.

C. Container activation devices are in place and in good repair.

D. System piping, fittings, and hangers are in good repair.

E. The fire detection subsystem is in service and connected to the container actuation devices.

F. All openings to the volume being protected are closed or are connected for remote releasing automatically on system operation.

G. All equipment interlocks are in operating condition.

H. Container brackets are in good repair.

I. Reserve Halon storage containers, where required, are connected to the system or stored in their designated location.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. Halon 1301 containers are in good physical condition, filled with the required quantity of Halon 1301 fire extinguishing agent, and mounted properly to meet the system's minimum design conditions.

B. Discharge nozzles are in good physical condition, unobstructed, and aligned properly.

C. The system's fire detection subsystem is in service and connected to the container actuation device(s).

D. All openings that are closed or automatic-releasing devices are functioning properly.

E. All equipment interlocks are operational.

F. System piping, fittings, and hangers are in good repair.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 12A, NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign on the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, and provide an alternate means to protect the hazardous operations.

D. Begin repair operations immediately or B or C shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Weigh Halon containers and check pressure before returning to service.

B. Conduct an operating test of the system before returning it to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 <u>REFERENCES</u>

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 12A

D. NFPA 72

E. NFPA 72E

8.0 <u>BASIS</u>

The operability of the Halon 1301 fire extinguishing system ensures that adequate fire suppression capability is available to contain fires occurring in the protected area in accordance with its design parameters.

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32 - HALON 1211 (TOTAL FLOODING)

1.0 COMMITMENT

The Halon 1211 fire extinguishing system is operable when the following are established.

A. There is an adequate quantity of containers filled with Halon 1211 fire extinguishing agent.

B. There are Halon 1211 discharge nozzles in place, aligned properly, and unobstructed, to distribute the Halon at its minimum design conditions.

C. Container activation devices are in place and in good repair.

D. System piping, fittings, and hangers are in good repair.

E. The fire detection subsystem is in service and connected to the container actuation devices.

F. All openings to the volume being protected are closed or are connected for remote releasing automatically on system operation.

G. All equipment interlocks are in operating condition.

H. Container brackets are in good repair.

I. Reserve storage containers, where required, are connected to the system or stored in their designated location.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The Halon 1211 containers are in good physical condition, charged with the required quantity of Halon 1211 fire extinguishing agent, and mounted properly to meet the system's minimum design conditions.

B. Discharge nozzles are in good physical condition, unobstructed, and aligned properly.

C. The system's fire detection subsystem is in service and connected to the cylinder actuation devices.

D. All openings that are closed or automatic-releasing devices are functioning properly.

E. All equipment interlocks are operational, and system piping, fittings, and hangers are in good repair.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 12B, NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign on the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, and provide an alternate means to protect the hazardous operations.

D. Begin repair operations immediately or B or C shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Weigh Halon containers and check pressure before returning to service.

B. Conduct an operating test of the system before returning it to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 12B

D. NFPA 72

E. NFPA 72E

8.0 BASIS

The operability of the Halon 1211 fire extinguishing system ensures that adequate fire suppression capability is available to contain fires occurring in the protected area in accordance with its design parameters.

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33 - DRY CHEMICAL SYSTEM

1.0 COMMITMENT

The dry chemical extinguishing system is operable when the following are established.

A. There is an adequate quantity of containers filled with an appropriate dry chemical extinguishing agent.

B. Dry chemical containers are pressurized adequately or an appropriate expellent gas cartridge is provided to discharge the dry chemical agent.

C. Container activation devices are in place and in good repair.

D. There are dry chemical discharge nozzles in place, aligned properly, and unobstructed, to distribute the dry chemical at its minimum design conditions.

E. All piping, hoses, fittings, and hangers are in good repair.

F. Fire detection subsystem and manual activation devices are in service and connected to the container activation devices.

G. All openings to the hazard being protected are closed or are connected for remote automatic releasing on system operation.

H. All equipment interlocks are in operating condition.

I. Container brackets are in good repair.

J. Reserve dry chemical containers, where required, are connected to the system or stored in their designated location.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The dry chemical and expellent gas containers are in good condition, mounted properly, and charged with the required quantity of dry chemical extinguishing agent or expellent gas to meet the system's minimum design conditions.

B. Discharge nozzles are in good physical condition, unobstructed, and aligned properly.

C. The system's fire detection subsystem is in service and connected to the container activation devices.

D. All openings to the volume being protected are closed or automatic-releasing devices are functioning properly.

E. All equipment interlocks are operational.

F. The system's piping, hoses, fittings, and hangers are in good repair.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 17, NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign on the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, and provide an alternate means to protect the hazardous operations.

D. Begin repair operations immediately or B or C shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. If the dry chemical agent is stored in a pressurized cylinder, check the pressure before returning to service.

B. If the system has a separate expellent gas cartridge, check each cartridge for proper operation before returning to service:

1. Nitrogen cartridges - check pressure

2. CO_2 cartridges - weigh cylinder

C. Conduct an operating test of the system before returning to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing .

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 17

D. NFPA 72

E. NFPA 72E

8.0 BASIS

The operability of the dry chemical extinguishing system ensures that adequate fire suppression capability is available to contain fires occurring in the protected area in accordance with its design parameters.

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34 - WET CHEMICAL SYSTEM

1.0 COMMITMENT

The wet chemical system is operable when the following are established.

A. There is an adequate quantity of containers filled with an appropriate wet chemical extinguishing agent.

B. There is an adequately sized expellent gas cartridge provided to discharge the wet chemical agent.

C. Wet chemical discharge controls are in place and in good repair.

D. There are wet chemical discharge nozzles in place, with nozzle caps, aligned properly, and unobstructed, to distribute the wet chemical at its minimum design conditions.

E. All piping, fittings, and hangers are in good repair.

F. Fire detection subsystem and manual activation devices are in service and connected to the wet chemical discharge controls.

G. Devices ensuring the shutdown of fuel or power to the protected appliances function properly upon system actuation.

H. Container brackets are in good repair.

I. Reserve wet chemical containers, where required, are connected to the system or stored in their designated locations.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The wet chemical containers and expellent gas cartridges are in good physical condition, mounted properly, and charged with the required quantity of wet chemical agent or expellent gas to meet the system's minimum design conditions.

B. Discharge nozzles are in good physical condition, unobstructed, and aligned properly.

C. The system's fire detection subsystem is in service and connected to the wet chemical discharge controls.

D. All fuel or power to appliances being protected is shut off or automatic shutoff devices are functioning properly.

E. The system's piping, fittings, and hangers are in good repair.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 17A, NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign on the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, and provide an alternate means to protect the hazardous operations.

D. Begin repair operations immediately or B or C shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Conduct an operating test as mentioned previously before returning the system to service.

B. Check the level of wet chemical and expellent gas containers as mentioned previously before returning the system to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 17A

D. NFPA 72

E. NFPA 72E

8.0 BASIS

The operability of the wet chemical fire extinguishing system ensures that adequate fire suppression capability is available to contain fires occurring in the protected area in accordance with its design parameters.

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35 - HIGH EXPANSION FOAM SYSTEM

1.0 COMMITMENT

The high expansion foam system is operable when the following are established.

A. There is sufficient water quantity and water pressure available to supply the foam generators at their minimum design conditions.

B. There is an adequate quantity and quality of foam concentrate in the system to supply the foam generators at minimum design conditions.

C. Foam generators are in place with all fans in operating condition.

D. All control valves are in their operating conditions (normally open).

E. Supply piping, fittings, and hangers are in good repair.

F. Supply air and foam duct closers are open or connected for remote opening upon system operation.

G. All openings to the volume being protected are closed or connected for remote releasing upon system operation.

H. High level air vents are open or connected for remote opening upon system operation.

I. The fire detection subsystem is in service and connected to the high expansion foam controller.

J. Reserve foam concentrate supplies, where provided, are connected to the system.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The water and foam concentrate supplies are connected to the foam generators and are sufficient in quantity and quality to satisfy the system's minimum design conditions.

B. Foam generators are operable.

C. All control valves are in their operating positions.

D. All duct closers are open.

E. All openings to the volume being protected are closed.

F. All high level air vents are open.

G. The fire detection subsystem is in service and connected to the high expansion foam controllers.

H. The foam delivery system (piping, fittings, ducts, hangers) is in good repair.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 11A, NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, and provide an alternate means shall be provided to protect the hazardous operations.

D. Begin repair operations or A and B or C shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Test the water supply to verify that an adequate pressure and volume is available at the system connection.

B. The AHJ shall decide whether or not a discharge test should be conducted on the repaired system.

C. Hydrostatic and flush test any repaired piping of the system before returning to service.

D. Test the fire detection subsystem to verify that all of the fire detectors are in place and will activate the high expansion foam controls.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 11A

D. NFPA 72

E. NFPA 72E

8.0 BASIS

The operability of the high expansion foam system ensures that adequate fire suppression capability is available to contain fires occurring in the protected area in accordance with its design parameters.

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36 - CARBON DIOXIDE EXTINGUISHING SYSTEM (HIGH PRESSURE)

1.0 COMMITMENT

The CO_2 extinguishing system is operable when the following are established.

A. There are an adequate number of high pressure cylinder containers, with CO_2 fire extinguishing agent under pressure, connected to piping and nozzles.

B. The quantity of CO_2 fire extinguishing agent is adequate to meet the system's minimum design conditions.

C. There are CO_2 discharge nozzles in place, aligned properly, and unobstructed, to distribute the CO_2 at its minimum design conditions.

D. Cylinder activation devices are in place and in good repair.

E. System piping, fittings, and hangers are in good repair.

F. Fire detection subsystem is in service and connected to the cylinder actuation devices.

G. All openings to the volume being protected are closed or are connected for remote releasing automatically on system operation.

H. All equipment interlocks are in operating condition.

I. Cylinder brackets are in good repair.

J. Reserve CO_2 storage cylinders, where required, are connected to the system or stored in their designated location.

K. Low pressure level supervisory signals are in service.

L. CO_2 hand hose reels are in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The high pressure CO_2 containers are in good physical condition and contain the minimum required quantity of extinguishing agent.

B. Discharge nozzles are not obstructed and are aligned properly.

C. Discharge activation devices are in place.

D. The system's fire detection subsystem is in service and connected to the actuation device.

E. All openings that are closed or automatic releasing devices are functioning properly.

F. All equipment interlocks are operable.

G. The system's piping, fittings, and hangers are in good repair.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 12, NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign on the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within one hour of the outage, and provide an alternate means to protect the hazardous operations.

D. Begin repair operations immediately or A and B or C shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Weigh CO_2 cylinders and check pressure before returning to service.

B. Conduct an operating test of the system before returning it to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 12

D. NFPA 72

E. NFPA 72E

8.0 BASIS

The operability of the CO_2 fire extinguishing system ensures that adequate fire suppression capability is available to contain fires occurring in the protected area in accordance with its design parameters.

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37 - CARBON DIOXIDE EXTINGUISHING SYSTEM (LOW PRESSURE)

1.0 COMMITMENT

The CO_2 extinguishing system is operable when the following are established.

A. There is a low-pressure storage container, with CO_2 fire extinguishing agent under pressure, connected to piping and nozzles.

B. The quantity of CO_2 fire extinguishing agent is adequate to meet the system's minimum design conditions.

C. There are CO_2 discharge nozzles in place, aligned properly, and unobstructed, to distribute the CO_2 at its minimum design conditions.

D. Container activation devices are in place and in good repair.

E. System piping, fittings, and hangers are in good repair.

F. The fire detection subsystem is in service and connected to the cylinder actuation devices.

G. All openings to the volume being protected are closed or are connected for remote releasing automatically on system operation.

H. All equipment interlocks are in operating condition.

I. Container brackets are in good repair.

J. Reserve CO_2 storage containers, where required, are connected to the system or stored in their designated location.

K. Low pressure level supervisory signals are in service.

L. CO_2 hand hose reels are in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The low pressure CO_2 container is in good physical condition and contains the minimum required quantity of extinguishing agent.

B. Discharge nozzles are not obstructed and are aligned properly.

C. Discharge activation devices are in place.

D. The system's fire detection subsystem is in service and connected to the actuation device.

E. All openings are closed or automatic releasing devices are functioning properly.

F. All equipment interlocks are operable.

G. The system's piping, fittings, and hangers are in good repair.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 12, NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign on the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, and provide an alternate means to protect the hazardous operations.

D. Begin repair operations immediately or A and B or C shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Conduct an operating test of the system before returning to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 12

D. NFPA 72

E. NFPA 72E

8.0 BASIS

The operability of the CO_2 fire extinguishing system ensures that adequate fire suppression capability is available to contain fires occurring in the protected area in accordance with its design parameters.

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38 - WATER SPRAY SYSTEM (LOCAL APPLICATION)

1.0 COMMITMENT

The local application water spray system is operable when the following are established.

A. The system connected to an adequate water supply with the quantity and pressure available meet the system's minimum design conditions.

B. The system is connected to a listed or approved control panel that is functioning properly.

C. Approved water spray nozzles with operable fusible links are in all required locations and unobstructed.

D. The waterflow alarm is in place and operable.

E. Automatic shutdowns for fuel to the protected equipment are in service and connected to the control panel.

F. The system control valve is open.

G. Piping, fittings, and hangers are in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The local application water spray system is connected to an adequate water quantity and pressure.

B. The system is connected to a functioning control panel.

C. The system control valve is open.

D. Approved water spray nozzles with fusible links are in all required locations and unobstructed.

E. The waterflow alarm is operable and connected to the control panel for automatic fuel shutdown and system alarm.

F. All piping, fittings, and hangers are in good repair.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 13, NFPA 15, and NFPA 96.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Place a tag on the control valve indicating what portion of the system is out of service.

B. Remove all protected equipment from service until repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning it to service.

5.3 Testing

A. Test the water supply to verify that an adequate water quantity and pressure is available at the system's connection.

B. Conduct a test of the bypass valve to verify that the system local alarm and fuel shutdown devices are functioning properly.

C. Hydrostatic and flush test any repaired portions of the system before returning it to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 13

D. NFPA 15

E. NFPA 96

8.0 BASES

The operability of the water spray fire extinguishing system ensures that adequate fire suppression capability is available to contain fires occurring in the protected area in accordance with its design parameters.

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41 - POND OR LAKE WATER SUPPLY

1.0 COMMITMENT

Pond and river water supply are operable when the following are established.

A. Control valves are in operating positions (normally open).

B. An adequate quantity and quality of water is stored in the reservoir to meet the system's minimum design conditions.

C. The wet pit, where provided, is structurally sound, free of debris, and maintained at a minimum temperature of 40 °F.

D. Strainers and/or purification systems are in good working condition.

E. Any suction openings are adequately submerged.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. An adequate quantity and quality of water is available in the reservoir at a pressure that meets the system's minimum design conditions.

B. Suction strainers and purification systems are in good repair.

C. Control valves are open.

D. The suction orifice is adequately submerged.

E. The fire pump is operable with adequate driver and power or fuel.

F. The waterflow alarm is operable.

G. The system piping, hydrants, FDCs, etc. are in good repair.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B) and NFPA 1231.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed

schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Place a tag on all control valves, FDCs, and hydrants dependent upon that particular system.

B. Stop all hazardous operations, or

C. If the system supplies an automatic suppression system, start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Conduct a flow test per the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B) before returning the system to service.

B. Hydrostatic and flush test repaired portions of system piping before returning the system to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection, testing, and maintenance.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 1231

8.0 BASIS

The operability of the water supply ensures that adequate water volume and pressure is available for the operation of hydrants, sprinkler systems, and standpipe systems. These are used for suppressing fires occurring in the protected area within their own design parameters.

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42 - TANK WATER SUPPLY SYSTEM

1.0 COMMITMENTS

Water storage tanks are operable when the following are established.

A. Control valves are in operating positions (normally open).

B. The tank is structurally sound.

C. Where subject to freezing, the tank and tank riser are adequately heated and/or insulated.

D. The water discharge system piping is operable and in good repair.

E. Automatic tank floats for refill and fill shutoff are in place and operable.

F. There is an adequate volume of water and pressure provided for the tank to satisfy its minimum design conditions.

G. System piping, fittings, and hangers are in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The tank is filled with water.

B. Control valves are open.

C. Floats for refilling and refill shutoff are in place and operable.

D. Discharge piping is in good repair and operable.

E. There is an adequate volume and pressure to supply fire suppression systems at their minimum design conditions.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 22, and NFPA 25.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Stop all hazardous operations, or

B. If the system supplies automatic suppression systems, start a recorded fire watch within 1 hour of the outage, or

C. Provide an alternate means to protect the hazardous operations.

D. Begin repair operations within 8 hours or A or B or C shall be required until the repairs are complete.

E. Place a tag at all FDCs, applicable hydrants, and control valves stating what portions of the system are out of service.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Conduct a flow test per DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B) before returning the system to service.

B. Hydrostatic and flush test repaired portions of system piping before returning the system to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection, testing, and maintenance.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 22

D. NFPA 25

8.0 BASIS

The operability of the tank water supply system ensures that adequate water volume and pressure is available for the operation of hydrants, sprinkler systems, and standpipe systems. These are used for suppressing fires occurring in the protected area within their own design parameters.

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43 - FIRE PUMPS

1.0 COMMITMENT

The fire pump system is operable when the following are established.

A. Control valves are in the appropriate position.

B. Adequate suction and discharge pressures and volumes available to meet the system's minimum design conditions.

C. There is an adequate primary power source and secondary power source, where required, to operate drivers and drive the pumps at their minimum design conditions.

D. The pump is connected to an adequate quantity and quality of water to supply the distribution system at its minimum design conditions.

E. The controller (manual or automatic) is operable to start and stop the pump as needed under an emergency condition.

F. All piping, fittings, and hangers are in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. There is an adequate quantity and quality of water available.

B. Control valves are open.

C. Strainers are in place and operable.

D. The driver (electric, fuel, or steam) is operable and has adequate power.

E. Appropriate suction and discharge pressures are available.

F. The controller is operable and properly adjusted.

G. There is sufficient piping to deliver an appropriate volume and pressure of water to suppression systems at their minimum design conditions.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 20, and NFPA 25.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following:

A. Post a tag at each control valve indicating what system or part thereof has been removed from service.

B. Stop all hazardous operations, or

C. If automatic systems are supplied by the pump, start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means of water supply to protect the hazardous operations.

E. Begin repair operations within 8 hours, and the AHJ shall determine if B, C, and D shall be required until repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Conduct and pass a performance test before returning to service to verify that an adequate volume and water pressure is available.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 20

D. NFPA 25

8.0 BASIS

The operability of the pumping system ensures that an adequate volume and pressure of water is available for the various extinguishing systems. These are used to contain fires occurring in the protected facility in accordance with their own design parameters.

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44 - FIRE SERVICE MAINS

1.0 COMMITMENT

The fire service main is operable when the following are established.

A. Fire main control valves are in the open position.

B. Hydrants are operable and in appropriate positions.

C. There is an adequate volume and pressure of water available from the water supply to meet design conditions.

D. All piping and fittings are in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The system is filled with water.

B. Control valves are in appropriate positions (normally open).

C. Fire hydrants are operable, in appropriate locations, and unobstructed.

D. There is adequate water pressure and volume available.

E. The system's piping and fittings are in good repair.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 24, and NFPA 25.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a tag at each FDC and system control valve indicating what system or part thereof has been removed from service

B. Stop all hazardous operations, or

C. If the system supplies automatic sprinkler systems, start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours, and the AHJ shall decide if B, C, and D shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available.

B. Hydrostatically test the system per the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B) before returning the system to service.

C. Conduct a flow test per the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B) before returning the system to service.

D. Flush test any repaired system per the DOE Fire Protection Inspection, Testing, and Maintenance Procedures (Appendix B) before returning the system to service.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 24

D. NFPA 25

8.0 BASIS

The operability of the fire main service ensures that adequate water volume and pressure is available for the operation of hydrants, monitor nozzles, hose and hydrant houses, and sprinkler and standpipe risers. These are used for suppressing fires occurring in the protected facility within their own design parameters.

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51 - FIRE ALARM SYSTEM

1.0 COMMITMENT

The Fire Alarm System is operable when the following are established.

A. Alternating current (AC) power is supplied to the system.

B. Direct current (DC) power is supplied to the system.

C. All alarm initiation devices are installed and operational.

D. All alarm indicating appliances are installed and operational.

E. All signaling line circuits are in service and operational.

F. The control panel is cleared of any faults, alarms, supervisory signals, and trouble conditions.

G. All supervisory initiation devices are installed and operational.

2.0 APPLICABILITY

At all times.

3.0 OPERATIONAL REQUIREMENTS

A. The system is energized with primary and backup power.

B. The manual fire alarm stations are operational and located in all required locations.

C. The audible and/or visual alarming indicating appliances are installed and located in all required locations.

D. All fire sprinkler waterflow alarms are connected and operational.

E. All fire detector alarms are connected and operational.

F. All other alarm initiation devices are connected and operational.

G. All supervisory devices (such as valve tamper, low air pressure, fire pump supervisory devices, low water, and low temperature switches) are connected, in their normal position, and operational.

H. All trouble conditions are clear.

I. All external circuits are electrically supervised.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Place a tag at the fire alarm control panel (FACP) indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 24 hours or B or C or D shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Test the fire detection devices to verify that a fire can be detected.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 72

D. NFPA 72E

8.0 BASIS

The operability of the fire alarm system ensures that the condition causing the alarm is reported to occupants and any required central monitoring service. It also ensures that the life safety notification provisions of the facility are maintained during all anticipated operations.

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52 - CENTRAL MONITORING (FIRE) SYSTEM

1.0 <u>COMMITMENT</u>

The Central Monitoring System is operable when the following are established.

A. AC power is supplied to the system.

B. DC power is supplied to the system.

C. All remote fire alarm systems are installed and operational.

D. All alarm indicating appliances are installed and operational.

E. All signaling line circuits are in service and operational.

F. The control panel is cleared of any faults, alarms, supervisory signals, and trouble conditions.

G. All supervisory indicating appliances are installed and operational.

H. All system printers are installed and operational.

I. All offsite alarm circuits are installed and operational.

2.0 <u>APPLICABILITY</u>

At all times.

3.0 <u>OPERATIONAL REQUIREMENTS</u>

A. The system is energized with primary and backup power.

B. The remote fire alarm systems are operational and located in all required locations.

C. The audible and/or visual alarming-indicating appliances are installed and located in all required locations.

D. All system printers are installed and operational.

E. All trouble conditions are clear.

F. All external circuits are electrically supervised.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 71, NFPA 72, and NFPA 72E.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Place a tag at the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 24 hours or B or C or D shall be required until the repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Test the fire alarm subsystem devices to verify that an alarm or supervisory signal can be received and recorded.

6.0 RECORDS

Maintain records for the life of the facility showing the system design and all inspection and testing.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 71

D. NFPA 72

E. NFPA 72E

8.0 BASIS

The operability of the central monitoring system ensures that the condition causing the alarm is reported to occupants and any required offsite service. It also ensures that the life safety notification provisions of the facility are maintained during all anticipated operations.

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61 - FIRE DOORS AND WINDOWS

1.0 COMMITMENT

A. Fire doors or windows are installed in all required openings.

B. Each fire door and window is equipped with listed or approved hardware (hinges, latching device, holder and closer, smoke gasketing) as required.

C. Fire doors and windows are operable at all times.

D. Fire doors and windows are closed unless arranged for automatic closing and release.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. All fire doors, windows, and related hardware are in the required locations and in good physical condition.

B. Opening and closing hardware is operable.

C. Doors and windows are either closed or equipped with operable automatic-releasing devices.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection Inspection, Testing, and Maintenance Procedures (Appendix B) and NFPA 80.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

Notify facility management and other appropriate AHJs and complete the following.

A. If one or more of the commitments is not maintained, post a sign at the fire door or window indicating that door and opening protection are not in service. The AHJ shall specify the size and location of the sign.

B. Stop all hazardous operations, and/or

C. Provide an alternate means protect the hazardous operations.

D. Begin repair operations within 24 hours. The AHJ will decide if B and/or C will be required until repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Conduct a full operation test after completing any repairs.

6.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 80

8.0 BASES

Operable fire door and window systems provide an effective fire barrier at the system-rated duration for the life of the facility.

62 - FIRE DAMPERS

1.0 COMMITMENT

A. Fire dampers are installed in all required openings.

B. Each fire damper is equipped with listed or approved hardware (fusible link, magnetic closer, smoke gasketing) as required.

C. Fire dampers are operable at all times.

D. Fire dampers are kept closed unless arranged for automatic closing and release.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. All fire dampers are in the required locations and in good physical condition.

B. Opening and closing hardware is operable.

C. Dampers are either closed or equipped with operable automatic releasing devices.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B) and NFPA 90A.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

Notify facility management and other appropriate AHJs and complete the following.

A. If one or more of the commitments is not maintained, post a sign at the fire damper indicating that duct protection is not in service. The AHJ will specify the size and location of the sign.

B. All hazardous operations will stop, and/or

C. An alternate means will be provided to protect the hazardous operations.

D. Begin repair operations within 24 hours. The AHJ shall decide if B and/or C shall be required until repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. Conduct a full operation test after completing any repairs.

6.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 90A

8.0 BASIS

Operable fire damper systems provide an effective fire barrier at the system-rated duration for the life of the facility.

63 - PENETRATIONS IN FIRE WALLS

1.0 COMMITMENT

A. Approved fire resistance rated material is installed in all required penetrations of fire walls and barriers.

B. The fire resistant material is installed in accordance with its listing and/or approval.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

All required penetrations are filled with properly rated material in accordance with its listing and/or approval.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B) and NFPA 220.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

Notify facility management and other appropriate AHJs and complete the following.

A. If one or more of the commitments is not maintained, post a sign at the penetration indicating that penetration protection is not in service. The AHJ will specify the size and location of the sign.

B. All hazardous operations will be stopped, and/or

C. An alternate means will be provided to protect the hazardous operations.

D. Begin repair operations within 24 hours. The AHJ shall decide if B and/or C shall be required until repairs are complete.

5.2 Inspection

A. Visually inspect the system before returning to service.

5.3 Testing

A. None required.

6.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

8.0 BASIS

Operable penetration protection ensures an effective fire barrier for the system-rated duration for the life of the facility.

71 - EMERGENCY AND EXIT ILLUMINATION

1.0 COMMITMENT

A. Exit lights with battery or generator backup power are installed in all required locations.

B. Exit access illumination lights with battery or generator backup power are installed in all required locations.

C. The exit and exit access illumination lights are installed, powered, and in good repair.

2.0 APPLICABILITY

At all times.

3.0 OPERABILITY REQUIREMENTS

A. The light fixtures are installed, powered, and operable.

B. There is power available to charge the batteries.

C. The batteries are charged to at least 90% of the required electrical charge.

4.0 MAINTENANCE, TESTING, AND INSPECTION

A. Inspect, test, and maintain the system in accordance with the DOE Fire Protection, Inspection, Testing, and Maintenance Procedures (Appendix B), NFPA 101, NFPA 110, and NFPA 110A.

B. Reduced frequency of testing is allowed if the facility can prove increased reliability by submitting testing records and a proposed schedule to the AHJ for review and acceptance.

5.0 CORRECTIVE ACTION

5.1 Impairment

Notify facility management and other appropriate AHJs and complete the following.

A. If one or more of the commitments is not maintained, evacuate all occupants.

B. Begin repair operations within 24 hours. The AHJ shall decide if A is necessary.

5.2 Inspection

A. Visually inspect each fixture before returning to service.

5.3 Testing

A. Operation test each fixture when a unit is returned to service.

6.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

7.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 101

D. NFPA 110

E. NFPA 110A

8.0 BASIS

Exit signs and exit access illumination must be operable and adequate in accordance with the life safety provisions of the facility.

APPENDIX B

INSPECTION, TESTING, AND MAINTENANCE PROCEDURES

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CONTENTS

LIST OF TABLES

111 - WET PIPE SPRINKLER SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining wet pipe automatic sprinkler systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Visually inspect the entire system annually (including FDC, piping, pipe hangers, sprinkler heads, name plate, head obstructions, and unprotected spaces) to verify that it is in good condition and free of mechanical damage.

B. Control valves - Visually inspect all control valves of the system at regular intervals as follows.

1. Sealed valves - weekly.

2. Locked valves and valves with tamper switches - monthly.

3. The inspection shall verify that the valves are:

   a. In the normal open or closed position

   b. Properly sealed, locked, or supervised

   c. Accessible

   d. Provided with appropriate wrenches

   e. Free from external leaks

f. Provided with appropriate identification.

C. Check valves - Internally inspect all check valves at least every 5 years to verify that all components operate properly, move freely, and are in good condition. Clean, repair, or replace the internal components as necessary in accordance with the manufacturer's instructions.

D. Alarm valves

1. Inspect alarm valves monthly. The inspection shall verify the following.

   a. Gauges indicate that normal supply water pressure is being maintained.

   b. The valve is free of physical damage.

   c. All valves are in their appropriate open or closed position.

2. Internally inspect alarm valves and their associated strainers, filters, and restriction orifices at least every 5 years, unless tests indicate a more stringent frequency is required.

E. FDCs - Inspect monthly. The inspection shall verify the following.

1. The FDCs are visible and accessible.

2. Couplings or swivels are not damaged and rotate smoothly.

3. Plugs or caps are in place and not damaged.

4. If the FDC is plugged, or caps are not in place, inspect the interior of the connection for the following:

   a. Obstructions

   b. Whether or not the valve clapper is operational over its full range.

5. Gaskets are in place and in good condition.

6. Identification signs are in place.

7. The check valve is not leaking.

8. The automatic drain valve is in place and operating properly.

9. Components are cleaned, repaired, or replaced as necessary in accordance with the manufacturer's instructions.

4.0 TESTING

A. Sprinklers - Replace sprinklers when they have been in service for 50 years, or submit representative samples to a recognized testing laboratory acceptable to the AHJ for operational testing. Repeat test procedures thereafter at 10-year intervals.

Exceptions:

1. Test fast response sprinklers in service for 20 years. Retest at 10-year intervals.

2. At 5-year intervals, test representative samples of solder-type sprinklers, with a temperature classification of extra hazard (325 °F) or greater, that are exposed to semicontinuous to continuous maximum allowable ambient temperature conditions.

B. Conduct quarterly testing of the system alarms by using the inspector's test connection.

C. Conduct semiannual testing of the system supervisory devices.

D. Conduct quarterly testing of the main drain connection to verify the availability of water to the system.

E. Fully close and reopen the system control valve annually.

F. Annually test any antifreeze solution for the design freeze point.

5.0 MAINTENANCE

A. Maintain all components of the system in working condition. Repair or replace any components that fail a test or inspection in accordance with the manufacturer's instructions.

B. Sprinklers

1. Replacement sprinklers shall have the proper characteristics for the application intended. This includes the following:

   a. Style

   b. Orifice size and K factor

   c. Temperature rating

   d. Coating, if any

   e. Deflector type

   f. Design requirements

2. Use only new, listed sprinklers to replace existing sprinklers.

3. Store a supply of spare sprinklers in a cabinet on the premises for replacement purposes. The stock of spare sprinklers shall be proportionally representative of the types and temperature ratings of the system sprinklers. Provide a minimum of two sprinklers of each type and temperature rating. The stock of spare sprinklers shall be as follows:

   a. For protected facilities having less than 300 sprinklers, at least 6.

   b. For protected facilities having 300-1,000 sprinklers, at least 12.

   c. For protected facilities having over 1,000 sprinklers, at least 24.

   Provide and keep sprinkler wrench(es) in the cabinet to be used in the removal and installation of sprinklers. Provide a sprinkler wrench for each type of sprinkler installed.

4. Protect sprinklers covering spray coating areas against overspray residue. Protect sprinklers subject to overspray accumulations by using plastic bags having a maximum thickness of .003 in. or by using small paper bags. Replace coverings when deposits or residue accumulate (daily).

5. Annually replace sprinklers and automatic spray nozzles used for protecting commercial-type cooking equipment and ventilation systems.

6. Conduct an obstruction investigation for sprinkler systems and yard main piping whenever any of the following conditions exist:

   a. Defective intake screens for fire pumps taking suction from open bodies of water.

   b. Discharge of obstructive material during routine water tests.

   c. Foreign materials in fire pumps, dry-pipe valves, or check valves.

   d. Heavy discoloration of water during drain tests or plugging of inspector's test connections.

   e. Plugging of sprinklers.

   f. Plugged piping in sprinkler systems dismantled during building alterations.

g. Failure to flush yard piping or surrounding public mains following new installations or repairs.

h. A record of broken public mains in the vicinity.

i. Abnormally frequent false tripping of dry-pipe valves.

j. A system is returned to service after an extended duration (greater than 1 year).

k. There is reason to believe that the sprinkler system contains sodium silicate or its derivatives.

C. Control valves

1. Annually lubricate the operating stems of outside screw and yoke (OS&Y) valves. Then close and reopen the valve completely to test its operation and distribution of the lubricant. Graphite or graphite in light oil should be used.

2. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

D. Clean and repair internal components of alarm valves as necessary, in accordance with the manufacturer's instructions and as deemed necessary by inspection.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a test of the main drain to verify that the control valve is open.

C. Conduct a test using the inspector's test connection to verify that the system local audible alarm and/or alarm signal to the monitoring service will operate within the required time.

D. Hydrostatic test any repaired parts of the system before returning to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 13

D. NFPA 25

112 - DRY PIPE SPRINKLER SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining dry pipe sprinkler systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Visually inspect the entire system annually (including FDC, piping, pipe hangers, sprinkler heads, pressure gauges, name plate, head obstructions, and unprotected spaces) to verify that it is in good condition and free of mechanical damage.

B. Verify weekly the availability of an adequate supply of air or nitrogen capable of repressurizing the system within 30 minutes.

C. Control valves - Visually inspect all control valves of the system at regular intervals as follows:

1. Sealed valves - weekly.

2. Locked valves and valves with tamper switches - monthly.

3. The inspection shall verify that the valves are

a. In the normal open or closed position

b. Properly sealed, locked, or supervised

c. Accessible

d. Provided with appropriate wrenches

e. Free from external leaks

f. Provided with appropriate identification.

D. Check valves - Internally inspect all check valves at least every 5 years to verify that all components operate properly, move freely, and are in good condition. Clean, repair, or replace the internal components as necessary in accordance with the manufacturer's instructions.

E. FDCs - Inspect monthly. The inspection shall verify the following.

1. The FDCs are visible and accessible.

2. Couplings or swivels are not damaged and rotate smoothly.

3. Plugs or caps are in place and not damaged.

4. If the FDC is plugged, or caps are not in place, inspect the interior of the connection for

   a. Obstructions

   b. Whether or not the valve clapper is operational over its full range.

5. Gaskets are in place and in good condition.

6. Identification signs are in place.

7. The check valve is not leaking.

8. The automatic drain valve is in place and operating properly.

9. Components are cleaned, repaired, or replaced as necessary in accordance with the manufacturer's instructions.

F. Dry-pipe valves

1. Daily, during cold weather, inspect valve enclosure heating equipment for dry-pipe valves subject to freezing to make sure the temperature is at least 40 °F.

   Exception: Inspect valve enclosures equipped with low temperature alarms weekly.

2. Inspect gauges weekly.

   a. The gauge on the supply side of the valve shall indicate that the normal supply water pressure is being maintained.

b. The gauge on the system side of the valve shall indicate that the proper ratio of air or nitrogen pressure to water supply pressure is being maintained in accordance with the manufacturer's instructions.

c. The gauge on the quick opening device, if installed, shall indicate the same pressure as the gauge on the system side of the dry pipe valve.

Exception: Inspect systems equipped with low air or nitrogen pressure alarms monthly.

3. Inspect the dry-pipe valve weekly to ascertain that

   a. The valve is free of physical damage.

   b. The trim valves are in their appropriate open or closed position.

   c. There is no leakage from the intermediate chamber.

4. Inspect the interior of the dry-pipe valve annually when the trip test is conducted. Clean, repair, or replace parts as necessary, in accordance with the manufacturer's instructions.

5. Inspect strainers, filters, and restricted orifices internally every 5 years unless tests indicate a more stringent frequency is required.

4.0 TESTING

A. Sprinklers - When sprinklers have been in service for 50 years, either replace or submit representative samples to a recognized testing laboratory acceptable to the AHJ for operational testing. Repeat test procedures thereafter at 10-year intervals.

Exceptions:

1. Test all fast response sprinklers in service for 20 years. Retest them at 10-year intervals.

2. At 5-year intervals, test representative samples of solder-type sprinklers, with a temperature classification of extra hazard (325 °F) or greater, that are exposed to semicontinuous to continuous maximum allowable ambient temperature conditions.

B. Fully close and open the system control valve annually.

C. Dry-pipe valve

1. Test the primary water level quarterly.

2. Test each dry-pipe valve during warm weather in accordance with the manufacturer's instructions.

   Exception: For valves protecting property whose nature is such that water can't be discharged for test purposes, conduct the trip test in a manner that will not require discharge into the piping.

3. Every third year and whenever the system is altered, trip test the dry-pipe valve with the control valve wide open and the quick opening device, if installed, in service. In years when full flow testing is not required, trip test each dry-pipe valve with the control valve partially open.

4. Do not apply grease or other sealing materials to the seating surfaces of the dry-pipe valves.

5. Test quick opening devices, if installed, semiannually.

6. Attach a tag or card to the valve showing the date on which the valve was last tripped and the name of the person and organization conducting the test. Maintain separate records of the initial water pressure and valve operating conditions on the premises for comparison with previous results. Maintain records of tripping time.

7. Test semiannually low air pressure alarms, if provided, in accordance with the manufacturer's instructions.

8. Test automatic air pressure maintenance devices, if provided, at the time of the annual valve trip test, in accordance with the manufacturer's instructions.

D. Conduct bimonthly testing of the system alarms by using the alarm bypass connection.

E. Conduct annual testing of the main drain connection to verify the availability of water to the system.

5.0 <u>MAINTENANCE</u>

A. Repair or replace any components that fail a test or inspection in accordance with the manufacturer's instructions.

B. Sprinklers

1. Replacement sprinklers shall have the proper characteristics for the application intended. These include

   a. Style

   b. Orifice size and K factor

c. Temperature rating

d. Coating, if any

e. Deflector type

f. Design requirements

2. Use only new, listed sprinklers to replace existing sprinklers.

3. Store a supply of spare sprinklers in a cabinet on the premises for replacement purposes. The stock of spare sprinklers shall be proportionally representative of the types and temperature ratings of the system sprinklers. Provide a minimum of two sprinklers of each type and temperature rating. Stock the spare sprinklers as follows:

   a. For protected facilities having less than 300 sprinklers, at least 6.

   b. For protected facilities having 300-1,000 sprinklers, at least 12.

   c. For protected facilities having over 1,000 sprinklers, at least 24.

   Provide and keep sprinkler wrench(es) in the cabinet to be used in the removal and installation of sprinklers. Provide a sprinkler wrench for each type of sprinkler installed.

4. Protect sprinklers covering spray coating areas against overspray residue. Protect sprinklers subject to overspray accumulations by using plastic bags having a maximum thickness of .003 in. or by using small paper bags. Replace coverings when deposits or residue accumulate.

5. Annually replace sprinklers and automatic spray nozzles used for protecting commercial-type cooking equipment and ventilation systems.

6. Conduct an obstruction investigation for sprinkler systems and yard main piping whenever any of the following conditions exist:

   a. Defective intake screens for fire pumps taking suction from open bodies of water.

   b. Discharge of obstructive material during routine water tests.

   c. Foreign materials in fire pumps, dry-pipe valves, or check valves.

d. Heavy discoloration of water during drain tests or plugging of inspector's test connections.

e. Plugging of sprinklers.

f. Plugged piping in sprinkler systems dismantled during building alterations.

g. Failure to flush yard piping or surrounding public mains following new installations or repairs.

h. A record of broken public mains in the vicinity.

i. Abnormally frequent false tripping of dry-pipe valves.

j. A system is returned to service after an extended duration (greater than 1 year).

k. There is reason to believe that the sprinkler system contains sodium silicate or its derivatives.

C. Control valve

1. Annually lubricate the operating stems of OS&Y valves. Then completely close and reopen the valve to test its operation and distribution of the lubricant. Graphite or graphite in light oil should be used.

2. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

D. Dry-pipe valves

1. Locate and repair leaks resulting in pressure losses greater than 10 psi/week.

2. During the triannual trip test, thoroughly clean the interior of the dry-pipe valve and replace or repair parts as necessary.

3. Drain the low points in dry-pipe sprinkler systems after each operation and before the onset of freezing weather conditions.

6.0 <u>CORRECTIVE ACTION</u>

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a test of the main drain to verify that the control valve is open.

C. Conduct a test using the alarm bypass connection to verify that the system local audible alarm and/or alarm signal to the monitoring service will operate within the required time.

D. Hydrostatic and flush test any repaired parts of the system before returning to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 13

D. NFPA 25

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113 - DELUGE SPRINKLER SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining deluge sprinkler systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Visually inspect the entire system annually (including FDC, piping, pipe hangers, sprinkler heads, pressure gauges, name plate, head obstructions, and unprotected spaces) to verify that it is in good condition and free of mechanical damage.

B. Control valves - Visually inspect all control valves of the system at regular intervals as follows:

1. Sealed valves - weekly.

2. Locked valves and valves with tamper switches - monthly.

3. The inspection shall verify that the valves are

   a. In the normal open or closed position

   b. Properly sealed, locked, or supervised

   c. Accessible

   d. Provided with appropriate wrenches

   e. Free from external leaks

f. Provided with appropriate identification.

C. Check valves - Internally inspect all check valves at least every 5 years to verify that all components operate properly, move freely, and are in good condition. Clean, repair, or replace the internal components as necessary in accordance with the manufacturer's instructions.

D. FDCs - Inspect monthly. The inspection shall verify the following.

1. The FDCs are visible and accessible.

2. Couplings or swivels are not damaged and rotate smoothly.

3. Plugs or caps are in place and not damaged.

4. If the FDC is plugged, or caps are not in place, inspect the interior of the connection for

   a. Obstructions

   b. Whether or not the valve clapper is operational over its full range.

5. Gaskets are in place and in good condition.

6. Identification signs are in place.

7. The check valve is not leaking.

8. The automatic drain valve is in place and operating properly.

9. Components are cleaned, repaired, or replaced as necessary in accordance with the manufacturer's instructions.

E. Deluge valves

1. Daily, during cold weather, visually inspect valve enclosure heating equipment for the deluge valves' ability to maintain a minimum temperature of at least 40 °F.

   Exception: Inspect valve enclosures equipped with low temperature alarms weekly.

2. Inspect gauges weekly. The gauge on the supply side of the valve should indicate that the normal supply water pressure is being maintained.

   Exception: The gauge monitoring the detection system pressure, if provided, shall be inspected monthly to indicate that normal pressure is being maintained.

3. Inspect the deluge valve weekly to ascertain that

   a. The valve is free from physical damage

   b. All trim valves are in their appropriate open or closed position

   c. There is no leakage from the valve seat

   d. Electrical components are in service.

4. Inspect the interior of the deluge valve annually when the trip test is conducted. Clean, repair, or replace parts as necessary in accordance with the manufacturer's instructions.

   Exception: Internal inspection of valves that can be reset without removal of a faceplate shall be conducted every 5 years.

5. Internally inspect strainers, filters, and restricted orifices every 5 years, unless tests indicate a more stringent frequency is required.

4.0 TESTING

A. Sprinklers - Replace sprinklers when they have been in service for 50 years, or submit representative samples to a recognized testing laboratory acceptable to the AHJ for operational testing. Repeat test procedures thereafter at 10-year intervals.

   Exceptions:

   1. Test fast response sprinklers in service for 20 years. Retest at 10-year intervals.

   2. At 5-year intervals, test representative samples of solder-type sprinklers, with a temperature classification of extra hazard (325 °F) or greater, that are exposed to semicontinuous to continuous maximum allowable ambient temperature conditions.

B. Fully close and reopen the control valves annually.

C. Conduct bimonthly testing of the system alarms by using the alarm bypass connection.

D. Conduct annual testing of the main drain connection to verify the availability of water to the deluge valves.

E. Deluge valves

1. Trip test each deluge valve annually in warm weather in accordance with the manufacturer's instructions.

   a. Observe the water discharge patterns from all open sprinklers or spray nozzles to ensure that patterns are not impeded by plugging. Also, observe the sprinklers to ensure that they are properly positioned and that obstructions do not prevent discharge patterns from effectively wetting surfaces to be protected. When obstructions occur, clean the piping, sprinklers, or nozzles and retest the system.

   b. Record pressure readings at the hydraulically most remote nozzle or sprinkler to ensure that the waterflow has not been impeded by partially closed valves, plugged strainers, or piping. Record a second pressure reading at the deluge valve to ensure that the water supply is adequate. Compare these readings to the hydraulic design pressures to ensure that the original system design is met and that the water supply is adequate to meet the design requirements.

      Exception: When the hydraulically most remote nozzle or sprinkler is inaccessible, it is permissible to visually check nozzles or sprinklers without taking a pressure reading on the most remote nozzle or sprinkler. However, when the reading taken at the riser indicates that the water supply has deteriorated, place a gauge on the hydraulically most remote nozzle or sprinkler and compare the result with the required design pressure.

   c. Multiple systems - Simultaneously test the maximum number of systems expected to operate in case of fire to check the adequacy of the water supply.

      Exception: When the nature of the protected property is such that water cannot be discharged unless protected equipment is shut down (e.g. energized electrical equipment), conduct a full flow system test at the next scheduled shutdown. In all cases, the test frequency shall not exceed 3 years.

2. Operate manual actuation devices at least annually.

3. After the trip test, return the system to service in accordance with the manufacturer's instructions.

4. Do not apply grease or other sealing materials to the seating surfaces of the valve.

5. Attach a tag or card to the valve showing the date on which the

valve was last tripped and the name and organization conducting the test. Maintain records of operating conditions on the premises for comparing with previous results. Also maintain records of tripping time.

D. Deluge system activation fire detection subsystem.

1. Test each initiation device (manual activation stations and fire detectors) in accordance with manufacturer's requirements semiannually.

2. Test duration of battery backup power supply on an annual basis.

3. Conduct bimonthly testing of system output, system activation signals, and alarm, supervisory, and trouble conditions.

5.0 MAINTENANCE

A. Maintain the system in operating condition. Repair or replace any components failing a test or inspection in accordance with the manufacturer's instructions.

B. Sprinklers

1. Replacement sprinklers shall have the proper characteristics for the application intended. These include

   a. Style

   b. Orifice size and K factor

   c. Temperature rating

   d. Coating, if any

   e. Deflector type

   f. Design requirements.

2. Use only new, listed sprinklers to replace existing sprinklers.

3. Store a supply of spare sprinklers in a cabinet on the premises for replacement purposes. The stock of spare sprinklers shall be proportionally representative of the types and temperature ratings of the system sprinklers. Provide a minimum of two sprinklers of each type and temperature rating. Stock spare sprinklers as follows:

   a. For protected facilities having less than 300 sprinklers, at least 6.

b. For protected facilities having 300-1,000 sprinklers, at least 12.

c. For protected facilities having over 1,000 sprinklers, at least 24.

Provide and keep sprinkler wrench(es) in the cabinet to be used in the removal and installation of sprinklers. Provide a sprinkler wrench for each type of sprinkler installed.

4. Protect sprinklers covering spray coating areas against overspray residue. Protect sprinklers subject to overspray accumulations by using plastic bags having a maximum thickness of .003 in. or by using small paper bags. Replace coverings when deposits or residue accumulate (daily).

5. Annually replace sprinklers and automatic spray nozzles used for protecting commercial-type cooking equipment and ventilation systems.

6. Conduct an obstruction investigation for sprinkler systems and yard main piping whenever any of the following conditions exist:

   a. Defective intake screens for fire pumps taking suction from open bodies of water

   b. Discharge of obstructive material during routine water tests

   c. Foreign materials in fire pumps, dry-pipe valves, or check valves

   d. Heavy discoloration of water during drain tests or plugging of inspector's test connections

   e. Plugging of sprinklers

   f. Plugged piping in sprinkler systems dismantled during building alterations

   g. Failure to flush yard piping or surrounding public mains following new installations or repairs

   h. A record of broken public mains in the vicinity

   i. Abnormally frequent false tripping of dry-pipe valves

   j. A system is returned to service after an extended duration (greater than 1 year)

   k. There is reason to believe that the sprinkler system contains sodium silicate or its derivatives.

C. Control valve

1. Annually lubricate the operating stems of OS&Y valves. Then, completely close and reopen the valve to test its operation and distribution of the lubricant. Graphite or graphite in light oil should be used.

2. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

D. Deluge valves

1. During the annual trip test, thoroughly clean the interior of the deluge valve, and replace or repair parts as necessary.

2. Drain the low points in deluge systems after each operation and before the onset of freezing weather conditions.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a test of the main drain to verify that the control valve is open.

C. Conduct a test using the alarm bypass connection to verify that the system local audible alarm and/or alarm signal to the monitoring service will operate within the required time.

D. Hydrostatic and flush test any repaired parts of the system before returning to service.

E. Test the activation system to verify that all of the fire detectors are in place and will operate the deluge valve.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 13

D. NFPA 25

E. NFPA 72

F. NFPA 72E

114 - PRE-ACTION SPRINKLER SYSTEM

(WITH SUPERVISORY AIR PRESSURE)

1.0 PURPOSE

A. This procedure establishes a method for inspecting, testing, and maintaining pre-action sprinkler systems with supervisory air pressure.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Visually inspect the entire system annually (including FDC, piping, pipe hangers, sprinkler heads, name plate, head obstructions, and unprotected spaces) to verify that it is in good condition and free of mechanical damage.

B. Control valves - Visually inspect all control valves of the system at regular intervals as follows.

1. Sealed valves - weekly.

2. Locked valves and valves with tamper switches - monthly.

3. The inspection shall verify that the valves are

a. In the normal open or closed position

b. Properly sealed, locked, or supervised

c. Accessible

d. Provided with appropriate wrenches

e. Free from external leaks

f. Provided with appropriate identification.

C. Check valves - Internally inspect all check valves at least every 5 years to verify that all components operate properly, move freely, and are in good condition. Clean, repair, or replace the internal components as necessary in accordance with the manufacturer's instructions.

D. FDC - Inspect monthly. The inspection shall verify the following.

1. The FDCs are visible and accessible.

2. Couplings or swivels are not damaged and rotate smoothly.

3. Plugs or caps are in place and not damaged.

4. If the FDC is plugged, or caps are not in place, inspect the interior of the connection for

   a. Obstructions

   b. Whether or not the valve clapper is operational over its full range.

5. Gaskets are in place and in good condition.

6. Identification signs are in place.

7. The check valve is not leaking.

8. The automatic drain valve is in place and operating properly.

9. Clean, repair, or replace components as necessary in accordance with the manufacturer's instructions.

E. Deluge valve

1. Daily, during cold weather, visually inspect valve enclosure heating equipment for deluge valves subject to freezing to make sure that the temperature is at least 40 °F.

   Exception: Inspect valve enclosures equipped with low temperature alarms weekly.

2. Visually inspect gauges weekly. The gauge on the supply side of the valve shall indicate that the normal supply water pressure is being maintained.

Exceptions:

a. Monthly, test the gauge monitoring the pre-action system supervisory air pressure, if provided, to indicate that the normal pressure is being maintained.

b. Monthly, test the gauge monitoring the detection system pressure, if provided, to indicate that normal pressure is being maintained.

c. Semiannually, test gauges that are connected to systems, which are monitored by an approved fire alarm system.

3. Inspect the deluge valve weekly to ascertain that

   a. The valve is free from physical damage

   b. All trim valves are in their appropriate open or closed position

   c. There is no leakage from the valve seat

   d. Electrical components are in service.

4. Inspect the interior of the deluge valve annually when the trip test is conducted. Clean, repair, or replace parts as necessary in accordance with the manufacturer's instructions.

5. Inspect strainers, filters, and restricted orifices internally every 5 years unless tests indicate a more stringent frequency is required.

4.0 TESTING

A. Sprinklers - Replace sprinklers when they have been in service for 50 years, or submit representative samples to a recognized testing laboratory acceptable to the AHJ for operational testing. Repeat test procedures thereafter at 10-year intervals.

Exceptions:

1. Test fast response sprinklers in service for 20 years. Retest at 10-year intervals.

2. At 5-year intervals, test representative samples of solder-type sprinklers, with a temperature classification of extra hazard (325 °F) or greater, that are exposed to semicontinuous to continuous maximum allowable ambient temperature conditions.

B. Control valves - Fully close and reopen the control valves annually.

C. Conduct bimonthly testing of the system alarms by using the alarm bypass connection.

D. Conduct annual testing of the main drain connection to verify the availability of water to the system.

E. Deluge valve

1. Quarterly, test the priming water level in supervised pre-action systems for compliance with the manufacturer's instructions.

2. Annually, trip test each deluge valve in warm weather in accordance with the manufacturer's instructions.

   Exception: For valves protecting property whose nature is such that water cannot be discharged into the piping for test purposes, conduct the trip test in a manner that will not require discharge into the piping area.

3. Operate manual actuation devices at least semiannually.

4. After the trip test, return the system to service in accordance with the manufacturer's instructions.

5. Do not apply grease or other sealing materials to the seating surfaces of the valve.

6. Attach a tag or card to the valve showing the date on which the valve was last tripped and the name and organization conducting the test. Maintain records of operating conditions on the premises for comparison with previous results. Also, maintain records of tripping time.

7. Semiannually, test low air pressure alarms, if provided, in accordance with the manufacturer's instructions.

8. Test automatic air pressure maintenance devices, if provided, at the time of the annual pre-action or deluge valve trip test, in accordance with the manufacturer's instructions.

F. Pre-action system activation fire detection subsystem.

1. Semiannually, test each initiation device (manual activation stations and fire detectors) in accordance with the manufacturer's requirements.

2. Test duration of battery backup power supply on an annual basis.

3. Conduct bimonthly testing of system output, system activation signals, and alarm, supervisory, and trouble conditions.

5.0 MAINTENANCE

A. Maintain the system in operating condition. Replace or repair any components failing a test or inspection in accordance with the manufacturer's instructions.

B. Sprinklers

1. Replacement sprinklers shall have the proper characteristics for the application intended. This includes

   a. Style

   b. Orifice size and K factor

   c. Temperature rating

   d. Coating, if any

   e. Deflector type

   f. Design requirements.

2. Use only new, listed sprinklers to replace existing sprinklers.

3. Store a supply of spare sprinklers in a cabinet on the premises for replacement purposes. The stock of spare sprinklers shall be proportionally representative of the types and temperature ratings of the system sprinklers. Provide a minimum of two sprinklers of each type and temperature rating. Stock spare sprinklers as follows:

   a. For protected facilities having less than 300 sprinklers, at least 6.

   b. For protected facilities having 300-1,000 sprinklers, at least 12.

   c. For protected facilities having over 1,000 sprinklers, at least 24.

   Provide and keep sprinkler wrench(es) in the cabinet to be used in the removal and installation of sprinklers. Provide a sprinkler wrench for each type of sprinkler installed.

4. Protect sprinklers covering spray coating areas against overspray residue. Protect sprinklers subject to overspray accumulations by using plastic bags having a maximum thickness of .003 in. or by using small paper bags. Replace coverings when deposits or residue accumulate (daily).

5. Annually, replace sprinklers and automatic spray nozzles used for protecting commercial-type cooking equipment and

ventilation systems.

6. Conduct an obstruction investigation for sprinkler systems and yard main piping whenever any of the following conditions exist:

   a. Defective intake screens for fire pumps taking suction from open bodies of water

   b. Discharge of obstructive material during routine water tests

   c. Foreign materials in fire pumps, dry-pipe valves, or check valves

   d. Heavy discoloration of water during drain tests or plugging of inspector's test connections

   e. Plugging of sprinklers

   f. Plugged piping in sprinkler systems dismantled during building alterations

   g. Failure to flush yard piping or surrounding public mains following new installations or repairs

   h. A record of broken public mains in the vicinity

   i. Abnormally frequent false tripping of dry-pipe valves

   j. A system is returned to service after an extended duration (greater than 1 year)

   k. There is reason to believe that the sprinkler system contains sodium silicate or its derivatives.

C. Control valves

1. Annually, lubricate the operating stems of OS&Y valves. Then close and reopen the valve completely to test its operation and distribution of the lubricant. Graphite or graphite in light oil should be used.

2. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

D. Deluge valves

1. Locate and repair leaks that cause drops in supervisory pressure and create electrical malfunctions, both of which cause alarms to sound.

2. During the annual trip test, thoroughly clean the interior of

the deluge valve and replace or repair parts as necessary.

3. Drain low points in pre-action systems after each operation and before the onset of freezing weather conditions.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a test of the main drain to verify that the control valve is open.

C. Conduct a test using the alarm bypass connection to verify that the system local audible alarm and/or alarm signal to the monitoring service will operate within the required time.

D. Hydrostatic and flush test any repaired parts of the system before returning to service.

E. Test the activation system to verify that all of the fire detectors are in place and will operate the deluge valve.

7.0 RECORDS

Maintain records showing the system inspection, testing, and maintenance for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 13

D. NFPA 25

E. NFPA 72

F. NFPA 72E

115 - PRE-ACTION SPRINKLER SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining pre-action sprinkler systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Visually inspect the entire system annually (including FDC, piping, pipe hangers, sprinkler heads, pressure gauges, name plate, head obstructions, and unprotected spaces) to verify that it is in good condition and free from mechanical damage.

B. Control valves - Visually inspect all control valves of the system at regular intervals as follows.

1. Sealed valves - weekly.

2. Locked valves and valves with tamper switches - monthly.

3. The inspection shall verify that the valves are

a. In the normal open or closed position

b. Properly sealed, locked, or supervised

c. Accessible

d. Provided with appropriate wrenches

e. Free from external leaks

f. Provided with appropriate identification.

C. Check valves - Internally inspect all check valves at least every 5 years to verify that all components operate properly, move freely, and are in good condition. Clean, repair, or replace the internal components as necessary in accordance with the manufacturer's instructions.

D. FDC - Inspect monthly. The inspection shall verify the following.

1. The FDCs are visible and accessible.

2. Couplings or swivels are not damaged and rotate smoothly.

3. Plugs or caps are in place and not damaged.

4. If the FDC is plugged, or caps are not in place, inspect the interior of the connection for

   a. Obstructions

   b. Whether or not the valve clapper is operational over its full range.

5. Gaskets are in place and in good condition.

6. Identification signs are in place.

7. The check valve is not leaking.

8. The automatic drain valve is in place and operating properly.

9. Components are cleaned, repaired, or replaced as necessary in accordance with the manufacturer's instructions.

E. Deluge valve

1. Daily, during cold weather, visually inspect valve enclosure heating equipment for deluge valves subject to freezing. Make sure that the temperature is at least 40 °F.

   Exception: Valve enclosures equipped with low temperature alarms shall be inspected weekly.

2. Visually inspect gauges weekly. The gauge on the supply side of the valve shall indicate that the normal supply water pressure is being maintained.

   Exception: The gauge monitoring the detection system pressure, if provided, shall be tested monthly to indicate that normal pressure is being maintained.

3. Weekly, inspect the deluge valve to ascertain that

   a. The valve is free from physical damage

   b. All trim valves are in their appropriate open or closed position

   c. There is no leakage from the valve seat

   d. Electrical components are in service.

4. Annually, inspect the interior of the deluge valve when the trip test is conducted. Clean, repair, or replace parts as necessary in accordance with the manufacturer's instructions.

   Exception: Internal inspection of valves that can be reset without removal of a faceplate shall be conducted every 5 years.

5. Internally inspect strainers, filters, and restricted orifices every 5 years unless tests indicate a more stringent frequency is required.

4.0 <u>TESTING</u>

A. Sprinklers - Replace sprinklers that have been in service for 50 years, or submit representative samples to a recognized testing laboratory acceptable to the AHJ for operational testing. Thereafter, repeat test procedures at 10-year intervals.

   Exceptions:

   1. Test any fast response sprinklers in service for 20 years. Retest them at 10-year intervals.

   2. At 5-year intervals, test representative samples of solder-type sprinklers, with a temperature classification of extra hazard (325 °F) or greater, that are exposed to semicontinuous to continuous maximum allowable ambient temperature conditions.

B. Fully close and reopen the control valves annually.

C. Conduct bimonthly testing of the system alarms by using the alarm bypass connection.

D. Conduct annual testing of the main drain connection to verify the availability of water to the system.

E. Deluge valve

   1. Annually, trip test each deluge valve in warm weather in accordance with the manufacturer's instructions.

Exception: For valves protecting property whose nature is such that water cannot be discharged into the piping for test purposes, conduct the trip test in a manner that will not require discharge into the piping.

2. Operate manual actuation devices at least annually.

3. After the trip test, return the system to service in accordance with the manufacturer's instructions.

4. Do not apply grease or other sealing materials to the seating surfaces of the valve.

5. Attach to the valve a tag or card showing the date on which the valve was last tripped and the name and organization conducting the test. Maintain records of operating conditions on the premises for comparing with previous results. Also maintain records of tripping time.

F. Pre-action system activation subsystem.

1. Semiannually, test each initiation device (manual activation stations and fire detectors) in accordance with manufacturer's requirements.

2. Test duration of battery backup power supply on an annual basis.

3. Conduct bimonthly testing of system output, system activation signals, and alarm, supervisory, and trouble conditions.

5.0 MAINTENANCE

A. Maintain the system in operating condition. Repair or replace any components that fail a test or inspection in accordance with the manufacturer's instructions.

B. Sprinklers

1. Replacement sprinklers shall have the proper characteristics for the application intended. This includes

a. Style

b. Orifice size and K factor

c. Temperature rating

d. Coating, if any

e. Deflector type

f. Design requirements.

2. Use only new, listed sprinklers to replace existing sprinklers.

3. Store a supply of spare sprinklers in a cabinet on the premises for replacement purposes. The stock of spare sprinklers shall be proportionally representative of the types and temperature ratings of the system sprinklers. Provide a minimum of two sprinklers of each type and temperature rating. The stock of spare sprinklers shall be as follows:

   a. For protected facilities having less than 300 sprinklers, at least 6

   b. For protected facilities having 300-1,000 sprinklers, at least 12

   c. For protected facilities having over 1,000 sprinklers, at least 24.

   Provide a sprinkler wrench(es) and keep it (them) in the cabinet, to be used in the removal and installation of sprinklers. Provide a sprinkler wrench for each type of sprinkler installed.

4. Protect sprinklers covering spray coating areas against overspray residue. Protect sprinklers subject to overspray accumulations by using plastic bags having a maximum thickness of .003 in. or by using small paper bags. Replace coverings daily when deposits or residue accumulate.

5. Annually replace sprinklers and automatic spray nozzles used for protecting commercial-type cooking equipment and ventilation systems.

6. Conduct an obstruction investigation for sprinkler systems and yard main piping whenever any of the following conditions exist:

   a. Defective intake screens for fire pumps taking suction from open bodies of water

   b. Discharge of obstructive material during routine water tests

   c. Foreign materials in fire pumps, dry-pipe valves, or check valves

   d. Heavy discoloration of water during drain tests or plugging of inspector's test connections

   e. Plugging of sprinklers

f. Plugged piping in sprinkler systems dismantled during building alterations

g. Failure to flush yard piping or surrounding public mains following new installations or repairs

h. A record of broken public mains in the vicinity

i. Abnormally frequent false tripping of dry-pipe valves

j. A system is returned to service after an extended duration (greater than 1 year)

k. There is reason to believe that the sprinkler system contains sodium silicate or its derivatives.

C. Control valve

1. Annually lubricate the operating stems of OS&Y valves. Then completely close and reopen the valve to test its operation and distribution of the lubricant. Use graphite or graphite in light oil.

2. Clean, repair, or replace internal components as necessary, in accordance with the manufacturer's instructions.

D. Deluge valve

1. During the annual trip test, Thoroughly clean the interior of the pre-action of deluge valve and replace or repair parts as necessary.

2. Drain low points in pre-action systems after each operation and before the onset of freezing weather conditions.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a test of the main drain to verify that the control valve is open.

C. Conduct a test using the alarm bypass connection to verify that the system local audible alarm and/or alarm signal to the monitoring service will operate within the required time.

D. Hydrostatic and flush test any repaired parts of the system before returning to service.

E. Test the activation system to verify that all of the fire detectors are in place and will operate the deluge valve.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 13

D. NFPA 25

E. NFPA 72

F. NFPA 72E

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116 - FOAM-WATER EXTINGUISHING SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining foam-water extinguishing systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Visually inspect the entire system quarterly (including all system piping, fittings, hangers, discharge devices, pressure gauges, name plates, valves, proportioners, etc.).

B. Control valves - Visually inspect all control valves of the system at regular intervals as follows.

1. Sealed valves - weekly.

2. Locked valves and valves with tamper switches - monthly.

3. The inspection shall verify that the valves are

   a. In the normal open or closed position

   b. Properly sealed, locked, or supervised

   c. Accessible

   d. Provided with appropriate wrenches

   e. Free from external leaks

f. Provided with appropriate identification.

C. Check valves - Internally inspect all check valves at least every 5 years to verify that all components operate properly, move freely, and are in good condition. Clean, repair, or replace the internal components as necessary, in accordance with the manufacturer's instructions.

D. Backflow preventers - Inspect and maintain, in accordance with the manufacturer's instructions, specialized backflow prevention devices, such as the following: (1) reduced pressure principle backflow preventers, (2) double check valve assemblies, (3) backflow preventers with intermediate atmospheric vents, and (4) atmospheric vacuum breakers. In addition, inspect OS&Y isolation valves weekly to ensure that they are in the normal positions. Monthly, inspect valves secured with locks or that are electrically supervised. Inspect reduced pressure backflow preventers weekly to ensure that the differential sensing valve relief port is not continuously discharging.

E. FDCs - Inspect monthly. The inspection shall verify the following.

1. The FDCs are visible and accessible.

2. Couplings or swivels are not damaged and rotate smoothly.

3. Plugs or caps are in place and not damaged.

4. If the FDC is plugged, or caps are not in place, inspect the interior of the connection for

   a. Obstructions

   b. Whether or not the valve clapper is operational over its full range.

5. Gaskets are in place and in good condition.

6. Identification signs are in place.

7. The check valve is not leaking.

8. The automatic drain valve is in place and operating properly.

9. Components are cleaned, repaired, or replaced as necessary in accordance with the manufacturer's instructions.

F. Deluge valve

1. Daily, during cold weather, visually inspect valve enclosure heating equipment for deluge valves subject to freezing to make sure that the temperature is at least 40 °F.

Exception: Weekly, inspect valve enclosures equipped with low temperature alarms.

2. Visually inspect gauges weekly. The gauge on the supply side of the valve should indicate that the normal supply water pressure is being maintained.

   Exception: Monthly, inspect the gauge monitoring the detection system pressure, if provided, to verify that normal pressure is being maintained.

3. Inspect the deluge valve weekly to ascertain that

   a. The valve is free from physical damage

   b. All trim valves are in their appropriate open or closed position

   c. There is no leakage from the valve seat

   d. Electrical components are in service.

4. Annually, inspect the interior of the deluge valve when the trip test is conducted. Clean, repair, or replace parts as necessary in accordance with the manufacturer's instructions.

   Exception: Every 5 years, conduct an internal inspection of valves that can be reset without removal of a faceplate.

5. Internally inspect strainers, filters, and restricted orifices every 5 years unless tests indicate a more stringent frequency is required.

G. Foam-water discharge devices - Visually inspect monthly to ensure that they are in place, continue to be aimed or pointed in the direction intended in the system design, and are free from external loading and corrosion. Where caps and plugs are required, the inspection should confirm they are in place and free to operate as intended.

   If the devices are misaligned, adjust them (aimed) by visual means, and check the discharge patterns at the next scheduled flow test.

   Discharge devices are listed and approved with particular foam concentrates. Inspect to verify that unlisted combinations of discharge devices and foam concentrate have not been substituted.

H. Strainers - Flush the mainline strainer (basket or screen) until clear after each operation or flow test. Remove, clean, and inspect individual water spray nozzle strainers after each operation or flow test. Inspect and clean all strainers in accordance with the manufacturer's instructions. Replace or repair damaged or corroded parts.

I. Drainage - Monthly, visually inspect the area beneath and surrounding a foam-water spray system to determine that drainage facilities, such as trapped sumps and drainage trenches, are not blocked, and retention embankments or dikes are in good repair.

J. Inspect the concentrate tank monthly to verify that there is an adequate quantity of foam concentrate to satisfy the system's original design requirements.

K. Semiannually, visually inspect all fire detectors in the system's fire detection subsystem to verify that the detector is in good physical condition and that there have been no changes that would affect its performance. Follow the guidelines in Procedure 151 for further maintenance and inspection.

4.0 TESTING

A. Sprinklers - Replace sprinklers after 50 years of service or submit representative samples to a recognized testing laboratory acceptable to the AHJ for operational testing. Repeat test procedures thereafter at 10-year intervals.

Exceptions:

1. Test fast response sprinklers that have been in service for 20 years. Retest at 10-year intervals.

2. At 5-year intervals, test representative samples of solder-type sprinklers, with a temperature classification of extra hazard (325 °F) or greater, that are exposed to semicontinuous to continuous maximum allowable ambient temperature conditions.

B. Preparation - Take care to prevent foam-water damage by verifying that there is adequate drainage. Provide protection for any devices that may be damaged during tests by the discharge of the system or run-off.

C. Fully close and reopen system control valves annually.

D. Operation performance test - Conduct operation tests annually to ensure that the foam-water system(s) will respond as designed, both automatically and manually. The test procedures simulate, wherever possible, anticipated emergency events so the response of the foam-water system(s) can be evaluated.

Exception: Where discharge from the system discharge devices will create a hazardous condition or conflict with local requirements, an approved alternate method to achieve full flow conditions is acceptable.

1. Response Time: Under test conditions, operate automatic detection systems, when exposed to a test source, within the requirements of NFPA 72E. This time shall be recorded.

2. Discharge Time: The system and foam-water supplies are designed to discharge effective foam-water from all nozzles within 30 seconds following operation of the detection system. These times shall be recorded.

   Exception: Closed head foam-water sprinkler systems.

3. Discharge Patterns: Observe the discharge patterns from all of the discharge devices to ensure that patterns are not impeded by plugging of the discharge devices, discharge devices are properly positioned, and obstructions do not prevent discharge patterns from effectively covering surfaces to be protected. When internal obstructions occur, clean the piping and discharge devices and retest the system. These discharge devices may be of different orifice sizes and types. Some discharge devices may be more subject to internal obstruction than others.

   Exception: Closed head foam-water sprinkler systems.

4. Pressure Readings: Record pressure readings at the highest, most remote discharge device to ensure solution flow has not been impeded by partially closed valves or by plugged strainers or piping. Record a second pressure reading at the main control valve to ensure the water supply is adequate. Compare these readings to the hydraulic design pressures and volumes to ensure the original system design is met and the water supply is adequate to meet the design requirements. Loss of pressure of more than 10% should be immediately investigated to determine its cause.

5. Multiple System: Simultaneously, test the maximum number of systems expected to operate in case of fire to check the adequacy of the water supply and concentrate pump.

6. Manual activation: Test devices at least annually.

7. Concentration Testing: During the full flow foam test, take a foam sample. This sample should then be placed in a 1 pint container; labeled with the name of the person to contact, the system location, address, telephone number, and date the sample was taken; and sent to the manufacturer for qualitative testing. Concentration should be within ±10% of the acceptance test results, but in no case more than 10% below minimum design.

8. After the full flow test, return the foam-water systems to service, and replenish the foam concentrate tank to the required level.

C. Test waterflow alarms bimonthly by opening the alarm bypass connection.

   Exception: There is no inspector's test connection on a deluge foam-water sprinkler system.

D. Annually, trip test the deluge valve. Conduct the tests without discharging foam from the system or diluting the foam concentrate supply.

E. Conduct annual testing of the main drain connection to verify the availability of water to the system.

F. Test the fire detection subsystem for proper operation under the procedures and frequencies stated in Procedure 151.

G. Semiannually, drain approximately 5 gal of foam liquid from the bottom of the concentrate tank through the tank drain. Let it stand for several hours so that any scale (rust) will settle to the bottom of the container. Return the sample to the tank top by pouring it through a strainer. By this method, the quantity of scale can be determined, and one can decide if the tank should be cleaned.

5.0 MAINTENANCE

A. Follow the manufacturer's maintenance recommendations for all components of the foam-water extinguishing system.

B. Sprinklers

   1. Replacement sprinklers must have the proper characteristics for the application intended. These include the following:

      a. Style

      b. Orifice size and K factor

      c. Temperature rating

      d. Coating, if any

      e. Deflector type

      f. Design requirements.

   2. Use only new, listed sprinklers to replace existing sprinklers.

3. Store a supply of spare sprinklers in a cabinet on the premises for replacement purposes. The stock of spare sprinklers shall be proportionally representative of the types and temperature ratings of the system sprinklers. Provide a minimum of two sprinklers of each type and temperature rating. The stock of spare sprinklers shall be as follows:

   a. For protected facilities having less than 300 sprinklers, at least 6.

   b. For protected facilities having 300-1,000 sprinklers, at least 12.

   c. For protected facilities having over 1,000 sprinklers, at least 24.

   Provide and keep sprinkler wrench(es) in the cabinet to be used in the removal and installation of sprinklers. Provide a sprinkler wrench for each type of sprinkler installed.

4. Protect sprinklers covering spray coating areas against overspray residue. Protect sprinklers subject to overspray accumulations by using plastic bags having a maximum thickness of .003 in. or by using small paper bags. Replace coverings when deposits or residue accumulate (daily).

5. Annually, replace sprinklers and automatic spray nozzles used for protecting commercial-type cooking equipment and ventilation systems.

6. Conduct an obstruction investigation for sprinkler systems and yard main piping whenever any of the following conditions exist:

   a. Defective intake screens for fire pumps taking suction from open bodies of water.

   b. Discharge of obstructive material during routine water tests.

   c. Foreign materials in fire pumps, dry-pipe valves, or check valves.

   d. Heavy discoloration of water during drain tests or plugging of inspector's test connections.

   e. Plugging of sprinklers.

   f. Plugged piping in sprinkler systems dismantled during building alterations.

   g. Failure to flush yard piping or surrounding public mains following new installations or repairs.

h. A record of broken public mains in the vicinity.

i. Abnormally frequent false tripping of dry-pipe valves.

j. A system is returned to service after an extended duration (greater than 1 year).

k. There is reason to believe that the sprinkler system contains sodium silicate or its derivatives.

C. Control valve

1. Annually, lubricate the operating stems of OS&Y valves using graphite or graphite in light oil. Then, completely close and reopen the valve to test its operation and distribution of the lubricant.

2. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

D. Deluge valve

1. During the annual trip test, thoroughly clean the interior of the deluge valve and replace or repair parts as necessary.

2. Drain low points in systems after each operation and before the onset of freezing weather conditions.

6.0 PROPORTIONER EQUIPMENT INSPECTION, TESTING, AND MAINTENANCE

A. Verify valve position monthly (open or closed) in accordance with specified operating requirements.

B. Vacuum vents are to be serviced annually as follows.

1. Remove vent from expansion dome. While vent is removed, make certain that the opening is not blocked and that dirt or other foreign objects do not enter the tank.

2. Remove vest bonnet and lift out vacuum valve and pressure valve.

3. Flush vent body internally and wash vacuum valve and pressure valve thoroughly. Water should be adequate for normal cleaning. Make sure the screen is not clogged and avoid the use of any hard, pointed objects to clear the screen.

4. If liquid has become excessively gummy or solidified, soak vent body and parts in hot, soapy water.

5. Turn vent body upside down and drain thoroughly. Dry parts by

placing them in a warm and dry area or by using an air hose.

6. Spray parts with a light Teflon[1] coating and reassemble vent. Avoid the use of any type of oil for lubrication purposes as oil is harmful to the foam liquid.

7. Replace vent bonnet and slowly turn vent upside down a few times to ensure proper freedom of the moveable parts.

8. Attach vent to the liquid storage tank expansion dome.

C. Standard pressure proportioner

1. Inspection

   This is a pressure vessel. To prevent injury, remove pressure before monthly inspection. Inspect as follows:

   a. Ball drip valves (automatic drains) are free and opened

   b. External corrosion on foam concentrate storage tanks is not present.

2. Testing

   a. Operation test will verify whether or not the proportioner is functioning properly.

3. Maintenance

   a. Ball drip (automatic type) drain valves be disassembled, cleaned, and reassembled every 5 years.

   b. Inspect the foam liquid tank for internal and external corrosion and hydrostatically test to the specified working pressure every 10 years.

   c. Drain the foam liquid storage tank of foam liquid and flush every 10 years. Foam liquid may be salvaged and reused.

D. Bladder Tank Proportioners

1. Inspection

   Inspect monthly as follows:

   a. Water control valves to the foam concentrate tank are open.

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[1]Teflon is a trademark of E.I. Du Pont de Nemours Company.

b. No external corrosion is present on the foam concentrate storage tanks.

2. Testing

a. The operation test will verify whether or not the proportioner is operating properly.

3. Maintenance

a. Remove and clean the sight glass, when provided, every 10 years.

b. Hydrostatically test the foam concentrate tank to the specified working pressure every 10 years. Consult the manufacturer for appropriate procedures.

E. Line proportioner

1. Inspection

Inspect monthly as follows.

a. Flush mainline strainer (basket or screen) until clear after each operation or flow test. Inspect and clean all strainers in accordance with the manufacturer's instructions. Replace or repair damaged or corroded parts.

b. Pressure vacuum vent operates freely.

c. No external corrosion is present on the foam concentrate storage tank.

2. Testing

a. The operation test will verify whether or not the proportioner is functioning properly.

3. Maintenance

a. Inspect the foam concentrate tank for internal corrosion every 10 years. Inspect pickup pipes inside the tank for corrosion, separation, or plugging every 10 years.

b. Drain and flush the foam concentrate tank every 10 years. Foam concentrate may be salvaged and reused.

F. Standard balanced pressure proportioner

1. Inspection

Inspect monthly as follows.

a. Flush mainline strainer (basket or screen) until clear after each operation or flow test. Inspect and clean all strainers in accordance with the manufacturer's instructions. Replace or repair damaged or corroded parts.

b. Ensure pressure vacuum vent operates freely.

c. Ensure gauges at pump unit and individual proportioner operate properly.

d. Keep sensing line valves at the pump unit and individual proportioner stations open.

e. Ensure power is available to the foam liquid pump.

2. Testing

a. The operation test will verify that the proportioner is functioning properly.

3. Maintenance

a. Run the foam concentrate pump every 5 years. Circulate foam concentrate back to the tank. Also, refer to the manufacturer's instructions and frequencies.

b. At least every 5 years, service foam pumps, drive train, and drivers in accordance with the manufacturer's instructions and frequency.

c. At least every 5 years, flush the balancing valve diaphragm through the diaphragm section with water or foam concentrate until fluid appears clear.

d. Inspect the foam concentrate tank internally every 10 years for corrosion and sedimentation. Excessive sedimentation requires draining and flushing of the tank.

G. In-line balanced pressure proportioner

1. Inspection

Inspect monthly as follows.

a. Flush mainline strainer (basket or screen) until clear after each operation or flow test. Inspect and clean all strainers in accordance with the manufacturer's instructions. Replace or repair damaged or corroded parts.

b. Ensure the pressure vacuum vent operates freely.

c. Ensure gauges at pump unit and individual proportioner operate properly.

d. Sensing line valves at the pump unit and individual proportioner stations be open.

e. Power be available to the foam liquid pump.

2. Testing

a. The operation test will verify whether or not the proportioner is operating properly.

3. Maintenance

a. Run the foam concentrate pump every 5 years. Circulate foam concentrate back to the tank. Also, refer to the manufacturer's instructions and frequencies.

b. Service the foam pumps, drive train, and drivers in accordance with the manufacturer's instructions and frequency at least every 5 years.

c. Flush the balancing valve diaphragm through the diaphragm section with water or foam every 5 years.

f. Inspect the foam concentrate tank internally every 10 years for corrosion and sedimentation. Excessive sedimentation requires draining and flushing of the tank.

7.0 <u>CORRECTIVE ACTION</u>

7.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or A and B or C or D will be required until the repairs are complete.

7.2 Inspection

A. Visually inspect the system before returning to service.

7.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a test of the main drain to verify that the control valve is open.

C. Conduct a test using the alarm bypass connection to verify that the system local audible alarm and/or alarm signal to the monitoring service will operate within the required time.

D. Consult the AHJ to determine whether or not a full flow test should be conducted on the repaired system.

E. Hydrostatic and flush test any repaired parts of the system before returning to service.

F. Test the fire detection subsystem to verify that all of the fire detectors are in place and will operate the deluge valve.

8.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

9.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 11

D. NFPA 13

E. NFPA 16

F. NFPA 25

G. NFPA 72

H. NFPA 72E

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121 - WET STANDPIPE SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining wet standpipe systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance to the AHJ.

3.0 INSPECTION

A. Monthly, visually check all components of the system, including piping, valves, hose connection, pipe supports, and allied equipment, to ensure that the system is free of corrosion, foreign material, physical damage, tampering, or other conditions that would prevent operation.

B. Control valves - Visually inspect all control valves of the system at regular intervals as follows:

1. Sealed valves - weekly.

2. Locked valves and valves with tamper switches - monthly.

3. The inspection shall verify that the valves are

   a. In the normal open or closed position

   b. Properly sealed, locked, or supervised

   c. Accessible

   d. Provided with appropriate wrenches

e. Free from external leaks

f. Provided with appropriate identification.

C. Check valves - Internally inspect all check valves at least every 5 years to verify that all components operate properly, move freely, and are in good condition. Clean, repair, or replace the internal components as necessary in accordance with the manufacturer's instructions.

D. Backflow preventers - Inspect and maintain specialized backflow prevention devices, such as reduced pressure principle backflow preventers, double check valve assemblies, backflow preventers with intermediate atmospheric vents, and atmospheric vacuum breakers, in accordance with the manufacturer's instructions. In addition, inspect OS&Y isolation valves weekly to verify that they are in the normal positions. Valves secured with locks or that are electrically supervised should be inspected monthly. Reduced pressure backflow preventers should be inspected weekly to ensure that the differential sensing valve relief port is not continuously discharging.

E. Hose valves - Visually inspect all hose valves weekly. Verify the following:

1. Hand wheel is not broken or missing

2. Outlet hose threads are not damaged

3. There are no leaks

4. The reducer and cap is not missing.

Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

F. Pressure regulating valves - Inspect all pressure regulating valves weekly to verify that they are:

1. Open

2. Not leaking

3. Maintaining downstream pressure per design criteria

4. In good condition with handwheels installed.

Conduct a flow test on each valve initially, and at 5-year intervals thereafter, in accordance with the manufacturer's instructions. Tag the valves with the most recent testing and pressure setting.

Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

G. FDCs - Inspect monthly. The inspection shall verify the following.

1. The FDCs are visible and accessible.

2. Couplings or swivels are not damaged and rotate smoothly.

3. Plugs or caps are in place and not damaged.

4. If the FDC is plugged, or caps are not in place, inspect the interior of the connection for:

   a. Obstructions

   b. Whether or not the valve clapper is operational over its full range.

5. Gaskets are in place and in good condition.

6. Identification signs are in place.

7. The check valve is not leaking.

8. The automatic drain valve is in place and operating properly.

9. Components are cleaned, repaired, or replaced as necessary in accordance with the manufacturer's instructions.

H. Hose Systems

1. Visually inspect hose cabinets monthly for drainage and to make sure that the hose is properly racked in the cabinet and that the nozzle is attached. Existing unlined hose may continue in use; however, all new or replacement hose should be lined and listed in accordance with NFPA 14. (does the last part read correctly?)

2. Monthly, visually inspect hose cabinet signs to verify proper signage.

3. Annually test nozzles on standpipe systems through their full range of operation.

4. Annually remove and rerack the 1-1/2-foot hose connected to standpipe systems so that it will not deteriorate at the bends. When the hose is reracked, different parts of the hose should be located at the bends. The gaskets at the hose connections should also be checked for deterioration and replaced if necessary. Hose on reels do not have to be reracked annually.

5. Lubricate swing-out hose racks and hose reels annually with graphite so they operate easily.

6. Clean, repair, or replace components as necessary in accordance with the manufacturer's instructions.

4.0 TESTING

A. Fully close and reopen the control valve annually.

B. A qualified person shall conduct an initial flow test by flowing the required volume of water at the hydraulically most remote, highest, or dead-end hose connection of each zone of the standpipe system. When a flow test of the most hydraulically remote outlet is not practical, consult the AHJ for the appropriate location of the test. Conduct a flow test every 5 years thereafter.

Use the design requirements in effect at the time of the installation for all testing. The AHJ must approve the actual test method(s) and performance criteria in advance.

C. Conduct hydrostatic tests every 5 years at no less than 200 psi for 2 hours, or at 50 psi in excess of the maximum pressure when maximum pressure is in excess of 150 psi, on all dry portions of a wet standpipe system. Measure the hydrostatic test pressure at the low elevation point of the individual system or zone being tested. The inside pipe should show no leakage.

Conduct hydrostatic tests on any system that has been modified or repaired.

D. Flush test system initially and after any repairs. The minimum rate of flow should not be less than the water demand rate of the system, which is determined by the system design, or not less than that necessary to provide a velocity of 10 ft/s, whichever is greater. For all systems, continue the flushing operations for a sufficient time to ensure thorough cleaning. When planning the flushing operations, give consideration to disposing the water issuing from the test outlets.

E. When provided, test waterflow alarms on a bimonthly basis. Test supervisory signals on a semiannual basis.

5.0 MAINTENANCE

A. Control valves

1. Lubricate the operating stems of OS&Y valves annually. Then close and reopen the valve to test its operation and distribution of the lubricant. Graphite or graphite in light oil should be used.

2. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

B. The following Table 121-1 is recommended for the inspection and maintenance of all standpipe systems.

C. Provide additional maintenance as recommended by the manufacturer's instructions for all components of standpipe systems.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Place a tag at the FDC and hose valves indicating what portions of the system are out of service.

B. Stop all hazardous operations, and/or

C. Provide an alternate means to protect the hazardous operations.

D. Begin repair operations within 24 hours. The AHJ decide if B and/or C will be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Conduct a hydrostatic test on any repaired portions of the system.

C. Flush test any repaired piping before returning the system to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

Table 121-1. Inspection and Maintenance of Wet Standpipe Systems.
(sheet 1 of 2)

Check Points	Components Corrective Action
Hose Valve Outlets	
1. Cap missing	1. Replace
2. Fire hose connection damaged	2. Repair
3. Valve handles missing	3. Replace
4. Cap gaskets missing or deteriorated	4. Replace
5. Valve leaking	5. Close or repair
6. Visible obstructions	6. Remove
7. Restricting device missing	7. Replace
Piping	
1. Damaged piping	1. Repair
2. Control valves damaged	2. Repair or replace
3. Missing or damaged support device	3. Repair or replace
4. Damaged supervisory devices	4. Repair or replace
Hose (if installed)	
1. Inspect	1. Remove and inspect the hose, including gaskets, and rerack or rereel at intervals in accordance with NFPA 1962
2. Mildew, cuts, abrasions, and deterioration evident	2. Replace with listed lined, jacketed hose.
3. Coupling damaged	3. Replace or repair
4. Gaskets missing or deteriorated	4. Replace
5. Incompatible threads on coupling	5. Replace or provide thread adaptor
6. Hose not connected to hose rack nipple or valve	6. Connect
7. Hose test date outdated	7. Retest or replace in accordance with NFPA 1962.

Table 121-1. Inspection and Maintenance of Wet Standpipe Systems.
(sheet 2 of 2)

Check Points	Components Corrective Action
Hose Nozzle	
1. Hose nozzle missing.	1. Replace with listed nozzle
2. Gasket missing or deteriorated	2. Replace
3. Obstructions	3. Remove
4. Nozzle does not operate smoothly	4. Repair or replace
Hose Storage Device	
1. Difficult to operate	1. Repair or replace
2. Damaged	2. Repair or replace
3. Obstruction	3. Remove
4. Hose improperly racked or rolled	4. Remove
5. Nozzle clip in place and nozzle correctly contained?	5. Replace if necessary
6. If enclosed in cabinet, will hose swing out at least 90 degrees?	6. Repair or remove any obstructions
Cabinet	
1. Check overall condition for corroded or damaged parts	1. Repair or replace parts. Replace entire cabinet if necessary.
2. Difficult to open	2. Repair
3. Cabinet door will not open fully	3. Repair or move obstructions
4. Door glazing cracked or broken	4. Replace
5. If cabinet is break-glass type, is lock functioning properly?	5. Repair or replace
6. Glass break device missing or not attached.	6. Replace or attach
7. Not properly identified as containing fire equipment	7. Provide identification
8. Visible obstructions	8. Remove
9. All valves, hose, nozzles, fire extinguisher, etc., easily accessible	9. Remove any material not related.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 14

D. NFPA 25

122 - DRY STANDPIPE SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining dry standpipe systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A Monthly, visually check all components of the standpipe and hose systems, including piping, valves, hose connections, pipe-clamp supports, and allied equipment, to ensure that the system is free of corrosion, foreign material, physical damage, tampering, or other conditions that would prevent operation.

B. Hose valves - Weekly, visually inspect all hose valves. The inspection shall verify that the following:

1. Hand wheel is not broken or missing

2. Outlet hose threads are not damaged

3. There are no leaks

4. The reducer and cap is not missing.

Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

C. Pressure regulating valves - Weekly, inspect all pressure regulating valves to verify that they are

1. Open

2. Not leaking

3. Maintaining downstream pressure per design criteria

4. In good condition with handwheels installed.

Conduct a flow test on each valve initially and at 5-year intervals thereafter in accordance with the manufacturer's instructions. Tag the valves with the most recent testing and pressure setting.

Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

D. FDCs - Inspect monthly to verify the following:

1. The FDCs are visible and accessible.

2. Couplings or swivels are not damaged and rotate smoothly.

3. Plugs or caps are in place and not damaged.

4. If the FDC is plugged, or caps are not in place, inspect the interior of the connection for

   a. Obstructions

   b. Whether or not the valve clapper is operational over its full range.

5. Gaskets are in place and in good condition.

6. Identification signs are in place.

7. The automatic drain valve is in place and operating properly.

8. Components are cleaned, repaired, or replaced as necessary in accordance with the manufacturer's instructions.

E. Hose systems

1. Visually inspect hose cabinets monthly for drainage and to make sure that the hose is properly racked in the cabinet and that the nozzle is attached. Replace any unlined hose with all new listed, lined fire hose.

2. Visually inspect hose cabinet signs monthly to verify proper signage.

3. Test nozzles on hose connected to standpipes through their full range of operation annually.

4. Annually remove and rerack the 1-1/2-in. lined hose in the connected dry standpipe system so that it will not deteriorate at the bends. When the hose is reracked, different parts of the hose should be located at the bends. Check the gaskets at the hose connections for deterioration and replace if necessary. Hose on reels does not have to be reracked annually.

5. Annually lubricate swing-out hose racks and hose reels with graphite so they operate easily.

6. Clean, replace, or repair components as necessary in accordance with the manufacturer's instructions.

4.0 TESTING

A. A qualified person shall conduct an initial flow test by releasing the required volume of water at the design pressures to the hydraulically most remote, highest, or dead-end hose connection of each zone of the standpipe system. When a flow test of the most hydraulically remote outlet is not practical, consult the AHJ for the appropriate location of the test. Conduct a flow test every 5 years thereafter.

   Use the design requirements in effect at the time of the installation for all testing. Approve the actual test method(s) and performance criteria in advance with the AHJ.

B. Every 5 years, conduct hydrostatic tests of not less than 200 psi for 2 hours, or at least 50 psi in excess of the maximum pressure when the maximum pressure is in excess of 150 psi. Measure the hydrostatic test pressure at the low elevation point of the individual system or zone being tested. The inside standpipe piping shall show no leakage. Take care to thoroughly drain the standpipe after each test.

   Conduct additional hydrostatic tests on any system that has been modified or repaired.

5.0 MAINTENANCE

A. The following Table 122-1 is recommended for the inspection and maintenance of all standpipe systems.

B. Perform additional maintenance as recommended by the manufacturer's instructions on all components of the dry standpipe and hose system.

Table 122-1. Inspection and Maintenance of Dry Standpipe Systems.
(sheet 1 of 2)

Check Points	Components Corrective Action
Hose Valve Outlets	
1. Cap missing	1. Replace
2. Fire hose connection damaged	2. Repair
3. Valve handles missing	3. Replace
4. Cap gaskets missing or deteriorated	4. Replace
5. Valve leaking	5. Close or repair
6. Visible obstructions	6. Remove
7. Restricting device missing	7. Replace
Piping	
1. Damaged piping	1. Repair
2. Control valves damaged	2. Repair or replace
3. Missing or damaged support device	3. Repair or replace
4. Damaged supervisory devices	4. Repair or replace
Hose (if installed)	
1. Inspect	1. Remove and inspect the hose, including gaskets, and rerack or rereel at intervals in accordance with NFPA 1962
2. Mildew, cuts abrasions, and deterioration evident	2. Replace with listed lined, jacketed hose
3. Coupling damaged	3. Replace or repair
4. Gaskets missing or deteriorated	4. Replace
5. Incompatible threads on coupling	5. Replace or provide thread adaptor
6. Hose not connected to hose rack nipple or valve	6. Connect
7. Hose test date outdated	7. Retest or replace in accordance with NFPA 1962

Table 122-1. Inspection and Maintenance of Dry Standpipe Systems.
(sheet 2 of 2)

Check Points	Components Corrective Action
Hose Nozzle	
1. Hose nozzle missing.	1. Replace with listed nozzle
2. Gasket missing or deteriorated	2. Replace
3. Obstructions	3. Remove
4. Nozzle does not operate smoothly	4. Repair or replace
Hose Storage Device	
1. Difficult to operate	1. Repair or replace
2. Damaged	2. Repair or replace
3. Obstruction	3. Remove
4. Hose improperly racked or rolled	4. Remove
5. Nozzle clip in place and nozzle correctly contained?	5. Replace if necessary
6. If enclosed in cabinet, will hose swing out at least 90 degrees?	6. Repair or remove any obstructions
Cabinet	
1. Check overall condition for corroded or damaged parts	1. Repair or replace parts Replace entire cabinet if necessary
2. Difficult to open	2. Repair
3. Cabinet door will not open fully	3. Repair or move obstructions
4. Door glazing cracked or broken	4. Replace
5. If cabinet is break-glass type, is lock functioning properly?	5. Repair or replace
6. Glass break device missing or not attached.	6. Replace or attach
7. Not properly identified as containing fire equipment	7. Provide identification
8. Visible obstructions	8. Remove
9. All valves, hose, nozzles, fire extinguisher, etc., easily accessible	9. Remove any material not related

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Place a tag at the FDC and hose valves indicating what portions of the system are out of service.

B. Stop all hazardous operations, or

C. Provide an alternate means to protect the hazardous operations.

D. Begin repair operations within 24 hours. The AHJ shall decide if B and/or C will be required until repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Conduct a hydrostatic test on any repaired portions of the system.

B. Flush test any repaired piping before returning the system to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 14

D. NFPA 25

123 - MANUAL WATER SPRAY SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining manual water spray systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Control valves - Visually inspect all control valves of the system at regular intervals as follows.

1. Sealed valves - weekly.

2. Locked valves and valves with tamper switches - monthly.

3. The inspection shall verify that the valves are

   a. In the normal open or closed position

   b. Properly sealed, locked, or supervised

   c. Accessible

   d. Provided with appropriate wrenches

   e. Free from external leaks

   f. Provided with appropriate identification.

B. Weekly inspection - Visually check the following:

1. Nozzles for blockage

2. That no machinery or equipment has been changed so it now blocks nozzle discharge

3. Nozzle positioning.

C. Annual inspection

1. Visually inspect all piping, fittings, and hangers for corrosion and proper drainage.

4.0 TESTING

A. Follow manufacturer's instructions for specific component testing procedures.

B. Fully cycle the control valve annually.

C. At least annually, make a full system flow test to evaluate the nozzle arrangement, discharge pattern, and obstructions to spray patterns, and to check for nozzle blockages. When more than one system might operate in the event of a fire, all such systems should be simultaneously flow tested. Measure the pressure at the highest, most hydraulically remote nozzle to ensure that it meets the design pressure. This pressure measurement can be taken by removing the nozzle, installing a tee with a pressure gauge attached, and replacing the nozzle in the tee. At the end of the test, the gauge and tee should be removed and the nozzle replaced. The system piping shall show no leakage during the test. (Strainers should be inspected after each operation and cleaned if necessary.)

5.0 MAINTENANCE

A. Control valves

1. Annually lubricate the operating stems of OS&Y valves. Then, completely close and reopen the valve to test its operation and distribution of the lubricant. Graphite or graphite in light oil should be used.

2. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

B. Clean strainers annually. This will generally involve shutting off the water supply and removing the strainer to clean it. Some strainers are self-cleaning and merely require rotating the operating wheel.

C. Perform additional maintenance according to the manufacturer's instructions on all components of the water spray system.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Stop all hazardous operations, or

B. Start a recorded fire watch within 1 hour of the outage, or

C. Provide an alternate means to protect the hazardous operations.

D. Begin repair operations within 8 hours or A or B or C shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available at the system connection.

B. Hydrostatic and flush test any repaired parts of the system before returning to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 15

D. NFPA 25

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131 - HALON 1301 (TOTAL FLOODING)

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining Halon 1301 fire extinguishing systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Visually inspect the entire system weekly.

B. Check weekly to make sure that the space being protected has not been altered.

C. Visually inspect all openings (doors, dampers, etc.) of the space being protected to verify that they are closed or are connected for releasing automatically upon system operation.

D. Check containers monthly for physical damage and proper mounting.

E. Check the container pressure gauges (if required) monthly for proper operating pressures. If the readings shows more than a 10% loss in required pressure, refill or replace the cylinder.

F. For fire detection system inspection, see Procedure 151.

4.0 TESTING

A. Weigh each Halon container with discharge control head semiannually. If a container shows a loss in net weight of more than 10%, it shall be refilled or replaced. The weight and pressure of the container shall be recorded on a tag attached to each container.

B. Operate control activation devices at least annually (except explosive squibs).

C. Conduct an operating test of the system annually. Control heads are to be removed before starting the test. Test all auxiliary functions, such as the damper release and door release.

D. Conduct all tests with trained personnel according to the manufacturer's instructions.

E. See Procedure 151 for fire detection system testing.

5.0 MAINTENANCE

A. At 20-year intervals, perform a hydrostatic test on the cylinders and hoses. When a system has been discharged and it has been a minimum of 5 years since the last hydrostatic test, another hydrostatic test is required before refilling the cylinders.

B. Conduct any other maintenance in accordance with the manufacturer's instructions.

C. See Procedure 151 for fire detection system testing.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign on the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, and

D. Provide an alternate means to protect the hazardous operations.

E. Immediately begin repair operations or B or C and D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Weigh Halon containers and check pressure before returning them to service.

B. Conduct an operating test of the system before returning it to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 12A

D. NFPA 72

E. NFPA 72E

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132 - HALON 1211 (TOTAL FLOODING)

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining a Halon 1211 fire extinguishing system.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Visually inspect the entire system weekly.

B. Check weekly to make sure that the space being protected has not been altered.

C. Visually inspect all openings (doors, dampers, etc.) of the space being protected to verify that they are closed or are connected for releasing automatically upon system operation.

D. Check containers monthly for physical damage and proper mounting.

E. Check the container pressure gauges monthly for proper operating pressures. If the readings show more than a 10% loss in pressure from that required, refill or replace the cylinder.

F. See Procedure 151 for fire detection system testing.

4.0 TESTING

A. Weigh each Halon container with discharge control head semiannually. If a container shows a loss in net weight of more than 10%, it should be refilled or replaced. Record the weight and pressure of the container on the attached tag.

B. Operate control activation devices at least annually (except explosive squibs).

C. Conduct an operating test of the system annually. Control heads are to be removed before starting the test. Test all auxiliary functions, such as damper release, door release, etc.

D. Conduct all tests with trained personnel according to the manufacturer's instructions.

E. See Procedure 151 for fire detection system testing.

5.0 MAINTENANCE

A. At 20-year intervals, perform a hydrostatic test on the cylinders and hoses. When a system has been discharged and it has been a minimum of 5 years since the last hydrostatic test, another hydrostatic test is required before refilling the cylinders.

B. Conduct any other maintenance in accordance with the manufacturer's instructions.

C. For fire detection system testing, see Procedure 151.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign on the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, and

D. Provide an alternate means to protect the hazardous operations.

E. Immediately begin repair operations, or B or C and D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Weigh Halon containers and check pressure before returning them to service.

B. Conduct an operating test of the system before returning it to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 12B

D. NFPA 72

E. NFPA 72E

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133 - DRY CHEMICAL SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining the dry chemical fire extinguishing systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. If the system is designed to have nozzle caps, check them weekly to ensure that they are in place.

B. Weekly, check to make sure that no foreign substances are accumulating on the fusible links and nozzles.

C. Weekly, check to make sure that corrosive cleaning solutions are not being used on links, cables, or nozzles.

D. Weekly, check the protected area for alterations that may have occurred.

E. Weekly, check the nozzles for physical damage and proper alignment.

F. If the dry chemical agent is stored in a pressurized container, check the pressure semiannually. If the gauges show more than a 10% loss in pressure from that required, refill or replace the container.

G. If the system has a separate expellent gas cartridge, check cartridge for proper operation semiannually. For nitrogen cartridges, this requires checking of pressure. For CO_2 cartridges, this requires weighing the cylinder and comparing it with the manufacturer's minimum. If the cartridge shows a 10% loss, refill or replace.

H. Annually, check the dry chemical agent for lumping or caking in systems having a separate expellent gas cartridge. If lumping or caking is noted, discard and replace the dry chemical agent.

I. For fire detection subsystems other than a fusible link, refer to Procedure 151.

J. Weekly, check openings (doors, dampers, etc.) of the space being protected to verify that they are closed or connected for automatic releasing upon system operation.

K. Check fuel and power shutdown devices on an annual basis.

4.0 TESTING

A. Conduct an operating test of each dry chemical system annually. This involves testing all system components without discharging dry chemical agent. Refer to Procedure 151 for fire detection system testing.

B. Conduct a discharge (bag test) where required by the AHJ every 6 years for each dry chemical system. Securely place bags over each nozzle and then activate the system. Weigh the amount of dry chemical agent discharged from each nozzle and compare it to that required by the design's minimum conditions. If any of the nozzles do not release enough dry chemical agent, the system needs to be checked for blockage. After the discharge test, blow out the system with air before resetting it.

C. Conduct a hydrostatic test every 12 years on the following:

1. Dry chemical chambers
2. Auxiliary pressure containers
3. Valve assemblies
4. Hoses and fittings
5. Check valves
6. Directional valves
7. Manifolds.

All equipment passing the test should be thoroughly dried before recharging.

D. For fire detection system testing, see Procedure 151.

5.0 <u>MAINTENANCE</u>

A. Perform maintenance promptly on any components that fail to operate properly during the annual operating tests.

B. Blow out the entire system with air after any operation.

C. Conduct any other maintenance recommended in the manufacturer's instructions.

D. For fire detection system maintenance, see Procedure 151.

6.0 <u>CORRECTIVE ACTION</u>

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign on the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations or

C. Start a recorded fire watch within 1 hour of the outage, and

D. Provide an alternate means to protect the hazardous operations.

E. Immediately begin repair operations or B or C and D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. If the dry chemical agent is stored in a pressurized cylinder, check the pressure before returning to service.

B. If the system has a separate expellent gas cartridge, check each cartridge for proper operation before returning to service:

1. Nitrogen cartridges - check pressure

2. CO_2 cartridges - weigh cylinder

C. Conduct an operating test of the system before returning to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 17

D. NFPA 72

E. NFPA 72E

134 - WET CHEMICAL SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining the wet chemical fire extinguishing systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. On a monthly basis, conduct inspections in accordance with the manufacturer's listed installation and maintenance manual. As a minimum, this "quick check" or inspection should include the following:

1. The extinguishing system is in its proper location

2. Manual activation devices are unobstructed

3. Tamper indicators and seals are intact

4. Maintenance tag or certificate is in place

5. No obvious physical damage or condition exists that may prevent operation

6. Pressure gauge(s), if provided, are in operable range

7. Nozzle blow-off caps are intact and undamaged

8. The protected area contains no alterations

9. Fuel and power shutdown devices are in good condition

10. Piping, fittings, and hangers are in good repair.

B. Check each expellent gas cartridge semiannually for proper operation. For nitrogen cartridges, this requires checking of pressure. For CO_2 cartridges, this requires weighing the cylinder and comparing it with the manufacturer's minimum. If the cartridges show a 10% loss, refill or replace.

C. Inspect wet chemical containers that are pressurized semiannually. If the container has lost more than 10% of its design pressure, refill or replace it.

D. For fire detection subsystem inspection, refer to Procedure 151.

4.0 TESTING

A. Conduct an operating test of each wet chemical system annually. Include a check of the detection system, alarms, and releasing device, including manual stations and other associated equipment (see Procedure 151 and manufacturer's instructions).

B. For fire detection system testing, see Procedure 151.

C. Subject the following parts of wet chemical extinguishing systems to a hydrostatic pressure test at intervals not exceeding 12 years:

1. Wet chemical containers

2. Auxiliary pressure containers

3. Hose assemblies.

Exceptions:

1. Auxiliary pressure containers not exceeding 2 in. in outside diameter and less than 2 ft in length.

2. Auxiliary containers bearing the U.S. Department of Transportation (DOT) "3E" marking.

Note: DOT or Canadian Transportation Commission (CTC) marked cylinders may require more frequent test intervals.

All tested equipment shall be thoroughly dried before reuse.

5.0 MAINTENANCE

A. Perform maintenance promptly on any components that fail to operate properly during the annual operating tests.

B. Recharge all wet chemical systems after use or as indicated by an inspection in accordance with the manufacturer's instructions.

C. Conduct any other maintenance recommended in the manufacturer's instructions.

D. For fire detection system maintenance, refer to Fire Alarm Inspection, Testing, and Maintenance procedure.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following:

A. Post a sign on the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations or

C. Start a recorded fire watch within 1 hour of the outage, and

D. Provide an alternate means to protect the hazardous operations.

E. Immediately begin repair operations or B or C and D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Conduct an operating test as mentioned previously before returning the system to service.

B. Check the level of wet chemical and expellent gas containers as mentioned previously before returning the system to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 17A

D. NFPA 72

E. NFPA 72E

135 - HIGH EXPANSION FOAM SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining high expansion foam fire protection systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Control valves - Visually inspect all control valves of the system at regular intervals as follows:

1. Sealed valves - weekly

2. Locked valves and valves with tamper switches - monthly

3. Verify that each control valve has the proper signage indicating what system or portion of system it controls - monthly

4. Fully close and reopen the control valve - annually

5. Annually, lubricate the operating stems of OS&Y valves with graphite or graphite in light oil. Then completely close and reopen the valve to test its operation and distribution of the lubricant

6. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

B. Make weekly visual inspections to verify the following:

1. Foam concentrate pumps, tanks, and lines are not damaged or leaking. Concentrate level in tanks is normal.

2. Concentrate pumps operate properly.

3. All valves for the foam system are properly positioned.

4. Control panel lights are operating properly.

5. All disconnects in the control panel are in the ON position.

6. Water supply pressure is normal.

7. Piping, ducts, fittings, and hangers are in good repair.

C. Refer to Procedure 151 for fire detection system inspection.

D. Check strainers after each use and test.

E. Inspect foam chambers annually for obstructions such as beehives and bird nests. Also verify that the vapor seal is in place.

4.0 TESTING

A. Test the entire detection system semiannually for proper operation (see Procedure 151).

B. Semiannually, drain about 5 gal of foam liquid from the bottom of the tank. Let this foam liquid stand for several hours so any scale settles to the bottom of the can. Return the sample to the tank by pouring it through a strainer. The presence of scale can then be noted and a decision made as to whether the tank should be cleaned.

C. Check the quality of the foam concentrate annually. The concentrate should be checked for evidence of sludging or deterioration. Send samples to the manufacturer for qualitative testing.

D. Conduct a system test each year. Preferably, this should include discharge of foam to make sure that all parts work properly.

5.0 MAINTENANCE

A. Monthly, operate the foam liquid pump for 30 to 60 seconds. Follow the manufacturer's instructions for other pump maintenance.

B. Service the pressure-vacuum vent on the foam concentrate storage tank semiannually (see manufacturer's instructions).

C. Maintain the system in full operating condition at all times.

Correct any troubles or impairments discovered during inspection or testing at once.

D. For fire detection system maintenance, see Procedure 151.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign at the FDC and system control valve indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, and

D. Provide an alternate means to protect the hazardous operations.

E. Immediately begin repair operations or B or C and D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Test the water supply to verify that an adequate pressure and volume is available at the system connection.

B. The AHJ shall decide whether or not a discharge test should be conducted on the repaired system.

C. Hydrostatic and flush test any repaired piping of the system before returning to service.

D. Test the fire detection subsystem to verify that all of the fire detectors are in place and will activate the high expansion foam controls.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 11A

D. NFPA 72

E. NFPA 72E

136 - CARBON DIOXIDE EXTINGUISHING SYSTEM (HIGH PRESSURE)

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining high pressure CO_2 fire extinguishing systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Visually inspect the entire system weekly for any physical damage.

B. Weekly inspect all openings of the room(s) being protected to make sure self-closing or automatic releasing devices will function on CO_2 extinguishing system operation.

C. Check weekly to make sure that the space being protect has not been altered.

D. For fire detection subsystem inspection, see Procedure 151.

E. Annually, examine all system hoses for damage, including those used as flexible connectors. If visual examination shows any deficiency, replace the hose.

4.0 TESTING

A. Weigh CO_2 cylinders with discharge control valve semiannually. If a container shows a loss in net weight of more than 10%, refill or replace it. Record the weight and pressure of the cylinder on the attached tag.

B. Operate control heads at least annually.

C. Conduct an operating test of the system annually. Control heads are to be removed before starting any testing.

D. Test all hoses, including those used as flexible couplings, every 5 years.

E. All tests shall be conducted by trained personnel in accordance with the manufacturer's instructions.

F. For fire detection subsystem testing, see Procedure 151.

G. Test supervisory devices in accordance with the manufacturer's instructions.

5.0 MAINTENANCE

A. At 12-year intervals, perform a hydrostatic test on the cylinders, tanks, and hoses. When the system has been discharged and it has been at least 5 years since the last hydrostatic test, perform a hydrostatic test before refilling the storage containers.

B. For fire detection subsystem maintenance, see Procedure 151.

C. Conduct any other maintenance in accordance with the manufacturer's instructions.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a sign on the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, and

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations immediately or B or C and D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Weigh CO_2 cylinders and check pressure before returning to service.

B. Conduct an operating test of the system before returning it to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 12

D. NFPA 72

E. NFPA 72E

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137 - CARBON DIOXIDE EXTINGUISHING SYSTEM (LOW PRESSURE)

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining low-pressure CO_2 fire extinguishing systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Make arrangements with operations to make the protected area available for the time needed to conduct the inspection, testing, and maintenance.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Visually inspect the entire system weekly for any physical damage.

B. Weekly, inspect all openings of the room(s) being protected to make sure self-closing or automatic releasing devices will function on CO_2 extinguishing system operation.

C. Weekly, check to make sure that the space being protected has not been altered.

D. Check the liquid level weekly in each low-pressure container by observing the liquid-level gauges. Refill the container if the container is 10% above the minimum capacity.

E. For fire detection subsystem inspection, see Procedure 151.

F. Annually, examine all system hoses, including those used as flexible connectors, for damage. If visual examination shows any deficiency, replace the hose.

4.0 TESTING

A. Operate control heads at least annually.

B. Conduct an operating test of the CO_2 discharge system annually.

C. Test all hoses, including those used as flexible couplings, every 5 years.

D. Conduct all tests by trained personnel in accordance with the manufacturer's instructions.

E. For fire detection subsystem testing, see Procedure 151.

F. Test supervisory devices in accordance with the manufacturer's instructions.

5.0 MAINTENANCE

A. At 12-year intervals, perform a hydrostatic test on the storage tank.

B. For fire detection subsystem maintenance, see Procedure 151.

C. Conduct any other maintenance in accordance with the manufacturer's instructions.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following:

A. Post a sign on the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations or

C. Start a recorded fire watch within 1 hour of the outage, and

D. Provide an alternate means to protect the hazardous operations.

E. Immediately begin repair operations or B or C and D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Conduct an operating test of the system before returning it to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 12

D. NFPA 72

E. NFPA 72E

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138 - WATER SPRAY SYSTEM (LOCAL APPLICATION)

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining local application water spray systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Conduct a weekly inspection to verify the following.

1. The entire system is free of physical damage.

2. Nozzles are unobstructed and free of grease buildup.

3. Fusible links are in place and free of grease buildup.

4. Corrosive cleaning agents have not been used on nozzles or system piping.

5. The system's water supply is in service.

6. The protected hazard has not been altered.

B. Control valves - Visually inspect all control valves at regular intervals as follows:

1. Sealed valves - weekly.

2. Locked valves and valves with tamper switches - monthly.

3. Verify that each control valve has the proper signage

indicating what system or portion of system it controls - monthly.

4. Annually, lubricate the operating stems of OS&Y valves with graphite or graphite in light oil. Then completely close and reopen the valve to test its operation and distribution of the lubricant.

5. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

4.0 TESTING

A. Conduct a bimonthly test of the system alarms and automatic fuel shutdowns by using the bypass valve.

B. Conduct a test of the main drain annually to verify that the control valve is open and that water is available to the system.

5.0 MAINTENANCE

A. Correct any deficiencies discovered during inspections or tests immediately.

B. Conduct all other maintenance in accordance with the manufacturer's instructions.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Place a tag on the control valve indicating what portion of the system is out of service.

B. Remove all protected equipment from service until repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Test the water supply to verify that an adequate water quantity and pressure is available at the system's connection.

B. Conduct a test of the bypass valve to verify that the system local alarm and fuel shutdown devices are functioning properly.

C. Hydrostatic and flush test any repaired portions of the system before returning it to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 13

D. NFPA 15

E. NFPA 96

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141 - POND OR LAKE WATER SUPPLY

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining the pond or lake water supply.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Inspect the water level and condition of the water in the pond daily.

B. Inspect the wet pit, where installed, and suction crib weekly to make sure they are clear of debris that may affect the intake water. During cold weather, inspect the wet pit daily to make sure the temperature is maintained at a minimum of 40 °F.

C. Inspect the screens for the suction crib monthly and clean, repair, or replace as necessary.

D. Annually, inspect foundations supporting fire pumps over wet pits for corrosion and physical damage.

E. Control valves - Visually inspect all control valves of the system at regular intervals as follows:

1. Sealed valves - weekly.

2. Locked valves and valves with taper switches - monthly.

3. Verify that each control valve has the proper signage indicating what system or portion of system it controls -

monthly.

4. Fully close and reopen the control valve - annually.

5. Annually, lubricate the operating stems of OS&Y valves with graphite or graphite in light oil. Then completely close and reopen the valve to test its operation and distribution of the lubricant.

6. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

F. Check valves - Internally inspect all check valves at least every 5 years to verify that all components operate properly, move freely, and are in good condition. Clean, repair, or replace the internal components as necessary in accordance with the manufacturer's instructions.

G. Backflow preventers - Inspect and maintain specialized backflow prevention devices, such as reduced pressure principle backflow preventers, double check valve assemblies, backflow preventers with intermediate atmospheric vents, and atmospheric vacuum breakers, in accordance with the manufacturer's instructions. In addition, inspect OS&Y isolation valves weekly to verify that they are in the normal positions. Valves secured with locks or that are electrically supervised should be inspected monthly. Reduced pressure backflow preventers should also be inspected weekly to ensure that the differential sensing valve relief port is not continuously discharging.

4.0 TESTING

No requirements.

5.0 MAINTENANCE

A. Maintain all equipment in proper working condition, consistent with the manufacturer's instructions.

B. Maintain valve pit and valve or heater houses at a minimum temperature of 40 °F, weather tight, and free of water accumulations.

C. Ensure repair work and replacement parts meet the original design criteria and installation standard of NFPA 22.

D. Flush strainers until clear after each operation or flow test. Inspect and clean all strainers in accordance with manufacturer's instructions. Replace or repair damaged or corroded parts.

E. Maintain wet pits free of debris and at a minimum temperature of

40 °F.

F. Maintain the reservoir water at the full level or at the designed water level, sufficient to provide proper submergence for the pump.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Place tags at all control valves, FDCs, and hydrants dependent upon that particular system.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage if the system supplies an automatic suppression system, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours or B or C or D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Conduct a flow test as per DOE Fire Protection Inspection, Testing, and Maintenance Procedures (Appendix B) before returning the system to service.

B. Hydrostatic and flush test repaired portions of system piping before returning the system to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 1231

142 - TANK WATER SUPPLY SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining the tank water supply system.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. At least monthly, visually inspect the water level and the condition of the water in the tank to verify that the quality and quantity of stored water meets minimum design conditions.

B. At least monthly, visually inspect the exterior of the tank, supporting structure, sway bracing, and the catwalks or ladders, where provided, for signs of obvious damage or weakening.

C. Control valves - Visually inspect all control valves of the system at regular intervals as follows:

1. Sealed valves - weekly.

2. Locked valves and valves with tamper switches - monthly.

3. Verify monthly that each control valve has the proper signage indicating what system or portion of system it controls.

4. Fully close and reopen the control valve - annually.

5. Annually, lubricate the operating stems of OS&Y valves with graphite or graphite in light oil. Then completely close and reopen the valve to test its operation and distribution of the lubricant.

6. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

D. Check valves - Internally inspect all check valves at least every 5 years to verify that all components operate properly, move freely, and are in good condition. Clean, repair, or replace the internal components as necessary in accordance with the manufacturer's instructions.

E. Backflow preventers - Inspect and maintain specialized backflow prevention devices, such as reduced pressure principle backflow preventers, double check valve assemblies, backflow preventers with intermediate atmospheric vents, and atmospheric vacuum breakers, in accordance with the manufacturer's instructions. In addition, inspect OS&Y isolation valves weekly to verify that they are in the normal positions. Valves secured with locks or that are electrically supervised should be inspected monthly. Reduced pressure backflow preventers should be inspected weekly to ensure that the differential sensing valve relief port is not continuously discharging.

F. Inspect the interior of the tank at least every 5 years.

G. At least monthly, inspect the area surrounding the tank and supporting structure, where provided, to ensure the area is free of the following:

1. Combustible storage, trash, debris, brush, or material that could present a fire exposure.

2. Accumulations of material on or near parts that could result in accelerated corrosion.

3. Ice build up.

4. Erosion (embankment-supported rubberized fabric [ESRF] water tanks only).

H. Visually inspect exterior seams and rivets (steel tanks) for leakage at least annually. Caulk any leaking seams. If there is not enough metal at the caulking edge, judicious welding can be used unless the rest of the steel plates are so badly corroded that replacement is needed.

I. Visually inspect the roof of storage tanks for structural stability and signs of rust annually.

J. Annually, inspect the hoops and grillage of wooden tanks.

K. Annually, inspect exterior painted, coated, or insulated surfaces of tanks and supporting structures, where provided, for signs of degradation.

L. Check the drain outlet for leaks in ESRF water tanks annually.

M. Check the fabric for wear in rubberized water tanks annually. Patch worn or torn sections of ESRF tanks as needed.

N. Check fabric outer protective paint for oxidation or weather checking in ESRF water tanks annually.

O. At least monthly, inspect the air pressurized water in pressure tanks.

P. Annually, have the interior of pressure tanks inspected by a qualified pressure-vessel inspector.

Q. During the heating season, check the heating system of a water storage tank within 2 months before starting the heating system and at least daily during the heating season.

R. Inspect and record the water temperature daily (cold weather only). The coldest temperature should not be less than 40 °F unless supervised.

S. At least annually, inspect expansion joints, where provided, for leaks and cracks. If they leak, repack and adjust them.

T. Examine all paint at least every year for flaking or cracking.

4.0 TESTING

A. Flow tests need to be conducted annually for all water supply systems. Record these tests and compare with previous tests to make sure that equipment is performing properly and that all valves that should be open are open.

1. For gravity tanks and pressure tanks, this test consists of opening a drain for the tank or sprinkler system. Record both the static (no flow) pressure and full flow pressure. Compare these pressures with those from previous tests; the results should be within 2 to 3 lb of being identical. If full flow pressures are significantly lower, check all valves between the water supply and the test point to ensure that they are fully open.

2. For ground level or underground tanks, the annual test is accomplished in conjunction with the fire pump full flow tests.

B. Semiannually, test level indicators for accuracy and freedom of movement.

C. Test low water temperature supervisory signals, where required, weekly during cold weather and semiannually if temperatures do not drop below 40 °F.

D. Monthly, test high water-temperature limit switches on tank heating systems, where installed, whenever the heating system is in service. If supervised, then test semiannually.

E. Test high and low water-level supervisory signals at least semiannually.

F. Test pressure gauges with a calibrated gauge in accordance with the manufacturer's instructions at least every 5 years. Recalibrate or replace gauges not accurate to within 3% of the scale of the gauge being tested.

5.0 MAINTENANCE

A. Maintain the tank at the full or designed water level.

B. Maintain the interior and exterior of any tank, along with the supporting structure, where provided, free of peeling paint, aquatic growth, sediment, foreign matter, tools, painting equipment, or any other material that may interfere with proper operation of the tank. Access to the interior of ESRF tanks can be achieved by draining the water and inflating the tank as if it were an air-supported structure.

C. Drain or flush the sediment from the tank annually.

D. Protect the tank and supporting structure, where provided, from rot, corrosion, rust, mechanical damage, accumulation of debris, and sediment. Maintain the tops of foundation piers at least 6 in. above ground level.

E. Replace the horizontal, radial spider rods, usually at the top of upper, cylindrical tank plates, if broken or badly corroded, making sure that no pieces drop into the water tank.

F. Maintain cathodic protection, where installed, in accordance with the manufacturer's instructions.

G. Keep the roof hatch cover and the door at the top of front proof castings fastened to prevent wind damage and to keep out birds.

H. Maintain tank thermometers in accordance with the manufacturer's instructions.

I. At least annually, fully cycle all tank drain valves.

J. Clean screened or open vents in tanks at least annually.

K. Maintain valve pits and valve or heater houses at a minimum temperature of 40 °F, and keep weather-tight and free of water accumulation.

L. Maintain tank heating systems in accordance with the manufacturer's instructions. The coldest water in the tank shall not be less than 40 °F.

M. Repair work and replacement parts must meet the original design criteria and NFPA 22.

N. Repair work and replacement parts must be made only with materials that will not become loose or dislodged and obstruct the outlet.

O. Complete and test all welding performed on the tank in accordance with AWWA D100 (AWS D5.2).

P. Paint steel and iron work every 5 years or as necessary to prevent corrosion.

Q. Repaint only on dry surfaces that are thoroughly cleaned of all loose paint, rust, scale, or other surface contamination.

R. During interior tank maintenance and painting activities, use a protective cover of no more than a few sheets of paper to cover the outlet opening. Remove this protective covering before returning the tank to service.

S. Repainting of steel tanks:

1. Clean all interior surfaces of steel tanks exposed to water immersion or the vapor phase zone above the high water level by near white blasting per Steel Structures Painting Council (SSPC)-SP10 or pickling per SSPC-SP8. Prime surfaces in accordance with the requirements for Inside Painting System No. 2 (wash primer per SSPC-PT3, plus one coat of vinyl per SSPC-Paint No. 9) or Inside Paint System No. 4 (one coat of vinyl paint per Bureau of Reclamation Specification VR-3) of AWWA Standard D102.78.

2. Clean all exterior surfaces and inside dry surfaces (pedestal tanks) by commercial blasting per SSPC-SP6 or pickling per SSPC-SP8. Prime with one coat of red lead alkyd per Type II or III of Federal Specification TT-P-86 or a suitable proprietary primer. These procedures should be done in accordance with the requirements for Outside Paint System No. 1 of AWWA Standard D102.78.

3. The appropriate primers for other interior and exterior paint systems may be used, provided permission is first obtained from the AHJ.

4. During repainting, all weld seams, unprimed margins, and any areas on which the primer (if preprimed) has been damaged shall be cleaned and patch primed with the same primer.

5. All finish coat painting for interior (wet) surfaces shall be in accordance with the requirements for Inside Paint Systems No. 2 or No. 4 of AWWA Standard D102.78, using the same basic system throughout. For System No. 2, use one complete field coat of vinyl per SSPC-Paint No. 9 and two complete coats of vinyl aluminum per SSPC-Paint No. 8 to provide a minimum total system dry film thickness of 4.5 mils (112 microns). As an alternate, the two final coats may be white vinyl per Bureau of Reclamation Specification VR-3 to provide a minimum total system dry film thickness of 5.0 mils (125 microns). A 5.0-mil (125-micron) minimum total thickness with one additional coat may be specified by the purchaser. For System No. 4, use three complete field coats in contrasting colors of vinyl paint per Bureau of Reclamation Specification VR-3 to provide a minimum total system dry film thickness of 6.0 mils (150 microns).

6. All exterior and inside dry finish coat painting must be in accordance with the requirements for Outside Paint System No. 1 of AWWA Standard D102.78. Use two coats of aluminum or alkyd enamel in a color specified by the purchaser to provide a minimum total system dry film thickness of 3.5 mils (87 microns) for aluminum finishes and 4.5 mils (112 microns) for alkyd enamels. As provided by Outside Paint System No. 4 of AWWA D102.78, permit the purchaser to specify an extra complete coat of primer for a total minimum system dry film thickness of 5.0 mils (125 microns) for aluminum finishes and 6.0 mils (150 microns) for alkyd enamels for the more severe atmospheric exposures.

7. Other finish coats may be used, provided they are compatible with the primers and permission is first obtained from the AHJ.

8. Painting application. All painting shall be accomplished in accordance with the appropriate requirements of SSPC Paint Application Specification No. 1 ("Shop, Field, and Maintenance Painting").

T. The top surface of ESRF tanks must be repainted periodically with frequency dependent upon the material used (consult AHJ).

U. Repainting ESRF tanks. Complete the preparation and repainting of ESRF tanks in accordance with the particular tank manufacturer's instructions.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Stop all hazardous operations, or

B. Start a recorded fire watch if the system supplies automatic suppression systems within 1 hour of the outage, or

C. Provide an alternate means to protect the hazardous operations.

D. Begin repair operations within 8 hours or A or B or C shall be required until the repairs are complete.

E. Place a tag at all FDCs, applicable hydrants, and control valves stating what portions of the system are out of service.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Conduct a flow test per 4.0, "Testing," before returning the system to service.

B. Hydrostatic and flush test repaired portions of system piping before returning the system to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 22

D. NFPA 25

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143 - FIRE PUMPS

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining the fire pumps.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Check the pressure on all fire pump gauges weekly.

B. Check for automatic indication of controller lights.

C. Check all valves weekly to make sure they are open.

D. Weekly inspect the pump room to make sure it is clean, dry, orderly, and free of miscellaneous storage.

E. During cold weather, daily inspect the pump room to see that it is kept at least at 40 °F.

F. Control valves - Visually inspect all control valves of the system at regular intervals as follows:

1. Sealed valves - weekly.

2. Locked valves and valves with tamper switches - monthly.

3. Verify that each control valve has the proper signage indicating what system or portion of system it controls - monthly.

4. Fully close and reopen the control valve - annually.

5. Annually, lubricate the operating stems of OS&Y valves with graphite or graphite in light oil. Then completely close and reopen the valve to test its operation and distribution of the lubricant.

6. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

G. Check valves - Internally inspect all check valves at least every 5 years to verify that all components operate properly, move freely, and are in good condition. Clean, repair, or replace the internal components as necessary in accordance with the manufacturer's instructions.

H. Backflow preventers - Inspect and maintain specialized backflow prevention devices, such as reduced pressure principle backflow preventers, double check valve assemblies, backflow preventers with intermediate atmospheric vents, and atmospheric vacuum breakers, in accordance with the manufacturer's instructions. Also, inspect reduced pressure backflow preventers weekly to ensure that the differential sensing valve relief port is not continuously discharging.

I. Fire pump pressure relief valves

1. Inspect all circulation relief valves weekly. The inspection shall verify that sufficient water flows through the valve when the pump is operating at shutoff pressure (churn) to prevent pump overheating. During the annual fire pump test, verify that this valve closes in accordance with the manufacturer's specifications.

2. Inspect all pressure relief valves weekly. The inspection shall verify that the pressure downstream of the relief valve fittings in the fire pump discharge piping does not exceed the pressure for which the system components are rated. During the annual fire pump flow test, verify that this valve is correctly adjusted and set to relieve at the appropriate pressure and closes below that pressure setting.

4.0 <u>TESTING</u>

A. Perform a fire pump running test weekly by reducing the water pressure. Do this with a test drain on the sensing line or with flow from the fire protection system. Qualified operating personnel should attend during the weekly pump operation to observe and record satisfactory performance of the pump driver, controller, and alarms.

B. Test packing gland tightness weekly.

C. Weekly, check to see that the suction and discharge pressure gauges are operable and that readings are appropriate.

D. Check the steam trap on steam turbines weekly.

E. Operate the speed governor for internal combustion drivers weekly.

F. Operate the overspeed trip for internal combustion drivers weekly.

G. Check the steam relief valve on steam turbines weekly.

H. Check the controller timer weekly.

I. Conduct a performance test annually. Water outlets on the test header, flow meter, or elsewhere in the discharge piping and hose network must be opened so that water is discharged at various flows. The test consists of determining that the pump will perform to discharge at no flow (churn), and 100% and 150% of rated flow. The water pressure gauges on the intake and discharge sides of the pump must be observed with readings recorded and pitot readings made at the discharge nozzle(s). These tests are repeated and recorded for all required flows. Results are plotted and compared to the manufacturer's pump test curve, past pump history, and the required flow.

J. During the annual performance test, check all valves in the suction and discharge lines to make sure that they are fully open. Verify the setting of the pressure relief valve, if installed, by actual flow test. The setting should be correctly adjusted and set to relieve at the appropriate pressure.

K. Report any significant reduction (10% net flow or pressure) in the operating characteristics of fire pump assembly to the AHJ and immediately start repairs.

L. Test supervisory signals semiannually.

M. Clean, inspect, and repair strainers as necessary after each performance test.

N. Verify correct valve positions before and after each performance test.

5.0 <u>MAINTENANCE</u>

A. Repair work and replacement parts must meet the original design criteria.

B. Perform maintenance promptly on any components that fail a test or inspection. Use the manufacturer's instructions and the data sheet included below:

Table 143-1. Fire Pump System Maintenance Schedule.
(sheet 1 of 3)

Complete as Applicable	1	2	3	4	5	6
A. Hydraulic System						
Lubricate pump bearings			X			A
Check shaft end play and adjust if necessary		X				A
Check accuracy of pressure sensor			X			When 15% out of calibration
B. Mechanical Transmission						
Lubricate coupling		X				A
Lubricate right-angle gear drive		X				A
C. Electrical System						
Exercise isolating switch and circuit breaker					X	M
Trip circuit breaker (if mechanism provided)					X	A
Operate manual starting means (electrical)					X	S
Inspect and operate emergency manual starting means (without power)	X				X	A
Tighten electrical connections as necessary		X				A
Lubricate mechanical moving parts (excluding starters and relays)		X				A
Calibrate pressure switch settings		X				A
Grease motor bearings			X			A

Table 143-1. Fire Pump System Maintenance Schedule.
(sheet 2 of 3)

	1	2	3	4	5	6
D. Diesel Engine System						
1. Fuel						
Tank level	X	X				W
Tank float switch	X				X	W
Solenoids valve operation	X				X	W
Strainer, filter, and/or dirt leg				X		Q
Water in system		X		X		W
Flexible hoses and connectors	X		R			W
Tank vents and overflow piping unobstructed		X			X	A
Piping	X					A
2. Lubrication System - Oil level	X	X				W
Oil change			R			50? or A
Oil filter(s)			X			50? or A
Lube oil heater		X				W
Crankcase breather	X		R	X		Q
3. Cooling System - Level	X	X				W
Antifreeze protection level					X	S
Antifreeze			X			A
Adequate cooling water to heat exchanger		X				W
Rod out heat exchanger				X		A
Water pump(s)	X					W
Condition of flexible hoses and connections	X	X				W
Jacket water heater		X				W
Inspect duct work, clean louvers (combustion air)	X	X	X			A

Table 143-1. Fire Pump System Maintenance Schedule.
(sheet 3 of 3)

	1	2	3	4	5	6
4. Exhaust System - Leakage	X	X				W
Drain condensate trap		X				W
Insulation and fire hazards	X					Q
Excessive back pressure					X	A
Exhaust system hangers and supports	X					A
Flexible exhaust section	X					S
5. Battery System - Electrolyte Level		X				W
Terminals clean and tight	X	X				Q
Remove corrosion, case exterior clean and dry	X			X		M
Specific gravity or state charge					X	M
Charger and charge rate	X					M
Equalize charge		X				M
6. Electrical System - General Inspection	X					W
Tighten control and power wiring connections		X				A
Wire chafing where subject to movement	X	X				Q
Operation of safeties and alarms		X			X	S
Boxes, panels, and cabinets				X		S
Circuit breaker fuses (every 2 years or ??)	X	X	R	X	X	M

1. Visual Inspection
2. Check
3. Change
4. Clean
5. Test
6. Frequency
   - W - Weekly
   - M - Monthly
   - Q - Quarterly
   - S - Semiannually
   - # - Indicates operating hours
   - R - Change or repair

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Post a tag at each control valve indicating what system or part thereof has been removed from service.

B. Stop all hazardous operations or

C. Start a recorded fire watch within 1 hour of the outage if automatic systems are supplied by the pump, or

D. Provide an alternate means of water supply to protect the hazardous operations.

E. Begin repair operations within 8 hours, and the AHJ shall determine if B, C, and D shall be required until repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Conduct a performance test before returning to service to verify that an adequate volume and pressure of water is available.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 20

D. NFPA 25

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144 - FIRE SERVICE MAINS

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining the fire service mains.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Exposed piping - Visually inspect quarterly to verify the following:

1. There is no leakage

2. There is no physical damage to the piping or supports

3. There is no sign of corrosion

4. Supporting devices are securely in place.

B. Hydrants

1. Inspect dry barrel and wall hydrants semiannually and after each operation. Hydrants shall be inspected and the necessary corrective action taken as follows.

Table 144-1. Dry Barrel Hydrant Inspection.

Characteristic	Dry Barrel Hydrant Action
1. Accessibility.	1. Make accessible.
2. Barrel contains water or ice (Presence of water or ice may indicate a faulty drain, a leaky hydrant valve, or high groundwater table).	2. Repair and drain. For high groundwater, it may be necessary to plug the drain and pump out the barrel after each use.
3. Improper drainage from barrel.	3. Repair drain.
4. Leaks in outlets or at top of hydrant.	4. Repair or replace gaskets, packing, or parts as necessary.
5. Cracks in hydrant barrel.	5. Repair or replace.
6. Tightness of outlets.	6. Lubricate if necessary; tighten if necessary.
7. Worn nozzle threads.	7. Repair or replace if worn.
8. Worn hydrant operating nut.	8. Repair or replace.
9. Availability of operating wrench.	9. Make sure wrench is available.

2. Inspect wet barrel hydrants annually and after each operation. Inspect hydrants and take the necessary corrective action as follows.

Table 144-2. Wet Barrel Hydrant Inspection.	
Characteristic	Wet Barrel Hydrant Action
1. Accessibility	1. Make accessible.
2. Leaks in outlets or at top of hydrant.	2. Repair or replace gaskets, packing, or parts as necessary.
3. Cracks in hydrant barrel.	3. Repair or replace.
4. Tightness of outlets.	4. Lubricate if necessary; tighten if necessary.
5. Worn nozzle threads.	5. Repair or replace.
6. Worn hydrant operating nut.	6. Repair or replace.
7. Availability of operating wrench.	7. Make sure wrench is available.

C. Inspect monitor nozzles semiannually. Check for the following conditions and take the necessary corrective action as appropriate:

1. Accessibility - make accessible

2. Physical damage - repair or replace

3. Missing equipment - replace equipment.

D. Inspect hose and hydrant houses monthly. Check for the following conditions and take the necessary corrective action as appropriate:

1. Accessibility - make accessible

2. Physical damage - repair or replace

3. Missing equipment - replace equipment.

E. Inspect FDCs monthly to verify that:

1. The FDCs are visible and accessible.

2. Couplings or swivels are not damaged and rotate smoothly.

3. Plugs or caps are in place and not damaged. If FDC plugs or caps are not in place, inspect the interior of the connection for obstructions and verify that the valve clapper is

operational over its full range.

4. Gaskets are in place and in good condition.

5. Identification signs are in place.

6. The check valve is not leaking.

7. The automatic drain valve is in place and operating properly.

F. Visually inspect isolation or sectional valves at regular intervals as follows:

1. Sealed valves - weekly.

2. Locked valves and valves with tamper switches - monthly.

3. Verify that each control valve has the proper signage indicating what system or portion of the system it controls - monthly.

4. Fully close and reopen control valves - annually.

5. Lubricate the operating stems of OS&Y valves with graphite or graphite in light oil. Then completely close and reopen the valve to test its operation and distribution of the lubricant - annually.

6. Clean, repair, or replace internal components as necessary in accordance with the manufacturer's instructions.

G. Internally inspect check valves at least every 5 years to verify that all components operate properly, move freely, and are in good condition. Clean, repair, or replace the internal components as necessary in accordance with the manufacturer's instructions.

H. Backflow preventers - Inspect and maintain specialized backflow prevention devices, such as reduced pressure principle backflow preventers, double check valve assemblies, backflow preventers with intermediate atmospheric vents, and atmospheric vacuum breakers, in accordance with the manufacturer's instructions. Inspect reduced pressure backflow preventers weekly to ensure that the differential sensing valve relief port is not continuously discharging.

4.0 TESTING

A. Test underground and exposed piping to determine the internal condition of the piping at minimum 5-year intervals. Perform flow tests at flows representative of those expected during a fire for the purpose of comparing friction loss characteristics of the pipe with that expected for the particular type of pipe involved. Give due consideration to the age of the pipe and to the results of previous flow tests.

Investigate any flow test results that indicate deterioration of available water flow and pressure to the satisfaction of the AHJ to ensure that adequate flow and pressure are available for fire protection.

B. Flush test initial and any repaired systems. The minimum rate of flow must not be less than the water demand rate of the system, which is determined by the system design, or not less than that necessary to provide a velocity of 10 ft/s, whichever is greater. For all systems, continue the flushing operations for a sufficient time to ensure thorough cleaning. When planning the flushing operations, give consideration to disposal of the water issuing from the test outlets.

C. At 5-year intervals, hydrostatically test private fire service mains, subject to supplemental pressure from a FDC, for 1 hour at a pressure of 150 psi.

D. Operate hydrants annually to ensure proper functioning. Fully open each hydrant and let the water flow (1 to 2-1/2-in. outlet) until all foreign material has cleared; not less than 1 minute.

After operation, observe dry barrel and wall hydrants for proper drainage from the barrel. Full drainage shall take no longer than 60 minutes. When soil conditions or other factors are such that the hydrant barrel will not drain within 60 minutes, or when the groundwater level is above that of the hydrant drain, pump the water out of the barrel. In areas subject to freezing weather, clearly identify which dry barrel hydrants that have plugged drains need to be pumped out after operation.

E. Test monitor nozzles that are mounted on hydrants as described above. To ensure proper operability, annually move and oscillate all monitor nozzles throughout their full range.

F. Test all housed fire hydrant hose in accordance with NFPA 1962.

5.0 MAINTENANCE

A. Maintain all equipment in proper working condition, consistent with manufacturer's recommendations.

B. Hydrants

1. Lubricate hydrants at least annually to ensure that all stems, caps, plugs, and threads are in proper operating condition.

2. Keep hydrants free of snow, ice, or other materials and free from physical damage so that free access is ensured.

C. Lubricate monitor nozzles at least annually to ensure proper operating condition.

D. Maintain hose and hydrant houses in a continuous condition that ensures all fire hose and required components are in usable condition.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following:

A. Post a tag at each FDC and system control valve indicating what system or part thereof has been removed from service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage if the system supplies automatic sprinkler systems, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 8 hours. The AHJ shall decide if B, C, and D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Test the water supply to verify that an adequate pressure and volume of water is available.

B. Hydrostatically test the system per 4.A, under 4.0, "Testing," before returning the system to service.

C. Conduct a flow test per paragraph 4.B before returning the system to service.

D. Flush test any repaired system per paragraph 4.B before returning the system to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 24

D. NFPA 25

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151 - FIRE ALARM SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining the fire alarm and detection systems.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Inspect the entire system semiannually to verify that each device is in good physical condition and that there are no changes that could affect its performance.

4.0 TESTING

A. Test the control panel monthly in accordance with manufacturer's recommendations.

B. Verify bimonthly that each fire sprinkler alarm initiation device signal is transmitted.

C. Verify semiannually that each supervisory initiation device signal is transmitted.

D. Test each manual fire alarm station initiation device semiannually to verify that the signal is transmitted.

E. Test all pneumatic line-type detectors for leaks and proper operation semiannually.

F. Every 5 years, test each fire (restorable heat) detection device.

G. Using a calibrated light source, test each fire (radiant energy type) detection device on a semiannual basis. If outside this design range, recalibrate or replace the unit.

H. Annually test each fire (smoke) detection device to verify proper operation of the detector and transmission of the alarm.

I. On a semiannual basis, test each fire, gas, or other detector.

J. Check the sensitivity of each smoke detector within 1 year of installation and every 2 years thereafter. Sensitivity testing must be in accordance with manufacturer's instructions and use manufacturer-approved equipment. Clean smoke detectors found outside 0.25% per foot obscuration per manufacturer's recommendations and recheck for correct sensitivity before reinstallation.

K. Check each duct type smoke detector annually to verify that it is properly sampling the air stream.

L. Check each audible or visual alarm indicating appliance on an annual basis to verify that the alarm can be heard and/or seen in all required locations. Record and evaluate audible alarming sound pressure levels to determine if the level can be adequately heard by all occupants.

M. Check each remote annunciator, emergency voice, and/or two-way alarm communication system on an annual basis to verify each is operating according to system requirements.

N. Operate each engine-driven generator dedicated to the signaling system each week under load by disconnecting the normal power to the system and operating it under load for at least 30 minutes, continuous.

O. Annually operate each system battery supply under load by disconnecting the normal power to the system and operating it under supervisory load for 4 hours and full load for 5 minutes, continuous.

P. Replace 2% of the nonrestorable heat detectors after 15 years and 2% every year thereafter. Submit the removed detectors to an approved testing laboratory for verification. If the detectors fail in the laboratory, remove and replace an additional 2%.

5.0 MAINTENANCE

A. Repair or replace any device that fails a test or inspection in accordance with the manufacturer's instructions.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Place a tag at the fire alarm control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 24 hours or B or C or D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Test the fire detection devices to verify that they are operating properly.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 72

D. NFPA 72E

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152 - CENTRAL MONITORING (FIRE) SYSTEM

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining the central monitoring (fire) system.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. None required.

4.0 TESTING

A. Test the control panel weekly in accordance with manufacturer's recommendations.

B. Check each audible and visual alarm supervisory-indicating appliance on an annual basis to verify that the alarm can be heard and/or seen in all required locations. Record and evaluate audible alarming sound pressure levels to determine if the level is adequate to be heard by all occupants.

C. Check each printer, off-premises alarm, remote terminal, emergency voice, and/or two-way alarm communication system on an monthly basis to verify each is operating according to system requirements.

D. Operate each engine-driven generator dedicated to the signaling system each week under load by disconnecting the normal power to the system and operating it under load for at least 30 minutes, continuous.

E. Operate each system battery supply annually under load by disconnecting the normal power to the system and operating it under supervisory load for 4 hours and full load for 10 minutes, continuous.

5.0 MAINTENANCE

A. Repair or replace any component that fails a test or inspection in accordance with the manufacturer's instructions.

6.0 CORRECTIVE ACTION

6.1 Impairment

If one or more of the commitments is not maintained, notify facility management, the Fire Department, and other appropriate AHJs and complete the following.

A. Place a tag at the control panel indicating what portion of the system is out of service.

B. Stop all hazardous operations, or

C. Start a recorded fire watch within 1 hour of the outage, or

D. Provide an alternate means to protect the hazardous operations.

E. Begin repair operations within 24 hours or B or C or D shall be required until the repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Test the fire alarm subsystem devices to verify that an alarm or supervisory signal can be received and recorded.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 71

D. NFPA 72

E. NFPA 72E

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161 - FIRE DOORS AND WINDOWS

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining fire doors and fire windows.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Conduct a monthly inspection to verify that fire doors and windows are not blocked open, releasing devices are operable, and that latching mechanisms are functioning properly.

4.0 TESTING

A. Annually test closing mechanisms.

5.0 MAINTENANCE

A. Correct any deficiencies in accordance with the manufacturer's instructions.

6.0 CORRECTIVE ACTION

6.1 Impairment

Notify facility management and other appropriate AHJs and complete the following.

A. Post a sign at the fire door or window indicating that door and opening protection are not in service. The AHJ shall specify the size and location of the sign.

B. Stop all hazardous operations, or

C. Provide an alternate means to protect the hazardous operations.

D. Begin repair operations within 24 hours. The AHJ shall decide if B and/or C shall be required until repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Conduct a full operation test after completing any repairs.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 80

162 - FIRE DAMPERS

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining fire dampers.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Conduct a semiannual inspection to verify that fire dampers are not blocked open, releasing devices are operable, and that latching mechanisms are functioning properly.

4.0 TESTING

A. Annually test closing mechanisms.

5.0 MAINTENANCE

A. Correct any deficiencies in accordance with the manufacturer's instructions.

6.0 CORRECTIVE ACTION

6.1 Impairment

Notify facility management and other appropriate AHJs and complete the following.

A. Post a sign at the fire damper indicating that duct protection is not in service. The AHJ shall specify the size and location of the sign.

B. Stop all hazardous operations, or

C. Provide an alternate means to protect the hazardous operations.

D. Begin repair operations within 24 hours. The AHJ shall decide if B and/or C shall be required until repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Conduct a full operation test after completing any repairs.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 90A

163 - PENETRATIONS IN FIRE WALLS

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining wall penetrations - fire rated.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

B. Reduced testing frequency

1. The required frequency of testing can be reduced if it can be proven that the system's reliability is significantly better than the minimums established by NFPA and this procedure. Submit written records and proof of reliability for review and acceptance by the AHJ.

3.0 INSPECTION

A. Conduct a monthly visual inspection to verify that the fire barrier is not breached.

4.0 TESTING

A. No destructive testing required.

5.0 MAINTENANCE

A. Repair any deficiencies in accordance with the manufacturer's instructions.

6.0 CORRECTIVE ACTION

6.1 Impairment

Notify facility management and other appropriate AHJs and complete the following.

A. Post a sign at the penetration indicating that penetration protection is not in service. The AHJ shall specify the size and location of the sign.

B. Stop all hazardous operations, or

C. Provide an alternate means to protect the hazardous operations.

D. Begin repair operations within 24 hours. The AHJ shall decide if B and/or C shall be required until repairs are complete.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. None required.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

171 - EMERGENCY AND EXIT ILLUMINATION

1.0 PURPOSE

A. This procedure outlines the requirements for inspecting, testing, and maintaining emergency lights and exit illumination.

2.0 PROCEDURE

A. Preplanning

1. Before starting this procedure, notify the Fire Department, management, and the AHJs.

2. Arrange with operations for the time needed to conduct the inspection, testing, and maintenance of the protected area.

3.0 INSPECTION

A. Visually inspect each fixture on a monthly basis to verify that it is operational and aimed correctly. The light should illuminate for a minimum of 30 seconds.

B. Visually inspect the emergency power supply systems (EPSS) weekly.

C. Inspect the stored electric energy emergency and standby power systems (SEPSS) every month. The inspection shall include the following.

1. Check that the battery and associated charger and control equipment are in a clean and satisfactory condition. Also, check that no exceptional environment or other condition exists that could damage or affect performance.

2. Check battery electrolyte levels, where applicable, and refill as necessary. Clean and regrease terminals and intercell connectors, if necessary, and clean cell tops.

3. Check and record individual cell voltages where practical.

4. Check and record specific gravity of pilot cells, where applicable.

5. For free-electrolyte lead acid batteries in transparent containers, note condition of plates and sediment.

6. Perform load test and record at the beginning and end of test for each battery set: output voltage, battery voltage, and test duration.

7. Check that all indicator lamps, meters, and controls are operating correctly.

8. Check load value to ensure that it is within the equipment rating.

4.0 TESTING

A. Annually, each fixture should be load tested for 90 minutes to determine if the battery is carrying an adequate electrical charge.

B. EPSS

1. Exercise generator sets under operating temperature conditions, and at a capacity not less than 50% of the total connected EPSS load (not less than 30% of EPS nameplate rating and preferably at least 50% of EPS nameplate rating), at least monthly for a minimum of 30 minutes.

2. Automatically replace equivalent loads used for testing with the emergency loads in case of failure of the primary source.

3. Include complete cold starts with load tests of generator sets.

4. Set time delays as follows.

   a. Time delay on start: Minimum 1 second (.5 seconds for gas turbine cycle).

   b. Time delay on transfer to emergency: No minimum required.

   c. Time delay on restoration to normal: 5 minutes minimum.

   d. Time delay on shutdown: 5 minute minimum.

5. Test the transfer switch monthly by electrically operating it from normal position to alternate position and returning it to normal.

6. Annually exercise EPSS circuit breakers for Level 1 usage, including main and feed breakers between the EPSS and the transfer switch load terminals.

   Exception: Exercise medium and high voltage circuit breakers every 6 months and test them under simulated overload conditions every 2 years.

C. SEPSS

1. Exercise equipment at least quarterly under connected load for a minimum of 5 minutes.

2. Once per year, check the SEPSS at full load for the full duration for its class.

5.0 MAINTENANCE

A. Annually, each fixture should be cleaned, realigned if necessary, and the battery connections checked.

B. Conduct routine maintenance, and that deemed necessary by inspections, in accordance with the manufacturer's instructions for EPSS and SEPSS equipment.

6.0 CORRECTIVE ACTION

6.1 Impairment

Notify facility management and other appropriate AHJs and complete the following:

A. Evacuate all occupants.

B. Begin repair operations within 24 hours. The AHJ shall decide if A is necessary.

6.2 Inspection

A. Visually inspect the system before returning to service.

6.3 Testing

A. Operation test each fixture when a unit is returned to service.

7.0 RECORDS

Maintain records showing the system design and all inspection and testing for the life of the facility.

8.0 REFERENCES

A. DOE Order 5480.4

B. DOE Order 5480.7A

C. NFPA 101

D. NFPA 110

E. NFPA 110A

SAMPLE DATA SHEETS

DATA SHEET 111
WET PIPE SYSTEM TESTING

SYSTEM LOCATION:________________________ YEAR:______________

VALVES	MAKE	MODEL	SIZE	SUPERVISION
Control				
Check				
Alarm				
FDC				

SYSTEM DESIGN:

Pipe Schedule ________ Hydraulic _______ gpm ft^2

Hose Allowance ________ Water Demand: ________ gpm @ ________psi

Location ____________________

Building Modification Since Design? Yes _____ No _____

Design Water Supply: Static __________psi Residual __________psi

Flow __________ gpm Location and Elevation _________________

Fire Pump: Yes _____ No _____

NOTES:

DATA SHEET 111

WET PIPE SYSTEM TESTING

DATE: CONDUCTED BY:			
Control Valve Cycled			
Static Water Pressure			
Main Drain Connection			
Residual Water Pressure			
Building Heated Adequately			
Inspector's Test			
Local Alarm			
Water Flow Alarm			
Relocked or Seals Replaced			
Antifreeze Freeze Level			
Supervisory Signals			

NOTES:

DATA SHEET 112

DRY PIPE SYSTEM TESTING

SYSTEM LOCATION:________________________ YEAR:______________

VALVES	MAKE	MODEL	SIZE	SUPERVISION
Control				
Check				
FDC				
Dry Pipe				

SYSTEM DESIGN:

Pipe Schedule ________ Hydraulic _______ gpm ft^2

Hose Allowance ________ Water Demand: ________ gpm @ ________psi

Location ____________________

Building Modification Since Design? Yes _____ No _____

Design Water Supply: Static __________psi Residual __________psi

Flow __________ gpm Location and Elevation _________________

Fire Pump: Yes _____ No _____

NOTES:

DATA SHEET 112

DRY PIPE SYSTEM TESTING

DATE: CONDUCTED BY:			
Control Valve Cycled			
Static Water Pressure			
Main Drain Connection			
Residual Water Pressure			
Dry Pipe Priming Level			
Trip Test			
Time to Trip			
Air Pressure Trip Point			
Water Flow Alarm			
Local Alarm			
Relocked or Seals Replaced			
Supervisory Signals			
Air Pressure Controller			
System Drained			

NOTES:

DATA SHEET 113

DELUGE SYSTEM TESTING

SYSTEM LOCATION:________________________ YEAR:______________

VALVES	MAKE	MODEL	SIZE	SUPERVISION
Control				
Check				
Deluge				

SYSTEM DESIGN:

Pipe Schedule ________ Hydraulic _______ gpm ft^2

Hose Allowance ________ Water Demand: ________ gpm @ ________psi

Location ____________________

Actuation System: HAD __________ Smoke Detectors __________

Linear Beam Detectors __________ Thermal Detectors __________

Building Modification Since Design? Yes _____ No _____

Design Water Supply: Static __________psi Residual __________psi

Flow __________ gpm Location and Elevation _________________

Fire Pump: Yes _____ No _____

NOTES:

DATA SHEET 113

DELUGE SYSTEM TESTING

DATE: CONDUCTED BY:			
Control Valve Cycled			
Static Water Pressure			
Main Drain Connection			
Residual Water Pressure			
Trip Test			
Time to Trip			
Water Flow Alarm			
Local Alarm			
Discharge Patterns			
Duration of Discharge			
Supervisory Signals			
Relocked or Seals Replaced			
System Drained			
Manual Activation Devices			
Automatic Detection Devices			
Battery Backup			

NOTES:

DATA SHEET 114

PRE-ACTION SYSTEMS TESTING

SYSTEM LOCATION:________________________ YEAR:______________

VALVES	MAKE	MODEL	SIZE	SUPERVISION
Control				
Check				
Deluge				

SYSTEM DESIGN:

Pipe Schedule ________ Hydraulic _______ gpm ft^2

Hose Allowance ________ Water Demand: ________ gpm @ ________psi

Location ____________________

Actuation System: HAD __________ Smoke Detectors __________

Linear Beam Detectors __________ Thermal Detectors __________

Building Modification Since Design? Yes _____ No _____

Design Water Supply: Static __________psi Residual __________psi

Flow __________ gpm Location and Elevation _________________

Fire Pump: Yes _____ No _____

NOTES:

DATA SHEET 114

PRE-ACTION SYSTEMS TESTING

DATE: CONDUCTED BY:			
Control Valve Cycled			
Static Water Pressure			
Main Drain Connection			
Residual Water Pressure			
Deluge Valve Priming Level			
Trip Test			
Time to Trip			
Water Flow Alarm			
Local Alarm			
Air Pressure Trip Point			
Relocked or Seals Replaced			
Manual Activation Devices			
Supervisory Signals			
System Drained			
Automatic Detection Devices			
Battery Backup			

NOTES:

DATA SHEET 116

FOAM WATER EXTINGUISHING SYSTEM TESTING

SYSTEM LOCATION:________________________ YEAR:______________

VALVES	MAKE	MODEL	SIZE	SUPERVISION
Control				
Check				
Deluge				

SYSTEM DESIGN:

Pipe Schedule ________ Hydraulic _______ gpm ft^2

Hose Allowance ________ Water Demand: ________ gpm @ ________psi

Location ____________________

Actuation System: HAD __________ Smoke Detectors __________

Linear Beam Detectors __________ Thermal Detectors __________

Building Modification Since Design? Yes _____ No _____

Design Water Supply: Static __________psi Residual __________psi

Flow __________ gpm Location and Elevation _________________

Foam: Type _____________ Concentration ___________

Proportioner Type __________________

Fire Pump: Yes _____ No _____

NOTES:

DATA SHEET 116

FOAM WATER EXTINGUISHING SYSTEM TESTING

DATE: CONDUCTED BY:			
Control Valve Cycled			
Static Water Pressure			
Main Drain Residual			
Operation Performance Test			
Detection Response Time			
Discharge Time			
Discharge Patterns			
Foam Concentration			
Remote Head Pressure Reading			
Residual Water Pressure			
Deluge Valve Trip Time			
Water Flow Alarm			
Local Alarm			
Relocked or Seals Replaced			
Manual Activation Devices			
Automatic Detection Devices			
Supervisory Signals			
Battery Backup			

NOTES:

DATA SHEET 121

WET STANDPIPE SYSTEM TESTING

SYSTEM LOCATION:________________________ YEAR:______________

VALVES	MAKE	MODEL	SIZE	SUPERVISION
Control				
Check				
Alarm				
Pressure Relief				

SYSTEM DESIGN:

Classification: I _____ II _____ III _____

Hose Valves _________________ Hose Cabinet Assemblies

Water Demand: ________ gpm @ ________psi

Location ____________________

Building Modification Since Design? Yes _____ No _____

Design Water Supply: Static __________psi Residual __________psi

Flow __________ gpm Location and Elevation _________________

Fire Pump: Yes _____ No _____

NOTES:

DATA SHEET 121

WET STANDPIPE SYSTEM TESTING

Use standard Hydrostatic Test Form in NFPA 13 for initial hydrostatic tests and 5-year tests on dry portions of wet standpipes.

DATA SHEET 122

DRY STANDPIPE SYSTEM TESTING

SYSTEM LOCATION:________________________ YEAR:______________

VALVES	MAKE	MODEL	SIZE	SUPERVISION
Control				
Check				
Deluge				
Dry Pipe				
Pressure Relief				

SYSTEM DESIGN:

Classification: I _____ II _____ III _____

Hose Valves _________________ Hose Cabinet Assemblies

Water Demand: ________ gpm @ ________psi

Location ____________________

Building Modification Since Design? Yes _____ No _____

Design Water Supply: Static __________psi Residual __________psi

Flow __________ gpm Location and Elevation _________________

NOTES:

DATA SHEET 122

DRY STANDPIPE SYSTEM TESTING

Use standard Hydrostatic Test Form in NFPA 13 for 5-year hydrostatic tests.

DATA SHEET 131

HALON 1301 SYSTEM TESTING

SYSTEM LOCATION:________________________ YEAR:______________

Room or Area Designation ___________________________________

Volume Protected: Above Ceiling ________ Below Raised Floor ______

Between Floor and Ceiling ______

System Manufacturer: __________ System Concentration __________

Weight of Halon Agent with Cylinder __________

Weight of Cylinder (tare) __________

Weight of Halon Agent __________

Normal Pressure __________ psi

Detector Manufacturer ______________________________________

Control Panel ____

Detection System: Ion. _____ Photo. ______ ROR ______

FT ______ ROR/FT ______ Inhibit Switch ______

Type of Detection for System Operation:

Single Zone ______ Two Detectors (Cross-Zoned) ______

Two Detectors on Any Zone ______ Other ______

Equipment Interlocks:

HVAC ______ Damper Close ______ Door/Window Release ______

NOTES:

DATA SHEET 131

HALON 1301 SYSTEM TESTING

DATE: CONDUCTED BY:			
Weight of Halon with Cylinder			
Weight of Cylinder			
Weight of Halon Agent			
Activation Control Device Operation			
Operation Test			
Detectors			
Time to Discharge			
Equipment Interlocks			
Local Alarm			
Audible Alarm			
Visual Alarm			
Central Alarm			
Manual Activation Devices			
Battery Backup			

NOTES:

DATA SHEET 132

HALON 1211 SYSTEM TESTING

SYSTEM LOCATION:________________________ YEAR:______________

Room or Area Designation ___________________________________

Volume Protected: Above Ceiling ________ Below Raised Floor ______

Between Floor and Ceiling ______

System Manufacturer: __________ System Concentration __________

Weight of Halon Agent with Cylinder __________

Weight of Cylinder (tare) __________

Weight of Halon Agent __________

Normal Pressure __________ psi

Detector Manufacturer ______________________________________

Control Panel ____

Detection System: Ion. _____ Photo. ______ ROR ______

FT ______ ROR/FT ______ Inhibit Switch ______

Type of Detection for System Operation:

Single Zone ______ Two Detectors (Cross-Zoned) ______

Two Detectors on Any Zone ______ Other ______

Equipment Interlocks:

HVAC ______ Damper Close ______ Door/Window Release ______

NOTES:

DATA SHEET 132

HALON 1211 SYSTEM TESTING

DATE: CONDUCTED BY:			
Weight of Halon with Cylinder			
Weight of Cylinder			
Weight of Halon Agent			
Activation Control Device Operation			
Operation Test			
Detectors			
Time to Discharge			
Equipment Interlocks			
Local Alarm			
Audible Alarm			
Visual Alarm			
Central Alarm			
Manual Activation Devices			
Battery Backup			

NOTES:

DATA SHEET 137

HIGH PRESSURE CO_2 EXTINGUISHING SYSTEM TESTING

SYSTEM LOCATION:________________________ YEAR:______________

Room or Area Designation ___________________________________

Volume Protected: Above Ceiling ________ Below Raised Floor ______

Between Floor and Ceiling ______

System Manufacturer: __________ System Concentration __________

Weight of CO_2 Agent with Cylinder __________

Weight of Cylinder (tare) __________

Weight of CO_2 Agent __________

Normal Pressure __________ psi

Detector Manufacturer ______________________________________

Control Panel ____

Detection System: Ion. _____ Photo. ______ ROR ______

FT ______ ROR/FT ______ Inhibit Switch ______

Type of Detection for System Operation:

Single Zone ______ Two Detectors (Cross-Zoned) ______

Two Detectors on Any Zone ______ Other ______

Equipment Interlocks:

HVAC ______ Damper Close ______ Door/Window Release ______

NOTES:

DATA SHEET 137

HIGH PRESSURE CO_2 EXTINGUISHING SYSTEM TESTING

DATE: CONDUCTED BY:			
Weight of CO_2 Container			
Activation Control Device Operation			
Operation Test			
Detectors			
Time to Discharge			
Equipment Interlocks			
Local Alarm			
Audible Alarm			
Visual Alarm			
Central Alarm			
Manual Activation Devices			
Battery Backup			

NOTES:

DATA SHEET 138

LOW PRESSURE CO_2 EXTINGUISHING SYSTEM TESTING

SYSTEM LOCATION:________________________ YEAR:______________

Room or Area Designation ___________________________________

Volume Protected: Above Ceiling ________ Below Raised Floor ______

Between Floor and Ceiling ______

System Manufacturer: __________ System Concentration __________

Weight of CO_2 Agent with Cylinder __________

Weight of Cylinder (tare) __________

Weight of CO_2 Agent __________

Normal Pressure __________ psi

Detector Manufacturer ______________________________________

Control Panel ____

Detection System: Ion. _____ Photo. ______ ROR ______

FT ______ ROR/FT ______ Inhibit Switch ______

Type of Detection for System Operation:

Single Zone ______ Two Detectors (Cross-Zoned) ______

Two Detectors on Any Zone ______ Other ______

Equipment Interlocks:

HVAC ______ Damper Close ______ Door/Window Release ______

NOTES:

DATA SHEET 138

LOW PRESSURE CO_2 EXTINGUISHING SYSTEM TESTING

DATE: CONDUCTED BY:			
Weight of CO_2 Container			
Activation Control Device Operation			
Operation Test			
Detectors			
Time to Discharge			
Equipment Interlocks			
Local Alarm			
Audible Alarm			
Visual Alarm			
Central Alarm			
Manual Activation Devices			
Battery Backup			

NOTES:

DATA SHEET 143
FIRE PUMP TESTING

PUMP	Location (Area-Building-Pump Number)				
	Make		Rated Capacity - gpm		
	Model, Type		Rated Head - psi		
	Serial No.		Rated Speed - rpm		
DRIVER	Driver (Make-Model)				
	rpm	hp	Volts	Amps	Service Factor
SUCTION SUPPLY	From	Capacity - gal		Alarm at Low	
	Head or Lift, psi		Alarms - Low Level		
CONTROLLER	Make-Model		Type	UL Approved	
	Set to Start Pump at - psi			Cut out at - psi	
	After Delay - Min. or Manual Stop				
JOCKEY PUMP	Capacity gpm	Cuts in at - psi		Cuts out at - psi	
	Type				
ALARMS	Local	Pump Running		Power Failure	
	Overspeed	Selector Sw. in Auto		Overcrank	
	Low Oil Pressure		High Engine Temp		
POWER SUPPLY	Overhead-Underground-Lightning Protection				
	Transformer (No. - Location)				
OTHER					

DATA SHEET 143

FIRE PUMP TESTING

FIRE PUMP TEST REPORT

Date Time	No. and Size of Nozzles	Pump Pressure			Pitot Press	gpm	rpm	Volt	Amps	Corrected to Rated rpm	
		Dis	Suc	Net						Net Head	gpm

NOTES:

DATA SHEET 151

FIRE ALARM SYSTEM TESTING

SYSTEM TYPE:

Local ______ Proprietary ______ Central ______ Auxiliary ______

System Location: ____

Control Panel: Make __________ Model __________

Addressable __________ Location ___________

Initiating Circuit Style: __________

Indicating Circuit Style: __________

Signaling Circuit Style: __________

Supervisory Circuit Style: __________

Backup Power: Battery ________ hrs. Generator ________ hrs.

Off-premises Signaling: Direct Connection __________

Central Station ___________ Auxiliary Street Box: __________

Telephone Line __________ DACT __________

Transmitted To: __________

Manual Fire Alarm Stations: Partial Coverage ______

Full Coverage ______ Coded ______ Noncoded ______

Automatic Fire Alarm Stations: Partial Coverage ______

Full Coverage ______ Ion ______ Photo. ______

Linear Beam ______ Flame ______ Other ________________

FT ______ ROR ______ FT/ROR ______ DS _______

Waterflow Alarm Initiating Devices:

Location(s): _____________________________________

Type(s): ____

Other Initiating Signals (Halon, Hood, etc.) _______________

DATA SHEET 151 (cont.)

Alarm Signaling Devices

Bell _______ Horn _______ A/V _______ Speaker _______

Siren _______ Full Coverage _______ Partial Coverage _______

ADA _______

Voice Communication System:

Location of Panel: ____________________________________

Location of Speakers: _________________________________

DATA SHEET 151

FIRE ALARM SYSTEM TESTING

Date: Conducted By:	Pass	Fail	N/A
Control Panel			
Manual Pull Stations			
Pneumatic Line-Type Detectors			
Fire (Restorable Heat) Detector			
Fire (Radiant Energy) Detector			
Fire (Smoke) Detector			
Other Fire Detectors			
Duct-Type Smoke Detector			
Waterflow Alarms			
Supervisory Devices			
Smoke Detector Sensitivity			
Alarm Indicating Appliances			
Remote Annunciator			
Emergency Voice			
Two-Way Alarm Communication			
Generators			
Battery			
Off-Premises Communication			

NOTES:

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APPENDIX C

FIRE PREVENTION PROCEDURES AND PRACTICES

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CONTENTS

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APPENDIX C

FIRE PREVENTION PROCEDURES AND PRACTICES

The following procedures serve as examples and may be used to any degree to assist in developing new or improving existing programs.

C.1 Fire Watch Requirements

1.0 SCOPE

This procedure provides the requirements for a fire watch in facilities where automatic fire protection or alarm systems are installed but are out of service and the affected area is unattended. (see Section D.5, "Fire Protection System Impairments")

When developing this procedure, the Atomic Energy Commission Fire Protection Guide for Watchman Service *may be useful in determining the appropriate frequencies and level of fire watch recommended based on the importance of the facility, occupancy hazard, loss potential, and the protection impaired*.

2.0 REQUIREMENTS

Management shall ensure the following are accomplished:

1. Fire watches understand the specific nature of the impairment and the specific area affected.

2. Fire watches for fire system impairments shall rove all areas affected by the impairment.

3. Fire watches have been instructed in the appropriate emergency actions, including best method to sound the alarm, procedure to manually trip suppression systems if they are in service, or use of portable extinguishers.

4. Fire watches have been instructed in the frequency of the fire watch tours.

5. Fire watches have had portable fire extinguisher training.

6. Frequency of tours are as follows:

   a. Continuous, when required by facility process standards or process controls

   b. Hourly, when automatic suppression systems are out of service

c. Once every 2 hours if only automatic alarm capability is out of service

d. As amended by Fire Protection Engineering.

7. A log or documentation system is used to provide an audible record that ensures compliance.

8. Fire watches for welding, cutting, grinding, or open flame activity shall be performed per Section C.3, "Cutting, Welding, and Open Flame Work."

C.2 Portable Heaters

1.0 SCOPE

This procedure provides the minimum requirements for the safe use of portable heaters.

2.0 REQUIREMENTS

Management shall ensure the following are accomplished.

1. Fire Protection Engineering is consulted regarding size and spacing of heaters.

2. Manufacturer's recommendations are observed for the following:

   a. Adequate clearance to combustible furnishings, surfaces, or materials

   b. Adequate ventilation for fuel-fired heaters to prevent products of combustion buildup and to maintain stable flame quality.

3. Heaters are Underwriters Laboratories (UL) listed or American Gas Association (AGA) certified.

4. Fuel for heaters is stored and handled in accordance with the requirements for Section C.5, "Flammable and Combustible Liquids."

5. Fuel-fired heaters are located outside and heat is ducted indoors, unless otherwise approved by Fire Protection Engineering.

6. Indoor use of liquid petroleum gas fired heaters is temporary and only under the following conditions:

   a. In buildings under construction, or undergoing repairs or modifications.

   b. As temporary heat in noncombustible industrial occupancies.

   c. In other buildings for temporary emergency heating purposes, if necessary, to prevent damage to the building or contents.
   A fire watch must be provided.

7. Portable electric heaters are equipped with tip-over protection, which automatically shuts the unit off when the unit is tipped from its upright position.

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C.3 Cutting, Welding, and Open Flame Work

1.0 SCOPE

This procedure provides the requirements and responsibilities for cutting and welding with electric arcs, oxygen-fuel gas flames, and other forms of hot work such as open flames, grinding, or brazing activities. The scope of this procedure also requires compliance with NFPA 51B and the applicable Compressed Gas Association publications.

2.0 REQUIREMENTS

Management and craft supervisors shall ensure the following are accomplished.

1. Cutting and welding are done by authorized personnel in designated cutting and welding areas (shops) to the greatest extent practical.

2. Adequate ventilation is provided for all cutting and welding work.

3. Torches, regulators, pressure-reducing valves, and manifolds are UL listed or Factory Mutual (FM) approved.

4. Oxygen-fuel gas systems (e.g., oxygen or acetylene welders) are equipped with listed and/or approved backflow valves and pressure-relief devices.

5. Eye protection and protective clothing are worn by all cutters, welders, helpers, and fire watches, as appropriate. Workers adjacent to arc welding areas are protected from the rays by screens or shields.

6. When cutting and welding are done outside of designated areas, the following actions are performed.

   a. A permit is completed for each shift.

   b. A continuous fire watch is maintained by instructed employees. The fire watch shall be stationary at the hazard area, and in addition, a roaming watch shall be provided when warranted. A fire is attacked only when obviously within the capability of the portable extinguisher. See Section C.1, "Fire Watch Requirements."

   c. A member of supervision (i.e., craft supervisor) inspects the job site at least once before the start of each job and at least once every 24 hours until the completion of the job.

   d. A craft supervisor determines the best locations(s) for the fire watch and verifies that automatic fire protection is in service, that precautions taken are adequate, and that information on the permit is correct.

e. Combustible materials, equipment, or building surfaces within 20 ft of or below the work must be either covered with fire-resistant welding blankets, moved, or wetted down. Openings in ducts, tanks, or other confined spaces within 20 feet of the work are also covered or plugged. Fire-resistant welding blankets are used for electric arc operations instead of wetting the work down.

7. Cutting or welding is prohibited in the following situations.

   a. In sprinklered areas while sprinkler protection is out of service

   b. In explosive atmospheres of gases, vapors, or dusts or where explosive atmospheres could develop from residues or accumulations in confined spaces (see item 8)

   c. On metal walls, ceilings, or roofs built of combustible sandwich-type panel construction or having combustible covering.

8. Confined spaces such as tanks are tested to ensure that the atmosphere is not in excess of 10% of the lower flammable limit before cutting or welding in or on the tank. Tests are repeated as conditions warrant, once each shift as a minimum. Mechanical ventilation is continuous when cutting or welding in or on a confined space.

9. When cutting or welding must be done on small tanks, piping, or containers that cannot be entered, they are cleaned, purged, and tested before starting the work. For work on combustible liquid, gas piping, or tanks, intermittent testing is done during the work and a Job Safety Analysis provided.

C.4 Maintenance for Ventilation, Exhaust, and Blower Systems

1.0 SCOPE

This procedure provides the requirements for inspecting and cleaning building ventilation, exhaust, and blower systems to mitigate potential fire hazards. This standard applies to ventilation systems (including intake and exhaust openings, plenums, etc.) for changerooms, exhaust and blower systems in laboratories, paint booths, metal and woodworking areas, and other similar areas where flammable or combustible vapors, residues, lint, and/or fibers accumulate. The scope of this procedure also requires compliance with the applicable sections of the following NFPA standards:

NFPA 90A, "Installation of Air Conditioning and Ventilating Systems"
NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems"
NFPA 91, "Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying"
NFPA 96, "Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment"

NOTE: Ducts with known radiological contamination are excluded from this standard, except where the potential fire hazard is severe. Fire Protection Engineering requirements for HEPA filtration systems are provided in the "Fire Protection Criteria for Containment Ventilation Filter Plenum Systems" located in the DOE Fire Protection Resource Manual.

2.0 REQUIREMENTS

Management shall ensure that:

1. All building ventilation, exhaust, and blower systems where flammable or combustible vapors, residues, lint, and/or fibers accumulate are identified and documented.

2. All systems identified in item 1, above, are included in a minimum, annual preventive maintenance (PM) program. The frequency must be increased when conditions warrant.

3. The PM includes an inspection of all components of the systems and is documented for auditing purposes.

4. The PM includes, but is not limited to, cleaning grill plates, replacing filter media if design permits, and removing any buildup of foreign material from the duct interior if conditions warrant.

5. A list of all systems, identified in item 1 above, is forwarded to Fire Protection Engineering.

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C.5 Flammable and Combustible Liquids

1.0 SCOPE

This procedure provides the requirements for the use, storage, and handling of flammable and combustible liquids. The scope of this procedure also requires compliance with NFPA 30, NFPA 45, and NFPA 395.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Users of flammable and combustible liquids are familiar with the hazard classification for the purpose of complying with this standard.

   NOTE: Flammable and combustible liquids are classified as follows.

   a. Flammable Liquid. A liquid having a flash point below 100 °F (37.8 °C) and having a vapor pressure not exceeding 40 psi (absolute) (2,068 mm Hg) at 100 °F (37.8 °C) is known as a Class I liquid.

      Class I liquids are subdivided as follows.

      - Class IA liquids include those having flash points below 73 °F (22.8 °C) and having a boiling point below 100 °F (37.8 °C).
      - Class IB liquids include those having flash points below 73 °F (22.8 °C) and having a boiling point at or above 100 °F (37.8 °C).
      - Class IC liquids include those having flash points at or above 73 °F (22.8 °C) and below 100 °F (37.8 °C).

   b. Combustible Liquid. A liquid having a flash point at or above 100 °F (37.8 °C).

      Combustible liquids are subdivided as follows.

      - Class II liquids include those having flash points at or above 100 °F (37.8 °C) and below 140 °F (60 °C).
      - Class IIIA liquids include those having flash points at or above 140 °F (60 °C) and below 200 °F (93 °C).

- Class IIIB liquids include those having flash points at or above 200 °F (93 °C).

2. The following storage requirements are implemented.

   a. In industrial facilities, not more than a 1-day supply of flammable or combustible liquid may be stored in a single fire area outside of an approved flammable liquid storage cabinet; or not more than 25 gal of Class I liquids in containers and 120 gal of Class IB, IC, II, or III liquids in containers.

   b. If quantities of liquids exceeding the above limits are required, they must be stored in approved flammable liquid storage cabinets.

3. When flammable liquid storage cabinets are used, not more than 120 gal of Class I, II, and IIIA liquids are stored in the cabinet. Of this total, not more than 60 gal may be of Class I and II liquids.

4. When flammable liquid storage cabinets are used, not more than three cabinets may be stored in a single fire area. In industrial facilities, additional cabinets (limited to a maximum group of three) may be stored in the same fire area, provided the groups of cabinets are separated by 100 ft.

5. When flammable liquid storage cabinets are used, the vent openings must be sealed with properly fitted metal bungs; or when the cabinets are required to be vented, they must be vented to the outside.

6. When storage quantities exceed that permitted in items 2 and 4 above, the liquids are stored in rooms or facilities complying with NFPA 30 and 29 CFR 1910.106, "Flammable and Combustible Liquids."

7. All flammable and combustible liquids (except Class IIIB) in nuclear facilities are stored in approved flammable liquid storage cabinets, rooms, or buildings complying with NFPA 30 and 29 CFR 1910.106.

   NOTE: This requirement does not apply to laboratories.

8. When dispensing from drums, the drums are equipped with UL-listed or FM-approved dispensing devices.

9. When transferring liquids between conductive containers, the containers are bonded with a wire. The bonding wire or one of the containers must be grounded.

10. Class IA and IB liquids may be stored in glass containers of not more than 1 gal, if required for liquid purity or to avoid excessive corrosion of metal containers.

11. Stored liquids should not obstruct corridors, aisles, or exit doors,

and should not be stored in exit enclosures (e.g., stairwells).

12. When transferring Class I liquids in laboratories from containers of less than 5-gal capacity, the transfer is made in one of the following manners:

    a. With the use of a laboratory hood

    b. In an area provided with ventilation to prevent the accumulation of a flammable vapor or air mixture exceeding 25% of the lower flammable limit.

13. When transferring Class I liquids in laboratories from containers of 5-gal capacity or more, the transfer is made in one of the following manners:

    a. From a separate area outside the building

    b. In a separate, inside storage room that complies with the requirements of NFPA 30 and 29 CFR 1910.106.

14. Mechanical ventilation that meets the following criteria is provided when transferring Class I liquids in nonlaboratory areas.

    a. The ventilation flow rate must be 1 $ft^3/min/ft^2$ of floor area but in no case less than 150 ft^3/min.

    b. The intake and exhaust points must be within 12 in. of the floor and positioned at opposite sides or ends of the room.

    c. A flow monitor or equivalent mechanism must be provided so an audible alarm will sound if the ventilation system fails.

15. Combustible waste and residue is stored in closed, metal containers for daily disposal.

16. Outdoor storage requirements comply with NFPA 30 and 29 CFR 1910.106. NOTE: Contact Fire Protection Engineering for assistance.

17. Inside storage rooms comply with NFPA 30 and 29 CFR 1910.106. NOTE: Contact Fire Protection Engineering for assistance.

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C.6 Employee Training

1.0 SCOPE

This procedure outlines the annual fire protection training requirements for employees.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. All employees receive basic fire prevention training, which includes the following items as a minimum:

   a. Good housekeeping practices

   b. Proper response and notification in the event of a fire

   c. Instruction on the use of portable fire extinguishers

   d. Recognition of potential fire hazards.

2. Employees who perform fire watches receive hands-on portable fire extinguisher training.

3. All training is documented for auditing purposes.

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C.7 Control of Combustibles

1.0 SCOPE

This procedure provides the requirements for minimizing and controlling the use of combustible materials. The scope of this procedure also requires compliance with the applicable sections of NFPA 1.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Housekeeping inspections are performed monthly in their facilities to ensure equipment and materials are maintained in an orderly arrangement at all times.

2. At least 18 in. vertical clearance is maintained between the top of storage and sprinkler head deflectors.

3. Combustible materials are limited to the quantity required for current needs and are separated from ignition sources.

4. Workroom floors are maintained clean and dry to the extent practicable.

5. Noncombustible or fire retardant materials are used whenever possible.

6. Combustible waste is collected in metal containers and provided with lids. (Lids are not required for office waste cans.)

7. Combustible waste does not accumulate inside or adjacent to buildings.

8. In nuclear facilities, wood, plastic, and paper materials are strictly limited for uses that are essential to the facilities operation and to uses that do not have a noncombustible substitute.

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C.8 Compressed Gas Cylinders

1.0 SCOPE

This procedure provides the requirements for the storage, transportation, identification, and use of compressed gas cylinders. The design, use, and storage of compressed gas cylinders and systems shall comply with the following standards as applicable:

NFPA 50, "Bulk Oxygen Systems at Consumer Sites"
NFPA 50A, "Gaseous Hydrogen Systems at Consumer Sites"
NFPA 50B, "Liquefied Hydrogen Systems at Consumer Sites"
NFPA 51, "Design and Installation of Oxygen-Fuel Gas Systems for Welding Cutting and Allied Processes"
NFPA 51A, "Acetylene Cylinder Charging Plants"
NFPA 51B, "Cutting and Welding Processes"
NFPA 52, "Compressed Natural Gas Vehicular Fuel Systems"
NFPA 54, "National Fuel Gas Code"
NFPA 58, "Storage and Handling of Liquefied Petroleum Gases"
NFPA 59, "Storage and Handling of Liquefied Petroleum Gases at Utility Gas Plants"
NFPA 59A, "Production, Storage and Handling of Liquefied Natural Gas"
Compressed Gas Association Publications

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Cylinders in transit or storage are provided with protective valve caps and secured in the upright position.

2. All storage areas are clearly identified.

   a. The storage of compressed gas cylinders within buildings shall be limited to the quantity required for daily operations unless additional quantities are permitted by the applicable NFPA standard.

   b. The storage of compressed gas cylinders outside of buildings shall be in accordance with the applicable NFPA standard.

3. Flammable and oxidizing compressed gas cylinders are separated by 20 ft or with a minimum 5-ft-high, 30-minute fire rated wall.

4. Empty and full gas cylinders are segregated, and empty cylinders are tagged "empty."

5. Compressed gas cylinders are not exposed to temperatures above 125 °F and are protected from direct sun and weather elements.

6. Compressed gas cylinders are identified regarding their contents;

they are free of defects and are within their hydrostatic test date.

7. Gases are not mixed or transferred from one compressed gas cylinder to another and are refilled only by trained personnel.

8. Cylinders are not lifted by magnetic devices or by their protective caps. They must be secured to a cradle or platform and never dragged, dropped, or struck.

9. Compressed gas cylinders do not come in contact with electrical circuits, open flames, or arcs.

10. Compressed gas cylinders are not used for any purpose other than compressed gas containment.

11. Gas is not used from compressed gas cylinders without approved reducing regulators.

12. Connecting devices are free of oil, grease, and dirt and have threads corresponding to the cylinder valving.

13. Valves must be closed when cylinders are transported, moved at sites, and connected for use.

14. All devices used on compressed gas cylinders comply with the American National Standards Institute and Compressed Gas Association standards.

15. All compressed gas manifolds are designed in accordance with the applicable NFPA standard.

C.9 Smoking Policy

1.0 SCOPE

This procedure provides the company's smoking policy. The scope of this procedure also requires compliance with the applicable sections of NFPA 1.

2.0 REQUIREMENTS

1. Smoking is prohibited in the following Government owned, leased, or controlled areas:

   a. All indoor rooms and offices

   b. All government vehicles

   c. Near hazardous or toxic materials.

2. Adequate resources shall be supported by the company to aid employees in smoking cessation or curtailment should they request this assistance.

3. Designate areas where smoking is permitted.

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C.10 Construction Sites

1.0 SCOPE

This procedure provides the fire prevention requirements for construction sites. The scope of this procedure also requires compliance with the applicable sections of NFPA 241 and 29 CFR 1926.

2.0 REQUIREMENTS

The project manager shall ensure that the following are accomplished.

1. Access is always maintained to the site for Emergency Response vehicles.

2. The site or project is provided with two-way communications for the purpose of emergency notification.

3. The site or project is secured against unauthorized entry.

4. Welding, cutting, and open flame is performed in a designated area whenever possible.

5. The site or project is provided with portable firefighting equipment.

6. When water is available, the site or project is provided with an adequate supply (including an adequate number of fire hydrants strategically located at the site) for firefighting capability.

7. Projects involving multiple level buildings are provided with dry standpipe systems. (Consider the limitations of the site fire department or brigade when determining the need for dry standpipes in multiple level buildings during construction.)

8. Construction site safety inspections are conducted weekly and documented, and any unsafe conditions identified are tracked until corrected.

APPENDIX D

FIRE PROTECTION PROCEDURES AND PRACTICES

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APPENDIX D

FIRE PROTECTION PROCEDURES AND PRACTICES

D.1 Portable Fire Extinguishers

1.0 SCOPE

This procedure provides the requirements and responsibilities for the installation and maintenance of portable fire extinguishers. The scope of this procedure also requires compliance with NFPA 10.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. The location and type of portable fire extinguisher are in accordance with the requirements of NFPA 10. The relocation of any portable fire extinguisher must be approved by Fire Protection Engineering.

2. Portable fire extinguishers are inspected and maintained.

3. Before purchase, portable fire extinguishers are approved by Fire Protection Engineering.

4. Portable fire extinguishers are inspected monthly. If inspection forms are used, they shall be maintained for 1 year and be available on request.

5. Portable fire extinguishers are within their hydrostatic test date and maintained in a fully charged and operable condition.

6. Portable fire extinguishers are mounted on hangers or in cabinets, unless they are the wheeled types. Portable fire extinguishers that are used for welding and cutting operations are not required to be secured at the location of the welding or cutting.

7. Portable fire extinguishers that are provided for vehicles are mounted or secured to prevent physical damage to the extinguisher and injury to passengers.

8. Portable fire extinguishers are conspicuously marked and identified.

9. Portable fire extinguishers are not obstructed or obscured from view, and clear access to the portable fire extinguisher is maintained.

10. Immediate corrective action is taken for portable fire extinguishers identified as having a deficiency (e.g., empty, not mounted or missing, broken seal, etc.).

11. Employees receive fire extinguisher training upon initial employment. Thereafter, employees who may use a portable fire extinguisher must be given a documented refresher class annually.

D.2 Nonemergency Use of Fire Hydrants

1.0 SCOPE

This procedure provides the requirements and responsibilities for nonemergency use of fire hydrants.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Prior permission is obtained from the Fire Department and the site Water Department before nonemergency use of fire hydrants.

2. The hydrant user installs one valve (4 1/2-in. American national fire hose connection screw thread (NH) with a 4-in. Storz-type, i.e., sexless quick coupling) to a 4 1/2-in. port on each fire hydrant being used. This 4 1/2-in. port with the valve installed is reserved for fire department use only.

3. One or both 2 1/2-in. fire hydrant ports are used for nonemergency use only; the 4 1/2-in. port is used only by the fire department. The hydrant user provides an approved 2 1/2-in. gate valve (NH both ends) on one or both of the 2 1/2-in. fire hydrant ports, reduced down to 1 1/2 in. (i.e., a 2 1/2-in. NH gate valve followed by a 2 1/2-in. X 1 1/2-in. NH reducer).

4. The user provides and uses only approved fire hydrant wrenches when opening or closing a fire hydrant (i.e., no pipe wrenches are to be used).

5. The user keeps the fire hydrant in a fully open or fully closed configuration.

6. An approved portable backflow device or air gap is used to protect the potable water system from potential backflow conditions, where water for purposes such as flushing drains, filling tankers, etc., is drawn from a fire hydrant that is connected to a potable water system.

7. Special precautions are taken during freezing weather conditions to prevent fire hydrant damage. Do not leave the fire hydrant and any attached hoses pressurized in a nonflowing condition for an extended length of time.

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D.3 Building Exits

1.0 SCOPE

This procedure provides the requirements and responsibilities for maintaining safe building exits. The scope of this procedure also requires compliance with NFPA 101. Compliance with 29 CFR 1910, Subpart E is considered satisfied when the requirements of NFPA 101 are met.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Every building exit and path to an exit is kept clear and unobstructed.

2. Building exit doors are not locked and do not require more than one action to open.

3. Exit doors are maintained in good operating condition.

4. Material is not stored in stairwells or corridors of buildings.

5. Emergency lights, exit signs, and other exit marking systems are maintained in good operating condition.

6. Fire doors are not blocked open.

7. Exit discharges including exterior building stairs are kept clean and unobstructed.

8. Radiation barriers (e.g. roped areas, etc.) do not affect egress routes.

9. Security features are in compliance with NFPA 101.

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D.4 Building Emergency Lights

1.0 SCOPE

This procedure provides the requirements and responsibilities for battery-operated and emergency-generator-operated emergency lighting systems. The scope of this procedure also requires compliance with the applicable sections of NFPA 101, NFPA 70, and NFPA 110.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. All emergency light tests are documented and written records maintained.

2. Emergency lights that are found deficient are repaired within 24 hours, or portable emergency lights are provided at the affected area(s) until the permanent lights are restored to service.

3. Emergency lights are inspected during emergency light tests to verify the following:

    - Electrical cords are not damaged or frayed

    - Lamps are not cracked or damaged

    - Units are securely mounted

    - Lamps illuminate within 10 seconds of switching to the backup power supply.

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D.5 Fire Protection System Impairments

1.0 SCOPE

This procedure provides the requirements and responsibilities to minimize the duration and impact of modifications or unplanned impairments to fire protection systems.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Fire protection system modifications are reviewed and approved by Fire Protection Engineering.

2. Fire protection system operation is not hindered by storage practices, temporary construction activities, or enclosures.

3. Corrective actions are implemented for all fire protection system impairments.

4. The craft personnel, Fire Department, and necessary engineering support are coordinated to properly and expeditiously restore the fire protection system to service.

5. Fire Protection Engineering and the Fire Department are immediately notified of all fire protection system impairments.

6. Compensatory measures are implemented as required by Fire Protection Engineering until the system is restored.

7. When a fire protection system impairment is identified, the facility manager shall initiate corrective actions as soon as possible. Corrective actions shall consist of, but not be limited to, the following.

    a. Notify the building occupants affected by the impairment.

    b. Determine when any unsatisfactory housekeeping, storage, or special hazardous conditions need to be corrected.

    c. As necessary, terminate hazardous production or maintenance operations and impose "No Smoking" regulations until appropriate protection or detection is restored. Cutting, welding, or other "hot work" shall be prohibited until adequate protection is assured.

    d. With Fire Protection Engineering consultation, determine when the Fire Department should be present at the facility and/or provide alternate water supplies to the impaired system.

e. Maintain as much of the fire protection system in an operable status as possible.

f. Establish a fire watch throughout the area that is affected by the impairment of the fire protection system as required by Fire Protection Engineering. (See Section C.1, "Fire Watch Requirements.")

D.6 Fire Protection System Winterization

1.0 SCOPE

This procedure provides the requirements for developing a winterization program to ensure fire systems are protected against cold weather conditions. The standard applies to all government-owned facilities provided with fire protection systems and components e.g., sprinkler, deluge, foam systems, smoke detectors, or standpipes.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. A written winterization program is in place for their facilities. The program shall require that each facility be inspected annually during the month of September to ensure all areas are adequately winterized. The inspection shall include the following items as a minimum:

   a. Condition, operation, and adequacy of heating systems, e.g., forced air, radiant heaters, portable heaters.

   b. Condition and operation of thermostats and filters

   c. Condition/operation/installation of heat tape systems

   d. Draining of sprinkler system drip lines and fire pump hose headers.

   Audible inspection results shall be maintained for 2 years.

2. All areas where fire systems are present are provided with sufficient heat and/or noncombustible insulation to prevent freezing and/or equipment damage.

3. Heat tape and portable heaters are only used when no other preventive measures are immediately available. If used, these items must be listed or approved for their intended use.

4. Heat tape and portable heaters are not used as a permanent means of preventing system freezes. An engineered solution is provided for deficient areas, e.g., forced hot air, fixed radiant heaters, insulation, etc.

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D.7 Fire Barriers

1.0 SCOPE

This procedure provides the requirements to establish and ensure the integrity and continued operability of building fire barriers. The scope of this procedure also requires compliance with the applicable sections of NFPA 101 and NFPA 90A.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. All modifications or additions, which affect new or existing fire barriers, are reviewed and approved by Fire Protection Engineering.

2. All fire barrier penetrations are provided with approved, through-penetration firestops and/or are protected by approved operable fire door(s), fire damper(s), or fire window(s) having the appropriate fire-resistive rating(s).

3. Drawings for each building provided with fire barriers are prepared to show the location of all fire barriers.

4. Changes or modifications to installed fire barriers shall be controlled by administrative procedures.

5. Fire doors are identified and numbered.

6. Fire doors are not chocked or blocked open.

7. Security systems do not interfere with or affect the operation or integrity of fire doors (e.g., latch mechanisms), fire dampers, fire windows, or other fire protection system component.

8. Fire or smoke dampers are identified and numbered.

9. Fire or smoke dampers are not blocked open.

10. Inspection records of fire barrier penetration devices (fire doors and fire or smoke dampers) are maintained by the building administrator for auditing purposes.

11. Immediate attention is taken to resolve any deficiencies that involve fire barrier impairments.

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D.8 Building Standpipe Systems

1.0 SCOPE

This procedure provides the requirements for installing fire hose lines, when fire hose lines are required to meet the fire protection goals of the program. The scope of this procedure also requires compliance with NFPA 14.

At many DOE sites, building fire hose lines are not installed because site emergency response personnel and fire departments prefer not to use "in-house" lines, but would rather bring their own hoses for use in the fire. Some unique conditions may warrant the installation of hose lines, and these cases should be coordinated with the local fire department. Some codes require standpipes and/or hose lines to be installed in selected occupancies. When required, only the fire hose connections (without the hoses) are typically provided for fire department use to aid with manual firefighting efforts.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. The class of standpipe service provided for a facility is coordinated with the local fire department.

2. Standpipe systems are sized in accordance with NFPA 14.

3. Building fire hose connections are conspicuously identified and access to them is maintained clear and unobstructed.

4. Standpipes normally filled with water shall be protected against freezing by ensuring the water in the pipe is at or above 40 °F.

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APPENDIX E

SPECIAL HAZARDS PROTECTION PROCEDURES AND PRACTICES

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APPENDIX E

SPECIAL HAZARDS PROTECTION PROCEDURES AND PRACTICES

E.1 Temporary Enclosures

1.0 SCOPE

This procedure provides the requirements and responsibilities for temporary enclosure fire protection. The scope of this procedure also requires compliance with the applicable sections of NFPA 241.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Temporary enclosures erected within a facility are not structurally supported by piping arrangements designed for automatic sprinkler systems and other fire protection equipment.

2. The enclosure supporting structures are constructed of noncombustible or fire-retardant material approved by Fire Protection Engineering.

3. The coverings for enclosure walls, ceilings, and floors are of noncombustible or approved fire-retardant materials. Where plastic films are used, they must be approved by Fire Protection Engineering.

4. Enclosures and 10-ft-wide areas on the exterior of the enclosures are posted as "No Smoking" areas.

5. Combustible materials are not stored within the "No Smoking" areas.

6. Flammable and/or combustible liquids are kept to an absolute minimum and are stored in and dispensed from UL- or FM-approved safety cans. Flammable or combustible liquid-soaked clothes, rags, or waste are stored in UL- or FM-approved safety containers.

7. Combustible materials that are used in the enclosure operations (e.g., rags, paper products, etc.) are removed from the enclosure immediately after use or transported and stored in approved metal containers with lids. All combustible waste is removed from the enclosure after each work shift.

8. Exits are kept unobstructed at all times.

9. Cutting, welding, open flame, or grinding are not performed in enclosures without an approved permit.

10. Portable fire extinguishers are provided and positioned for easy visibility and access.

E.2 Computer Facilities

1.0 SCOPE

This procedure provides the requirements and responsibilities for computer facility fire protection. The scope of this procedure also requires compliance with DOE/EP-0108, *Standard for Fire Protection of AEC Electronic Computer Data Processing Systems*. This procedure applies to facilities that have the following characteristics:

1. Designated as vital to the DOE mission

2. Required for security

3. Valued at $1 million or more

4. Required for operations that could be performed by substitute methods, but the substitute methods would result in unacceptable delay or would involve significant additional expenditures for personnel, facilities, and equipment.

2.0 REQUIREMENTS

Management shall assure that the following are accomplished.

1. Computer areas are posted as "No Smoking" areas.

2. Furniture in computer areas is metal and limited to what is required for efficient operations.

3. Waste containers are noncombustible and equipped with fire safety lids.

4. Waste containers are emptied daily.

5. Areas under the raised floor are inspected quarterly to ensure no combustibles have accumulated.

6. Office or computer supplies, forms, stationary, and other combustible supplies are not stored in the computer area.

7. Maintenance operations are not performed in the computer area, except for those repairs made directly to equipment that is impractical to remove from the area.

8. Records and tapes are not stored in the computer area, except those required for daily operations.

9. Records and tapes required for daily operations are stored in closed metal cabinets.

10. Computer areas have an equipment salvage plan in place for the reconditioning of equipment that is exposed to smoke and water.

11. Fire protection features are provided in accordance with standards DOE/EP-0108, *Standard For Fire Protection of AEC Electronic Computer Data Processing Systems* and NFPA 75.

12. Employees who normally work in computer facilities are familiar with the fire protection systems in their work area.

13. Computer facilities with raised floors are provided with floor lifters that are mounted near the room exit door.

E.3 Oxidizing Materials

1.0 SCOPE

This procedure provides the general requirements for storing liquid and solid oxidizing materials. The scope of this procedure also requires compliance with NFPA 43A and NFPA 43C.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. An emergency plan is in place for facilities storing oxidizing materials.

2. Storage facilities are labeled with the "Class" of oxidizer they contain. (Reference NFPA 43A)

3. Oxidizing material is not stored with noncompatible materials such as ordinary combustibles, flammable or combustible liquids, greases, etc. (This does not apply to approved packaging material.)

4. The total amount of oxidizing material for each "Class" does not exceed 2 tons in nonsprinklered buildings or 4 tons in sprinklered buildings.

5. Employees involved in the storage operation receive instruction on handling the material in a safe manner.

6. "No Smoking" signs are posted at the entrance and within the storage building.

7. Any wood construction in storage buildings that may come in contact with oxidizers is protected with a compatible material to prevent the wood from impregnation by the oxidizers.

8. Combustible waste and used or empty containers are not stored with the oxidizing material.

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E.4 Gloveboxes

1.0 SCOPE

This procedure provides the design and operation requirements and responsibilities for the prevention of glovebox fires. The scope of this procedure also requires compliance with the Glovebox Fire Protection Criteria located in the DOE Fire Protection Resource Manual.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. All new gloveboxes and windows are constructed of noncombustible or fire retardant materials.

2. Glovebox gloves are of Hypalon[1] or neoprene material.

3. Window size is held to a minimum consistent with good operator vision and maintenance needs.

4. Gloveboxes are equipped with fire protection. Reference the DOE Glovebox Fire Protection Criteria.

5. Only combustibles required for daily operations are permitted in a glovebox.

6. Transient combustibles in gloveboxes are kept in closed metal containers.

7. Combustible waste is removed from gloveboxes daily or placed in closed metal containers (see item 6).

8. Flammable and combustible liquids used in gloveboxes are stored and dispensed from approved safety cans.

9. Glovebox exhaust filter openings are equipped with fire screens.

10. Heat-producing equipment in gloveboxes (e.g., calciners, hot plates) are equipped with high temperature automatic shutoff devices, safety shutoff valves, or safety tip-over switches.

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[1]Hypalon is a trademark of E.I. Du Pont de Nemours & Co.

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E.5 Explosives

1.0 SCOPE

This procedure provides the operation requirements and responsibilities for the manufacturer, storage, and use of explosive materials. The term explosive includes any material determined to be within the scope of Title 18, United States Code, Chapter 40 (18 USC 40), "Importance, Manufacture, Distribution, and Storage of Explosive Materials." It also includes any material classified as an explosive by the DOT Hazardous Material Regulations. The scope of this procedure also requires compliance with the following standards as applicable:

NFPA 495, "Explosive Material Code"
NFPA 498, "Explosive Motor Vehicle Terminals"
49 CFR 100-199, "Transportation"

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. The manufacture, storage, and use of explosive materials are prohibited unless it can be done in a safe manner.

2. The safety of the explosive workers, general public, and environment in the vicinity of the explosive materials are the primary importance of the operations.

3. Smoking and flame producing equipment are not permitted in the vicinity where explosive materials are produced, handled, stored, or used.

4. All explosive materials that are not in the process of manufacture, being transported, or in use are kept in a storage magazine.

5. Storage magazines are of the proper construction and are properly located for the type and amount of explosive being stored.

6. The area around storage magazines is kept clear of brush, dry grass, leaves, or similar combustibles for a minimum distance of 25 ft.

7. Combustible materials are not stored within 50 ft of explosive magazines.

8. All electrical equipment used near explosive material complies with NFPA 70 for classified hazardous areas.

9. Precautions are taken to prevent accidental detonation of explosives from currents induced by radar and radio transmitters, lightning, adjacent power lines, dust and snow storms, or other sources of extraneous electricity. These precautions shall include the following:

   a. Post signs warning against the use of mobile radio transmitters on all roads within 350 ft of explosive operations, as required.

   b. Construct tools used in the handling of explosives of nonsparking materials.

   c. Discontinue all handling of explosive materials during the approach and progress of an electrical storm. Move all personnel to a safe location.

   d. Provide bonding and grounding straps for all equipment where explosive materials are processed and handled.

   e. Ensure floorings are of nonsparking materials.

E.6 Transportation

1.0 SCOPE

This procedure provides the requirements for transporting flammable and combustible liquids, compressed gases, explosives, and other hazardous materials. For the purpose of this procedure, a vehicle is defined as either a railcar, ship, or highway truck. The scope of this procedure also requires compliance with the following standards as applicable:

NFPA 30, "Flammable and Combustible Liquids Code"
NFPA 58, "Storage and Handling of Liquefied Petroleum Gases"
NFPA 59, "Storage and Handling of Liquefied Petroleum Gases at Utility Gas Plants"
NFPA 59A, "Production, Storage and Handling of Liquefied Natural Gas"
NFPA 77, "Static Electricity"
NFPA 303, "Marinas and Boat Yards"
NFPA 306, "Control of Gas Hazards on Vessels"
NFPA 307, "Marine Terminals, Piers and Wharves"
NFPA 327, "Cleaning or Safeguarding tanks and Containers"
NFPA 385, "Tank Vehicles for Flammable and Combustible Liquids"
NFPA 386, "Portable Shipping Tanks"
NFPA 495, "Explosive Materials Code"
18 USC 40, "Importation, Manufacture, Distribution, and Storage of Explosive Materials"
33 CFR 1-199, "Navigation and Navigable Waters"
46 CFR 1-199, "Shipping"
49 CFR 100-199, "Transportation"
49 CFR 393, 396, 397, "Transportation"

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Flammable and combustible liquids, compressed gases, explosive, and hazardous materials are transported in the appropriate containers and vehicles with the proper valving, piping, hose, connectors, pumps, meters, dispensers, regulators, strainers, and emergency venting.

2. Materials are not stored or transported in a vehicle that is not in compliance with the DOT.

3. All vehicles and containers used for transporting any material covered by this procedure (regardless of quantity being transported, or whether loaded or empty) are conspicuously and legibly marked in accordance with the requirements of the DOT Hazardous Material Regulations.

4. Vehicle drivers and navigators are thoroughly trained and licensed in the proper method of operating, loading, and unloading the

vehicle.

5. Vehicles are not operated unless they are in proper repair, devoid of accumulation of grease and oil, and free of leaks.

6. Vehicle repairs are not made unless the repairs can be made without hazard.

7. Vehicle repairs are not performed in a closed building or with the vehicle loaded or unpurged.

8. Vehicles are bonded and grounded when required during loading and unloading operations.

9. Vehicles used for transporting materials covered by this procedure are designated as "No Smoking" areas.

10. Material is not transported from a land-based vehicle unless the parking brake is securely set, wheels blocked as required, and all other reasonable precautions have been taken to prevent motion of the vehicle.

11. Transportation vehicles are provided with at least one 20-B:C rated fire extinguisher, or two 10-B:C rated fire extinguishers, or one 2A-20B:C rated fire extinguisher.

12. Extinguishers are maintained in good operating condition (See Section D.1, "Portable Fire Extinguishers") and are accessible in the vehicle.

13. Material containers used in transportation are chemically compatible with the material being transported.

14. Transportation vehicles, except in an emergency situation, are not parked and left unattended adjacent to any building, street, highway, avenue, alley, water way, pier, wharf, or harbor facility that is not connected with the normal duties of the vehicle.

15. Vehicles used for transporting explosive materials are not exposed to spark producing surfaces on the inside of the transporting body.

16. Explosive materials are not transported through any prohibited vehicular bridge, roadway, or elevated highway.

E.7 Clean Rooms

1.0 SCOPE

This procedure provides the fire protection requirements for clean rooms. A clean room is a controlled environment facility in which all incoming air particulates, room temperatures, pressures, and humidity are strictly regulated. The scope of this procedure also requires compliance with NFPA 318 and FM Data Sheets FM 1-56, "Clean Rooms," and FM 7-7, "Semiconductor Plants."

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. The interior finish of clean rooms has a flame spread rating of 25 or less and a smoke development of 50 or less in accordance with American Society for Testing and Materials (ASTM) E-84, *Test Method for Surface Burning Characteristics of Building Materials*.

2. Carpet and flooring used in clean rooms has a minimum average critical radiant flux of 0.45 W/cm^2 when tested in accordance with ASTM E-648, *Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source*.

3. Clean rooms are constructed of fire resistive or noncombustible construction and are separated from other occupancies by a minimum 1-hour fire rated construction.

4. All piping, duct work, and cables passing through fire rated construction are fire stopped or wrapped with the appropriate materials for the penetration rating. Fire dampers shall not be installed in exhaust ventilation systems.

5. Clean rooms are subdivided by 1-hour fire rated partitions into the smallest areas possible to limit damage from fire. The largest individual clean room should not exceed 10,000 ft^2.

6. Clean rooms have an engineered smoke control system designed to exhaust 100% air in the fire area and simultaneously provide areas adjacent to the fire area with a 100% supply. This will ensure that at least a 0.20-in. water gauge higher pressure is provided in the adjacent areas.

7. Bench stations handling flammable, combustible, or corrosive materials are provided with ventilation hood systems.

8. Bench stations and hoods are made of noncombustible materials.

9. Ducting in ventilation systems are made of noncombustible materials or of materials that have a flame spread of 25 or less and smoke development of 50 or less.

10. All electrical equipment and wiring complies with NFPA 70.

11. Sprinkler protection is provided throughout the clean rooms, including under work benches and under exhaust hood systems.

12. Automatic smoke detection and alarm systems are provided throughout clean rooms.

13. Smoke detection is provided on a 200 ft^2 maximum spacing due to high air flows associated with clean rooms.

14. Smoke detection sounds internal evacuation alarms, actuates the smoke control system, and signals emergency fire department personnel.

15. CO_2 or sprinkler systems are provided for under-floor spaces over 5,000 ft^3 where the space contains power, communication, or data cables that are not located in approved conduit or metallic tubing.

16. HEPA filters used in clean rooms are UL listed.

17. HEPA filters and ducts are inspected frequently, and filters are cleaned or replaced on a regular schedule.

18. HEPA filters are not patched or plugged to improve their efficiency as this action adversely affects their fire resistance.

19. Exiting from clean rooms complies with NFPA 101.

20. Combustible or flammable liquids and corrosive liquids are limited to a 1-day supply in a clean room and are stored in approved safety containers. A maximum 10-day supply of combustible or flammable liquids and corrosive liquids may be located in a clean room provided they are stored in an approved noncombustible storage cabinet or locker. Separate all other combustible or flammable and corrosive liquids from the clean room by 1-hour fire rated construction.

21. Flammable gases used within clean rooms should have the supply cylinder or bulk tanks located outside the clean room separated by 1-hour fire rated construction.

22. All process and production areas are kept clean and free of all combustible materials such as cartons, papers, and packaging materials.

23. Portable fire extinguishers are provided per NFPA 10.

24. Detailed emergency procedures are posted in the clean room. Procedures should included instructions for shutting off all hazardous gases, maintaining fume exhaust systems, and sounding an evacuation alarm. Personnel should be trained in the emergency procedures.

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E.8 Laboratories

1.0 SCOPE

This procedure provides the fire protection requirements for laboratories. The scope of this procedure also requires compliance with the applicable sections of NFPA 45l.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Limit the quantity of hazardous chemicals stored in an open laboratory work area to the amount required for the specific task being performed.

2. Incompatible materials are segregated to prevent accidental contact with one another.

3. Containers of materials that may become hazardous over time are dated and inspected every 6 months to evaluate their condition. Materials that are safe may be redated, and those that can be made safe by treating them may be treated and redated. Safely discard all other materials.

4. Pressure relief systems discharge to a safe location.

5. All permanent piping is identified (as to its contents) at the supply and discharge points.

6. Operating controls for apparatus are accessible under normal and emergency conditions.

7. Entrances to laboratory units or areas are identified with signs to warn emergency personnel of unusual or severe hazards that are not related to the fire hazard of contents.

8. Documented monthly housekeeping inspections are performed for each laboratory, and corrective action is initiated immediately to resolve identified deficiencies.

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E.9 Pyrophoric Materials

1.0 SCOPE

This procedure provides the design and operation requirements, and responsibilities where pyrophoric materials and combustible metals are stored, processed, or handled. For the purpose of this scope, a pyrophoric material is a material that ignites spontaneously when exposed to air. The scope of this procedure also requires compliance with the following standards as applicable:

NFPA 68, "Explosion Venting"
NFPA 69, "Explosion Prevention Systems"
NFPA 325M, "Fire Hazard Properties of Flammable Liquids, Gases, and Volatile Solids"
NFPA 480, "Storage, Handling, and Processing of Magnesium"
NFPA 481, "Production, Processing, Handling, and Storage of Titanium"
NFPA 482, "Production, Processing, Handling, and Storage of Zirconium"
NFPA 651, "Manufacture of Aluminum and Magnesium Powder"

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. The appropriate extinguishing agents are used where pyrophoric materials and combustible metals are processed, stored, or handled. Most pyrophoric materials react violently with water, foam agents, halogenated agents, and CO_2. Some combustible metals cannot be extinguished with water and require special extinguishing powders (for Class D fires) or special inerting gases.

2. Processes involving pyrophoric materials are performed in an enclosed oxygen free, oxygen deficient, or inerting atmosphere that is moisture controlled (dry).

3. Whenever inert gas systems are used, a reserve supply of gas is available for emergency use.

4. Ordinary combustible materials, such as paper, wood, cartons, or packing material are not stored or allowed to accumulate near processes where pyrophoric materials and combustible metals are handled.

5. Smoking and uncontrolled use of open flames are prohibited where materials are processed, stored, or handled. Areas shall be clearly posted with "No Smoking" signs.

6. Nonsparking tools are used when handling combustible metal powders.

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E.10 Portable Structures

1.0 SCOPE

This procedure provides the fire protection requirements for portable structures.

2.0 REQUIREMENTS

Management shall ensure that:

1. The placement and use of all portable structures is reviewed by Fire Protection Engineering.

2. Portable structures comply with DOE/EV-0043, *Standard on Fire Protection for Portable Structures*, when any one of the following conditions exist:

   a. Creates a life hazard

   b. Endangers the public or environment

   c. Replacement value (structure and contents) exceeds $250,000

   d. Is vital to a DOE program.

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E.11 Hazardous Material Storage

1.0 SCOPE

This procedure provides the design and operation requirements, and responsibilities for hazardous material storage. Hazardous materials can include flammable and combustible liquids, gases, corrosives, oxidizers, water reactives, and radioactive materials. The scope of this procedure also requires compliance with the following standards as applicable:

NFPA 30, "Flammable and Combustible Liquids Code"
NFPA 43A, "Storage of Liquid and Solid Oxidizers"
NFPA 43B, "Storage of Organic Peroxide Formulations"
NFPA 43C, "Storage of Gaseous Oxidizing Materials"
NFPA 58, "Storage and Handling of Liquefied Petroleum Gases"
NFPA 59A, "Production, Storage, and Handling of Liquefied Natural Gas"
NFPA 231, "General Storage"
NFPA 231C, "Rack Storage of Materials"
NFPA 491M, "Hazardous Chemical Reactions"
NFPA 704, "System for Identification of the Hazards of Materials"

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Hazardous material storage is separated by minimum distances from other facilities and personnel areas.

2. Incompatible hazardous materials in the same building are separated by suitable fire rated construction. A material that is incompatible with another is a material that can cause hazardous reactions or can promote or initiate combustion with the material. Examples of materials that require separation between each other are flammable and combustible liquids, corrosive materials, oxidizers, and water reactives.

3. Incompatible hazardous materials stored outside of buildings are separated from one another by minimum distances.

4. Hazardous materials are stored in the appropriate containers.

5. Hazardous material storage areas and buildings are provided with containment for liquid run-off control.

6. Hazardous material storage buildings and aboveground tanks are provided with fire protection.

7. Hazardous materials that may cause environmental damage in a fire are located in separate hazardous material containment buildings or tanks.

8. Separate hazardous material containment buildings are provided with fire sprinkler systems or other approved fire protection control and extinguishing systems.

9. Accumulation of combustible materials such as cartons, papers, and packaging materials is prohibited in and around hazardous material storage.

10. Weeds or similar combustibles are not permitted within 15 ft of hazardous material storage areas.

11. Portable fire extinguishers in hazardous storage buildings are provided for the appropriate hazard per NFPA 10.

12. Personnel involved in hazardous material operations receive instructions in handling the materials in a safe manner.

13. Smoking is not permitted in or near hazardous storage areas.

14. Storage facilities are not used as dispensing facilities.

E.12 Hydrogen Systems

1.0 SCOPE

This procedure provides the design and operation requirements, and responsibilities for the prevention of hydrogen fires where hydrogen is handled, stored, used in piping or in a process, discharged through valves into pressure containers, or flowing out of containers through nozzles. The scope of this procedure also requires compliance with the following standards as applicable:

NFPA 50A, "Gaseous Hydrogen Systems at Consumer Sites"
NFPA 50B, "Liquefied Hydrogen Systems at Consumer Sites"
NFPA 77, "Static Electricity"
49 CFR 100-199, "Transportation"
Compressed Gas Association Publications

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Gas or liquid hydrogen is stored in approved containers equipped with pressure relief devices.

2. Piping, tubing, fittings, valves, gauges, and regulators in hydrogen systems are suitable for hydrogen service.

3. Hydrogen storage is not permitted inside buildings other than in separate, specially designed buildings or rooms.

4. Storage containers, piping, valving, regulating equipment, and other accessories are readily accessible to authorized personnel and emergency fire department apparatus and are protected against physical damage.

5. Hydrogen systems are electrically bonded or grounded before discharging hydrogen.

6. Legible instructions are maintained at locations that require operation of hydrogen equipment by the user.

7. A qualified person is in attendance at all times when mobile hydrogen supply equipment is unloading hydrogen.

8. Each hydrogen system installed is inspected annually and maintained by qualified personnel.

9. Weeds or similar combustibles are not permitted within 15 ft of gaseous hydrogen system equipment or within 25 ft of liquefied hydrogen system equipment.

10. Personnel using hydrogen and hydrogen equipment are provided documented training on the fire hazards associated with hydrogen, e.g., the flames are practically invisible.

E.13 Records Storage

1.0 SCOPE

This procedure provides the design and operation requirements, and responsibilities for fire protection of records storage. This procedure does not consider requirements that may be part of a security program needed to prohibit forcible entry. The scope of this procedure also requires compliance with the following standards as applicable:

NFPA 232, "Protection of Records"
NFPA 232AM, "Archives and Record Centers"
NFPA 910, "Libraries and Library Collection"
36 CFR, Chapter XII, "Records Management"

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Vital and important records (as defined by NFPA 232) are protected against fire.

2. Records that can be reproduced are duplicated and stored away from the originals so they will not be subject to the same fire incident.

3. Vital and important records are located and stored in noncombustible buildings protected with automatic sprinklers.

4. Areas that provide storage of vital and important records are provided with smoke detection systems.

5. Appropriate fire extinguishers are provided for record storage vaults, file rooms, and record storage areas.

6. Good housekeeping, orderliness, and maintenance of equipment are provided for record storage areas.

7. Record storage areas are posted as "No Smoking" areas.

8. File rooms and storage vaults are not used as working spaces.

9. Persons other than those authorized to handle records are not permitted in file rooms and record vaults.

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E.14 Aircraft

1.0 SCOPE

This procedure provides the requirements for the design, operation, and responsibility of protecting aircraft fueling facilities and hangars. The scope of this procedure also requires compliance with the following standards as applicable:

NFPA 77, "Static Electricity"
NFPA 407, "Aircraft Fuel Service"
NFPA 409, "Aircraft Hangars"
NFPA 410, "Aircraft Maintenance"
NFPA 415, "Aircraft Fueling Ramp Drainage"

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. When a fire suppression system is required, the system shall comply with NFPA 16.

2. In hangars housing aircraft having wing areas in excess of 3,000 ft^2, provide supplementary low-level fixed aqueous film-forming foam (AFFF) oscillating monitor nozzle systems in the main hangar area.

3. Foam concentrate tanks, proportioning equipment, and deluge valves shall be separated from main hangar areas by construction having a minimum 1-hour fire resistance rating.

4. Office areas located in hangar buildings shall be separated from main hangar areas by construction having a minimum 1-hour fire resistance rating.

5. Automatic wet-pipe sprinklers are provided in all areas of the hangar facility not provided with overhead AFFF sprinkler protection.

6. All hangars are provided with floor drains to accommodate liquid run-off from fire systems or spills.

7. Drainage systems are flushed thoroughly with high volumes of water at least annually, to ensure their operability.

8. Light and electrical fixtures in the main hangar area are rain tight.

9. Operation instructions for fire protection are permanently posted at each monitor nozzle station and at each manual deluge activation station.

10. Portable and wheeled fire extinguishers are provided in the main hangar areas and at fuel servicing locations per NFPA 10.

11. "No Smoking" signs are posted throughout main hangar areas and at aircraft fuel servicing locations.

12. Emergency fuel shutoff and electrical bonding systems are provided at all fueling locations.

13. Aircraft fuel servicing is done outdoors.

14. Only authorized personnel, trained in the safe operation of aircraft fuel servicing systems and their emergency controls, fuel and defuel aircraft.

15. Emergency fuel shutoff devices are inspected and tested at least every 3 months.

16. Aircraft fueling hoses are inspected daily before use. At least once a month the hoses shall be completely extended and inspected.

17. Fueling hoses are hydrostatically tested when signs of flattening, kinking, sharp bending, or crushing by a vehicle are indicated.

E.15 Lightning

1.0 SCOPE

This procedure provides the design and operation requirements, and responsibilities for lightning protection. The scope of this procedure also requires compliance with the following standards as applicable:

NFPA 70, "National Electric Code"
NFPA 78, "Lightning Protection Code"
FM 5-11, "Lightning Protection"

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Lightning protection systems are provided for facilities that handle, process, or store radioactive materials, explosives, or similarly hazardous materials; buildings containing high value equipment; and structures having a severe lightning risk value per NFPA 78, Appendix I.

2. Electric power and communication services to all facilities and underground power cables, where connected by overhead power distribution lines, have lightning and surge protection.

3. All lightning protection systems are maintained.

4. All lightning protection systems are visually inspected per NFPA 78, Appendix B, annually.

5. Complete in-depth testing and inspections per NFPA 78, Appendix B, are performed every 3 years on critical systems providing lightning protection for facilities involving radioactive or explosive materials.

6. Inspection and maintenance procedures are in place for personnel performing lightning protection system maintenance and inspections.

7. Inspection and maintenance records of the lightning protection systems are documented and maintained for auditing purposes.

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E.16 Explosion Proof Electrical

1.0 SCOPE

This procedure provides the design and operation requirements, and responsibilities for explosion proof electrical installations. The scope of this procedure also requires compliance with the applicable NFPA standard addressing the specific operation or process, as well as the following standards:

NFPA 70, "National Electrical Code"
NFPA 493, "Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1 Hazardous Locations"
NFPA 495, "Explosive Material Code"
NFPA 496, "Purged and Pressurized Enclosures for Electrical Equipment"
NFPA 497A, "Classification of Class I Hazardous Locations for Electrical Installations in Chemical Process Areas"
NFPA 497B, "Classification of Class II Hazardous Locations for Electrical Installations in Chemical Process Areas"
NFPA 497M, "Classification of Gases, Vapors, and Dusts for Electrical Equipment in Hazardous Locations"

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Explosion proof electrical equipment of the proper classification is provided in locations where flammable vapors, liquids, gases, or combustible dusts or fibers may be present in concentrations sufficient to produce explosive or ignitable mixtures.

2. All explosion proof electrical equipment used is UL listed or FM approved for use in the appropriate hazardous atmosphere.

3. No alterations or modifications are made to listed or approved equipment for hazardous locations. If modifications are made, the equipment shall be void for use in a classified hazardous location.

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E.17 Lasers

1.0 SCOPE

This procedure provides the design and operation requirements, and responsibilities for laser operations. The scope of this procedure also requires compliance with the following standards as applicable:

NFPA 70, "National Electrical Code"
American National Standards Institute ANSI/Z136.1, *Safe Use of Lasers*

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. All class lasers and laser systems have protective housings, interlocks, circuit breakers, insulation, switching devices, and the appropriate affixed warning labels.

2. When a high-valued laser system is located in a building, the building is protected by automatic fire detection and fire sprinkler systems.

3. All electrical equipment is installed in accordance with NFPA 70.

4. All laser system frames, enclosures, and other accessible non-current-carrying metallic parts are grounded.

5. Lasers and laser systems are operated and maintained only by authorized employees.

6. Employees involved with lasers and laser systems are properly trained.

7. Procedures are developed for the proper installation and use of all laser systems.

8. Beam target areas of Class IV lasers (per ANSI Z136.1) are free of combustible and flammable materials.

9. Lasers using flammable liquids are provided with effective means of controlling liquid fires.

10. Experimental lasers that (1) are not listed or approved for use in classified hazardous locations and (2) have unique electrical components are provided with the necessary precautions to control all fire hazards.

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E.18 Paint Spray Operations

1.0 SCOPE

This procedure provides the general requirements for the spray application of flammable and combustible materials. The scope of this procedure also requires that the design, installation, and protection of spray application systems comply with the following standard:

NFPA 33, "Spray Application Using Flammable and Combustible Materials"

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Spray operation areas are provided with continuous mechanical ventilation systems that are adequate to confine overspray and keep concentrations of flammable vapors below 25% of the lower flammable limit.

2. Spray areas are protected with an approved automatic fire protection system.

3. Procedures are established to ensure the following.

    a. Collection filters are replaced before there is an excessive restriction in air flow, and used filters are disposed of at a location detached and outside of the building or in a water-filled metal container.

    b. Overspray at the work area, in the plenum behind the filters, and in the exhaust duct is cleaned. (The cleaning solvent should have a flashpoint above 100 °F except for cleaning spray nozzles.)

    c. Rags and waste impregnated with overspray are disposed of in approved metal containers.

4. "No Smoking" signs are posted in spray areas and paint storage rooms.

5. Employees involved with the spray operations receive instruction in potential safety and health hazards, and operational and emergency procedures.

6. The quantity of flammable and combustible liquid stored in the vicinity of spray operations is in accordance with the requirements in C.5, "Flammable and Combustible Liquids."

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E.19 Dormitories

1.0 SCOPE

This procedure provides requirements for DOE-owned and -leased dormitories. The scope of this procedure also requires compliance with the applicable sections of NFPA 70.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Dormitories are designed in accordance with NFPA 101.

2. Dormitories over 20,000 ft^2 are provided with 2-hour fire separation barriers, so no single fire area exceeds this size.

3. Nonmetallic sheathed cable is not used in steel stud partitions or concrete construction.

4. Dormitory exits are maintained in accordance with Section D.3, "Building Exits."

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E.20 Decommissioning of Facilities

1.0 SCOPE

This procedure provides the fire protection requirements for facilities being decommissioned. The scope of this procedure also requires compliance with the applicable sections of NFPA 241.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Fire suppression systems are maintained operable to the extent possible during decommissioning activities.

2. During cold weather operations, provide temporary heating equipment for the facility so installed sprinkler systems can be maintained operable.

3. If operations require the use of explosives, provide at least two 1 1/2-in. hose lines, or one 2 1/2-in. hose line, at the immediate vicinity of the site during the actual detonation.

4. Electrical service is reduced to the minimum required for decommissioning, and all energized circuits are clearly identified.

5. Smoking is prohibited throughout the decommissioning area.

6. Flammable and combustible liquids are removed from the facility before any demolition is initiated.

7. A means for emergency notification is provided at the decommissioning area.

8. Free and unobstructed access is maintained at the decommissioning area for emergency response vehicles.

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E.21 Combustion Controls

1.0 SCOPE

This procedure provides the fire protection requirements for boilers, ovens, and furnaces.

2.0 REQUIREMENTS

Management shall ensure that the following are accomplished.

1. Boilers, ovens, and furnaces are designed in accordance with the applicable NFPA standards.

2. The equipment is started using only the igniters designed for the equipment.

3. All systems are provided with basic interlock systems to prevent improper operation of the equipment and to limit actions to those prescribed for the proper operating sequence.

4. All systems are provided with automatic safety features that prevent the systems from approaching an undesirable or unstable operating condition.

5. All interlock and automatic safety systems have audible and visual annunciation to indicate abnormal conditions.

6. All interlock and automatic safety systems are placed on a regular testing schedule to ensure they function as intended. Report and correct any defects identified and document the repairs.

7. All equipment have normal and emergency operating procedures in place, and the procedures are reviewed regularly to ensure they are current.

8. All operators receive formal training so they are prepared to operate the equipment safely and efficiently.

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APPENDIX F

FIRE DEPARTMENT OPERATIONS AND EMERGENCY RESPONSE--SAMPLE PROCEDURES

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APPENDIX F

FIRE DEPARTMENT OPERATIONS AND EMERGENCY RESPONSE--SAMPLE PROCEDURES

C - PERIODIC RESPONSIBILITIES AND DUTIES

I. PURPOSE

A. To define the periodic duties and responsibilities of the members of the department.

B. To divide the duties among the three platoon shifts and the Testing and Services (T&S) personnel.

I. GENERAL INFORMATION

A. Certain areas of the fire stations, and the department vehicles and equipment are divided into three groups. Each platoon is responsible for one group as their responsibility. Groups are rotated every 6 months. Some functions are assigned to individuals on a permanent basis.

III. ROTATING GROUP ASSIGNMENT SCHEDULES

Period	'A' Platoon	'B' Platoon	'C' Platoon
3/1/91-9/1/91	1	2	3
9/1/91-3/1/92	2	3	1
3/1/93-9/1/93	3	1	2
9/1/93-3/1/94	1	2	3

IV. GROUP 1 ASSIGNMENT RESPONSIBILITIES

A. All stations

1. Alarm room, all offices, hose tower, hose storage and breathing air compressor room, boiler room, equipment storage room, and emergency generator room.

2. Hose on assigned equipment.

B. Station A

1. Engine 1, T-1, lawn mower.
2. 185-N hydrant hose boxes.

C. Station B

1. Engine 2, T-2, Unit 1 and Unit 2, lawn mower.
2. Jaws on E-2 (HO-30-3977).

D. Station C

1. Engine 3, T-3
2. Jaws on E-3 (HO-30-3960)

E. Station D

1. Engine 4, T-4, and jaws (HO-30-5033)

V. GROUP 2 ASSIGNMENT RESPONSIBILITIES

A. All stations

1. All bathrooms, bedrooms, hallway, shop, storage rooms, warehouses, and outside grounds.

2. Hose on assigned equipment.

3. All station ladders (fixed and portable).

B. Station A

1. Engine 11, T-11, Unit 11, slip-in pump (HO-49-8085).

C. Station B

1. Engine 22, Unit 3, and HAZMAT 1.

D. Station C

1. Engine 33, HAZMAT 3, portable pump (HO-49-15819), Unit 31, slip-in, ambulance 3, auxiliary pump HO-49-18639.

E. Station D

1. Engine 44 and ambulance 4

VI. GROUP 3 ASSIGNMENT RESPONSIBILITIES

A. All stations

1. Kitchen, dining and squad room, and apparatus room.
2. All hose in hose racks, including warehouse.

B. Station A

1. Ambulance 1 and ambulance 5, S-1 auxiliary pumps 49-18678 and 49-15818.

2. All hose in hose rack and warehouse.

C. Station B

1. Ambulance 2, Unit 21, and slip-in pump (HO-49-5523), portable pump, Attack 1 and portable generator (HO-74-5821), chlorine tank trailer, U-3

2. All hose in hose racks.

D. Station C

1. Portable pump (HO-59-18679), Unit 31, and slip-in pump (HO-49-5086), T-33

E. Station D

1. Mobile air 1 and auxiliary generator (HO-74-5609), MX-4, Unit 41, and slip-in pump (HO-49-5087)

2. Hose in hose rack

VII. SPECIAL RESPONSIBILITY ASSIGNMENTS

A. Testing and Services (all stations)

1. All T&S vehicles

2. T&S managers will schedule maintenance and repairs on the above vehicles and on U-1, U-2, and U-4.

B. "A" Platoon (all stations)

1. Maintain laundry and dry cleaning records.

2. Care and upkeep of the foam generator assigned to the 100 Area Fire Station (HO-50-15802).

C. "B" Platoon (all stations)

1. Maintain all hose records. This includes any necessary revisions to maintain accurate and current records.

2. Make history card records for all hose.

3. Care and upkeep of foam generator assigned to Station 2 (HO-50-1927).

D. "C" Platoon (all stations)

1. All station filing, as needed.

VIII. VEHICLE REPAIR AND MAINTENANCE

A. The battalion commander, or delegate, will normally schedule vehicle repair or maintenance work for all platoon vehicles.

B. T&S officers will schedule vehicles assigned to their group.

C. Fire Department Maintenance Request forms must be completed and accompany each vehicle.

IX. STATION MAINTENANCE

A. Station repair and maintenance will be handled by T&S planners north of the Wye Barricade and by the T&S captain south of the Wye Barricade.

B. Maintenance Request forms must be submitted to the above individuals to schedule repair activity.

X. ANNUAL ACTIVITIES (ALL STATIONS)

A. Perform building tours in all facilities requiring annual inspections.

B. Perform hydrant flow testing during March and April.

C. Inspect and winterize hydrants during September and October.

D. Perform annual service test on all apparatus during the month of May. Reports are then forwarded to the deputy chief. An annual service test log for all equipment will be maintained in each station.

E. Test hose in racks during the last 2 weeks of April and first 2 weeks of May.

F. Test all other fire hose during May and June.

G. Test all portable ladders in June (officers conduct test; training officer coordinates).

H. Test all telesquirt ladders in June (performed by offsite vendor; training officer coordinates).

XI. SEMIANNUAL ACTIVITIES (ALL STATIONS)

A. Perform building tours in all facilities requiring semiannual inspections.

B. Rotate station and equipment assignments on March 1 and September 1.

1. Immediately after rotation of responsibilities, all rooms, walls, and floors are to be thoroughly cleaned.

2. Immediately after rotation, a thorough vehicle equipment inventory will be conducted by the responsible shift against the inventory listed for that vehicle. All equipment must be listed in alphabetical order on the back of the equipment inventory sheet along with the appropriate compartment (RF = right front, LF = left rear, etc.). All shortages will be noted and referred to the training officer. Any inventory revision will require deputy chief or training officer's approval. Complete inventory sheets are to be attached to the driver's door.

C. Check any first aid kits in suppression vehicles. Ensure they are complete and replace old or outdated material.

D. Wash and wax all equipment following 6-month assignment rotation.

E. The shift on duty in each station will inspect the fire barriers on March 1 and October 1.

1. The inspecting shift will document this inspection on the appropriate form.

XII. MONTHLY DUTIES

A. Each month

1. Shift officer conducts safety and security meetings, including filling out the documentation form for the meeting. Send a copy of the form to the training department.

B. First part of each month

1. Perform safety inspection of all stations.
2. Check fire extinguishers in all stations and document.

C. First monthly duty day (all stations)

1. Telesquirt maintenance and records to be completed by responsible platoons.

2. All drivers licenses will be checked, including state and government documents.

3. Each platoon will check their bunker gear, fill out the appropriate form, and submit it to their shift officer for filing. Any off-standard condition must be reported to the battalion commander on duty.

4. Assigned platoon checks fixed and portable ladders.

    a. Document on appropriate form. Check off sticker on beam of portable ladders; replace sticker if necessary.

5. Wash windows in assigned areas, inside and out.

D. First Sunday each month

1. Make full operational inspection of all masks by putting masks in service. Document on card.

2. Check all portable radios assigned to platoon against the master station list and send to the headquarters clerk for corrections and filing. The clerk will update the inventory and send a copy to the stations for posting. Missing radios or changes must be reported to the battalion commander immediately.

3. Perform monthly inspections on hazardous materials suits.

4. Pocket alarm dosimeter instruments (PADI) are to be tested by platoon on duty. T&S personnel will test their own units.

E. Second Sunday each month

1. Batteries for portable headset radios in HAZMAT-1 will be tested and replaced if needed.

2. Two-way head sets on each tanker will be tested and replaced, if needed.

3. Check all batteries on equipment if they are not the maintenance-free type, and check emergency power plants.

4. Recharge lanterns, weather station, and explosion meter on HAZMAT units by plugging into a power source. This equipment should not be charged for more than 12 hours except when it has been used and needs recharging.

5. Discharge all SL-20 flashlights and recharge.

6. Inventory all keys assigned to platoon.

F. First monthly Saturday and Sunday

1. Responsible platoons to strip, when necessary, and clean and

wax floors in assigned station area.

G. First Tuesday each month

1. Run emergency generators for 7 minutes at Station 1

2. Record liquid petroleum gas level before and after test. Notify Fire Department clerk if liquid petroleum gas is low (below 50%).

H. First Wednesday each month

1. Inventory ambulances

I. Last Friday of each month

1. Check first aid kits on T&S vehicles.

2. Check all equipment for lubrication and Class A due dates. Give information to T&S officer.

J. Last Saturday of each month

1. Check all equipment for lubrication and Class A due dates. Send completed sheets to battalion commanders.

XIII. WEEKLY DUTIES

A. Each Sunday

1. Visually inspect all masks. Document on records.

2. Roll and rack dry hose in tower. Graphite 2 1/2-in. couplings.

3. Check all breathing air bottles for adequate air supply. Refill, if necessary. NOTE: Minimum air pressure for high pressure cylinders is 4,200 psi.

4. Empty, wash out, and refill water and ice containers on tankers and power wagons during usage months (normally March through September).

5. After 1,500 hours, prepare soiled uniform and bedding laundry for vendor pickup.

6. Inventory station supplies (all stations). Send order to department clerk.

7. Mop and buff floors in assigned areas.

B. Each Monday

1. Station 2, fold and properly store laundry.

2. Check and air all tires; visually ensure all lug nuts are in place and tight.

3. Dip fuel tanks and record on fuel disbursement log. Inventory credit cards. Deliver paperwork to Fire Department clerk by 8:30 a.m. on Tuesday.

4. Log liquid petroleum gas percentage from tanks at 100 and 200 Stations.

5. Inspect satellite accumulation areas and log the inspection.

6. The eyewash stations in Fire Stations 1 and 3 are to be inspected each Monday evening.

C. Each Tuesday

1. Stations 1 and 4 fold and properly store laundry.

2. Station 3, check emergency gate operation. If problems are found, notify Security.

D. Each Wednesday

1. All stations prepare uniform laundry and bedding for Thursday pickup.

2. Weather permitting, move all apparatus out of the station and run at ~1,000 rpm until engines come up to normal temperature.

3. Flush apparatus floor and ramps.

4. Assigned platoon cleans warehouses and maintains them in a neat and orderly manner.

5. Clean locker tops and light fixtures.

6. Check filter masks on tanker equipment. Obtain replacements from shop technician, if needed. Ruptured bags must be checked by Health Physics.

E. Each Thursday

1. Clean kitchen cupboards, stove, counter tops, oven, and air filters. Wash out garbage containers. Scrub and clean showers.

F. Each Friday

1. Stations 2 and 3 fold towels. Properly store in assigned location.

2. T&S personnel clean assigned vehicles.

3. Dry cleaning to be checked by name and payroll number. Note and report discrepancies, including repairs.

G. Each Saturday

1. Weather permitting, move all apparatus out of the station and run at ~1,000 rpm until engines come up to normal temperature. All specialized equipment such as the chemical truck, HAZMAT vans, and attack truck are to be driven to ensure reliability.

2. Run and check all motors on equipment. This includes portable pumps, power plants (including power plant on HAZMAT 2), tankers, foam generators, and the K-12.

3. Mow lawns.

4. Water lawns after mowing, and water trees.

5. Operate and check AC converters on equipment and jaws.

6. Mop and buff floors in assigned station areas.

7. When assigned, flush apparatus floors and ramps.

8. Operate and check all discharge and intake valves, water governors, changeover valves, and telesquirt ladders.

XIV. DAILY ACTIVITIES

A. Before 7:30 a.m., off-going platoons clean the offices and kitchen areas and make them presentable for the days' business activities. Each shift must leave the station clean and neat for the oncoming shift. This includes sweeping or mopping; emptying wastebaskets; and dusting desks, file cabinets, and associated furnishings, if needed. Remove sheets and make up beds.

B. Incoming shift stores personal belongings neatly (nothing on beds).

C. Check radios, inventories, and vehicle fuel levels. The battalion commander should be informed of any maintenance needs.

D. Perform radio check with hospital on the following schedule:

Monday - A-1	Tuesday - A-2	Wednesday - A-3
Thursday - A-4	Friday - A-5	

E. Check personal alert safety system (PASS) alarms. Report deficient units to shift officer.

F. Officer on duty will make daily assignments, read current clipboard material, and pass on any other pertinent information.

G. Ice water jugs on tankers and power wagons (during grass fire season).

H. Clean and mop squad and dining rooms, kitchens, bedrooms, and bathroom floors.

I. Mop any other station floors, as needed.

J. Damp mop ambulance floors following shift change (and also after response, if needed).

K. Bleed water accumulation from air tanks on equipment having compressors.

L. Run and check mounted motors.

M. Water lawn as needed.

N. Wash and sweep Units 1, 2, 3, and 4, as needed.

O. Maintain station and equipment in ready for emergency response.

H - NOTIFICATION OF ABSENCES

I. PURPOSE

A. To establish the proper method of notifying the Fire Department because of absence.

B. To establish a uniform criteria for documenting the reason for absence.

C. To provide criteria for absence due to voluntary community firefighting.

II. RESPONSIBILITY

A. All fire department personnel are expected to maintain and promote good work habits regarding work attendance and productivity.

B. All fire department members are responsible for properly notifying their immediate supervisor of an absence.

1. This will include personal business (E) time.

C. The on-duty shift officer is responsible for receiving absence reports and for passing such information to the oncoming duty officer and battalion commander.

D. The shift officers are responsible for noting absences in the logbook and completing the Reason for Absence form.

E. The oncoming battalion commander is responsible for tallying an absence report for the department and for passing that information to the chief.

III. NOTIFICATION

A. All fire department members must report absences in sufficient time to allow their officer to arrange for a replacement, when necessary.

1. Platoon firefighters should call by 7:00 a.m. to report an absence.

2. T&S firefighters should call by 6:50 a.m., using a T&S phone number.

If absences are to be for a prolonged period of time, the employee must keep the officer informed as to the firefighter's status and expected return date.

IV. DOCUMENTATION

A. To fairly and evenly account for personal business and personal illness absence time, the Fire Department will adopt minimum requirements for completing the Reason for Absence form.

B. The form will be completed for each of the above mentioned absences.

1. The form, when completed, will be sent to the battalion commander for review.

2. Following the review, the form will be sent to Central Files at Fire Department headquarters.

C. In a personal illness, the following questions will be answered and recorded in the remarks section:

1. Was a physician visited?

2. Is there prescription medication being taken? If yes, does the medication limit work activities?

3. Are there any residual signs or symptoms of the illness that could limit work activities?

D. The form should be filled out by the immediate supervisor in the presence of the employee in a short meeting reserved for that purpose.

E. Failure to fill the form out correctly limits the ability of the supervisor to manage his employees safely and in a productive manner.

V. VOLUNTEER EMERGENCY SERVICE

A. Fire Department personnel who are actively involved in volunteer emergency services, such as a volunteer fire department, will not be granted absence time.

K - EMERGENCY RESPONSE PROCEDURE

I. PURPOSE

A. To provide consistent and safe personnel preparation for response to emergency events.

B. To acknowledge and reinforce certain incident safety requirements specified in NFPA 1500.

C. To endorse a system of incident command and specify a set of hazardous materials operational procedures.

II. SCOPE

A. This procedure applies to all Fire Department personnel involved in emergency response activities.

III. SPECIFICATIONS FOR PERSONNEL

A. Boarding requirements

1. On station receipt of an alarm, firefighters should respond directly to assigned positions on the apparatus.

2. Bunker gear may only be donned while standing on the apparatus bay floor. Bunker boots, pants, and helmets with eye protective face shields are required before boarding. Bunker coats may be worn at the discretion of each firefighter and must be donned either before boarding or on arriving at the scene. If the firefighter decides not to wear full bunker gear until arriving at the scene, the individual is responsible for ensuring all gear is secured. Engine drivers are exempt from wearing bunker gear during responses.

3. It is mandatory that all members, either riding or driving, buckle their seat belts before the vehicle moves. A thumbs up indication from the back seat to the cab signals a member's readiness. The engine operator and officer will work as a team to verify that back seat personnel give a thumbs up indication. Only after receiving this signal will the engine operator place the vehicle in motion.

4. Vehicles must be operated in accordance with standard emergency vehicle accident prevention safe practices.

IV. SPECIFICATIONS FOR PROTECTIVE CLOTHING AND RESPIRATORY PROTECTION

A. Use protective clothing and equipment whenever a potential exists for exposure to the hazards for which they are provided. It is required that full protective clothing--which includes coats, trousers, helmets with face shields, gloves, boots, and hoods--be worn at all times when involved in or exposed to the hazards of structural firefighting. Protective clothing requirements for other situations will be determined by the shift officer, based on the conditions encountered.

B. During grass firefighting activities, yellow jumpsuits, helmets with face shields, gloves, and bunker boots will be worn. Bunker pants and coats may be worn as a backup when a jumpsuit is unavailable.

C. Provide a self-contained breathing apparatus (SCBA) to be used by all personnel working in areas where the atmosphere

- Is hazardous
- Is suspected of being hazardous
- May rapidly become hazardous.

D. In addition to the above, provide all personnel working inside any confined space with an SCBA. Have them use an SCBA unless the safety of the atmosphere can be established by testing and be continuously monitored.

E. The required use of an SCBA means that the user must have the facepiece in place, breathing air from the SCBA only. Wearing an SCBA without the facepiece in place does not satisfy this requirement and should be permitted only under conditions in which the immediate safety of the atmosphere is ensured. All members working in proximity to areas where SCBA use is required should have an SCBA on their backs or immediately available for donning.

1. Areas where the atmosphere can rapidly become hazardous could include rooftop areas during ventilation operations and areas where an explosion or container rupture could be anticipated.

2. A hazardous atmosphere would be suspected in overhaul areas and above the fire floor in a building. Members working in these areas are required to use their SCBA unless the safety of the atmosphere is established by testing and maintained by effective ventilation. With effective ventilation in operation, face pieces could be removed, when approved by supervision, but SCBA should continue to be worn or immediately available.

V. INCIDENT COMMAND

A. The National Fire Academy's Incident Command System (ICS), for control and coordination of the emergency scene, is used for incident command.

VI. SPECIFIC INCIDENT SAFETY REQUIREMENTS

A. Members operating in hazardous areas shall work in groups of two or more. Members outside the hazardous area shall maintain an awareness of the position and function of all persons operating within the hazardous area.

B. Whenever members are operating in positions or performing functions that include special hazards, or that would result in injury because of equipment failure or other unforeseen event, backup personnel shall stand by with equipment to provide assistance or rescue.

C. When members are operating in areas or performing functions that involve an immediate risk of injury, qualified basic life support personnel shall stand by with medical equipment and transportation capability.

D. When inexperienced members are working at an incident, more experienced officers or members shall provide direct supervision.

VII. HAZARDOUS MATERIALS

A. The Fire Department will conduct operations at the site of a HAZMAT event in accordance with standard tactical and environmental practices. Refer to the Hazardous Materials Program for specifications and description of HAZMAT response procedures.

VIII. SPECIFICATIONS FOR POST-INDICATOR VALVE CONTROL DURING SPRINKLER SYSTEM ACTIVATIONS

A. To reduce unnecessary water damage and ensure immediate re-activation of the sprinkler system should a rekindle occur, a firefighter will be positioned at the post-indicator valve (PIV) as part of standard fire scene operations.

B. The battalion commander or senior officer in charge of a fire scene should direct the second responding engine company officer to position a firefighter at the appropriate sprinkler system PIV or OS&Y valve immediately after the determination has been made that the fire is contained. That firefighter will remain there until extinguishment and overhaul have been completed.

IX. RADIO COMMUNICATION BACKUP

A. Due to the architecture and construction of process plants and vessels, radio signal communication between interior and exterior fire department forces may be disrupted or eliminated when working in certain facilities. If forces are committed to a working emergency situation in such a locale, incident command will assign a sufficient number of "runners" to provide a communication link between interior and exterior forces.

B. When an internal plant frequency is available, the Fire Department will maintain and use radio equipment to interface with the existing system.

X. AMBULANCE RESPONSES

A. When ambulance calls are received, the station officer and ambulance crew are responsible for verifying the location with the radio operator before responding.

B. Two firefighters will respond on all ambulance runs. One of the two must be an emergency medical technician (EMT).

C. The ambulance crew will generally pick up the nurse and transport her or him to the scene.

D. Ambulance reports must be filled out on all ambulance runs, even if no patient is transported. Information on these reports is considered confidential and should be released only to the proper authorities. Patients refusing treatment should sign the ambulance report to document the refusal. If the patient will not sign the form, note that information on the form.

E. Patient status information will be transmitted to the hospital by radio. In general, the EMT should transmit the information, although the nurse may perform this duty on request. Patient names must not be transmitted over the radio, although payroll numbers may be used, when necessary. Status information should include the following:

1. Description of accident or illness, including mechanism of injury.

2. Severity and priority information, i.e., immediately life threatening, urgent, or nonurgent.

3. Radiation concerns, if any.

4. Vital signs, including age, sex, mechanism of injury, blood pressure, pulse, respirations, level of consciousness, estimated time of arrival, and any other pertinent information.
5. Any medications or other compounds that may have contributed to

the patient's illness. If possible, the bottle or container should be delivered to the hospital with the patient to aid in identifying the proper antidote.

G. Should an unattended death occur within the plant boundaries, the coroner and the Sheriff's Office or local police must be notified. Permission must also be obtained to move the body, except when medical personnel determine there may be a possibility of saving the victim. Transportation of deceased persons will be performed at the request of the coroner.

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L. FACILITY CONTROL IN EMERGENCY SITUATIONS

I. PURPOSE

A. To identify conditions and periods when Fire Department command personnel are to assume event scene emergency control.

B. To identify conditions and situations whereby building emergency directors (BED) delegate control of their facility to the Fire Department for the sole purpose of terminating fire service related emergency incidents.

C. To recognize how Fire Department command posts and points are established and identified.

D. To establish a basis for coordination between, and integration of, the response elements from the Fire Department and other contractor emergency command posts and centers.

E. To establish a sitewide contingency plan that describes the overall Fire Department contingency program to meet the primary objective of the DOE orders and directions.

II. FIRE DEPARTMENT MISSION

A. The Fire Department provides total fire suppression, emergency rescue, ambulance, and nonradioactive HAZMAT response services for all DOE facilities and contractors located within the confines of the site or under contractual agreement. Other services include fire alarm system inspection and testing, prefire planning, and SCBA maintenance and certification.

III. AUTHORITIES

A. Overall responsibility for facility operations, including safety of building personnel, will always remain with the BED. Transfer of control of the event scene to the Fire Department will require coordination with the BED to determine all potential hazards based on facility knowledge, e.g. criticality and reactor operations.

B. Under emergency fire, rescue, and HAZMAT situations, the Fire Department will take appropriate actions to control the emergency and provide emergency medical services to personnel. Specific emergency control authority will normally be passed from the BED to the Fire Department under emergency situations only.

C. If the BED cannot be promptly contacted, the Fire Department will assume full authority to control the emergency situation until the incident is terminated. This delegation of authority is based on prefire plans, jointly approved by the Fire Department and building management.

D. Fire command officers will maintain full authority to terminate and discontinue efforts for human rescue, attempted recovery of vital equipment, and body recovery, including the discontinuing of firefighting efforts, using the following self-radiation monitoring conditions

Maximum Permissible Exposure to Each Firefighter

To effect human rescue - - - - - - - - - - 100 rem
To save vital equipment - - - - - - - - - 10 rem
(25 rem voluntary)
Body recovery - - - - - - - - - - - - - - - - 3 rem

IV. EMERGENCY COMMAND CONTROL

A. In fire, medical, and HAZMAT situations, the BED passes control of the scene to the Fire Department. This allows the Fire Department to use its knowledge and expertise in controlling and terminating the emergency.

B. The BED shall maintain total facility responsibility and will provide support to the Fire Department. However, the Fire Department is ultimately responsible for putting out the fire, stabilizing a HAZMAT incident, and rescuing personnel, and will determine what methods will be used, with consultation with the BED.

C. Once the fire, HAZMAT, or rescue emergency is terminated, control of the event will be returned to the BED. The Fire Department will then assume a support role and provide any necessary assistance as requested by the BED.

D. When assistance is requested on a standby support basis, the Fire Department will respond and take appropriate action, as determined jointly by the BED and the officer in charge.

V. BUILDING EMERGENCY DIRECTOR AND DESIGNATED ALTERNATE SUPPORT

A. On all emergency responses to facilities, a BED is to report to the first-arriving vehicle to verify conditions.

B. In all fire related situations, the BED will report to the officer in charge of the fire truck or the Fire Department command post and senior fire officer.

C. The BED is to provide the Fire Department with information about known conditions and hazards.

D. The BED is to advise the Fire Department if a rescue attempt is required.

E. If radiological conditions exist, the BED will ensure that monitoring assistance is provided.

F. The BED will provide any other available assistance, as requested by the Fire Department.

G. If the BED does not report to the fire truck or command post area, the officer-in-charge may use his vehicle public address (PA) system to make an announcement requesting the BED to contact the senior fire officer on the scene.

H. The BED is free to use the Fire Department vehicle PA system to make announcements to building personnel, unless such use interferes with Fire Department emergency operations.

I. The BED shall have the responsibility and the authority to notify building personnel that the incident is controlled and the affected area may be reentered.

VI. COMMAND POST

A. The Fire Department command post is to be established at a safe distance from the event site, out of the way of responding emergency vehicles.

B. The command post function provides a central location where incident information is assembled and incident decisions will be made to control the event as quickly and safely as possible.

   1. An ambulance should be located at the command post on any major emergency and on large grass fires. This will be at the discretion of the incident commander.

C. The command post must have communication ability with all organizations working to control the emergency event.

D. If the command post is not identified by flagging, the field contact point will be at the location of the first-arriving Fire Department vehicle.

E. Command post flagging will not be initiated until it has been determined that an actual emergency exists and that control of the event will require time and/or support.

VII. COMMAND POST FLAG STANDARD

A. Only one flag standard with reddish-orange plastic flags will be used to denote the command post.

B. All Fire Department responding personnel, building emergency personnel, and security personnel will report to the command post or another mutually agreed upon staging area.

APPENDIX G

U.S. DEPARTMENT OF ENERGY BASIC FIREFIGHTER CERTIFICATION PROGRAM

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APPENDIX G

U.S. DEPARTMENT OF ENERGY BASIC FIREFIGHTER CERTIFICATION PROGRAM

The Basic Firefighter Certification Program will meet or exceed the Firefighter II level as identified in the National Fire Protection Association (NFPA) 1001 training requirements and is a performance-based document. The Basic Certified Firefighter shall be an operative firefighter requiring an expected level of supervision.

The U.S. Department of Energy (DOE) Basic Firefighter Certification program consists of three training components with two optional emergency medical certifications. The following are the required components of the program:

- NFPA Firefighter II Certification training
- Hazardous Materials (HAZMAT) First Responder training
- Site-specific training.

The Firefighter II program will meet or exceed the standards and requirements of NFPA 1001. Most states have a certification program in place that will meet or exceed these requirements. The Firefighter II training shall be per the certification program of the state where the facility is located if the state program meets or exceeds NFPA 1001 requirements. If the DOE facility is located in a state with no program, or with a program that does not meet or exceed the NFPA 1001 requirements, the DOE Firefighter II Instructor Reference Manual (Appendix B) shall be used as the guideline for a structured training program for recruited firefighters (candidates).

The HAZMAT First Responder training is a structured 40-hour program based on Department of Transportation (DOT) standards and guidelines.

The site-specific training shall cover any special hazards and conditions that may be found on the site as well as security access limitations. It is recommended that this training be a structured program of no less than 40 hours with both a written and practical examination on completion of the course.

This document outlines the basic level of competency required for those manual firefighting forces protecting DOE property regardless of how that service is provided.

It is recognized that local equipment and conditions may require that some specific functions be modified.

Optional requirements:

- Emergency medical technician (EMT) certification
- Paramedic certification

If the DOE facility fire department provides ambulance service for the facility, then there will be additional certifications required for the firefighters. If the ambulance functions only as a basic life support unit (no drugs, telemetry, or defibrillator), then the EMT-A certification is required. This class varies for different locations, but the basic DOT course is usually about 120 hours long and requires both a written and practical exam for the certification. EMT-A personnel must recertify every 2 years.

If the ambulance service will be an advanced life support unit, then paramedic certification is required. This training can vary from as little as 400 hours to as much as 750 hours depending upon the requirements of the hospital responsible for the DOT paramedic program in your area. There are also substantial continuing education requirements to maintain certification.

Many technical schools and 2-year colleges around the country provide state certification courses for Firefighter II, EMT-A, paramedic, and HAZMAT First Responder. These courses usually meet the NFPA Firefighter II, DOT EMT-A and paramedic, and DOT HAZMAT First Responder requirements. Because of this, many DOE facilities may have the option of requiring certification and training before employment. This will eliminate the need for the extensive 300-hour Firefighter II and HAZMAT First Responder programs to be given on site after the candidate is hired. It will also eliminate the 2-6 months of training, usually requiring overtime compensation, for EMT-A and paramedic certification.

Remember, although the DOE Fire Department may be smaller and have less responses than its municipal counterpart, the training requirements and level of competence are greater than the municipal counterparts because of the site-specific hazards that may be encountered during an emergency response. For this reason, these minimum requirements are established to provide for the safety of the community, DOE employees, and firefighters who will respond to site emergencies.

G.1 U.S. DEPARTMENT OF ENERGY FIREFIGHTER II CERTIFICATION PROGRAM REQUIREMENTS

G.1.1 Prerequisites for Program Candidates

A candidate for the Firefighter II certification program must be employed as a firefighter candidate, recruit, or trainee by the emergency response organization responsible for providing fire protection for the facility. Before entering the practical portion of the training program, the candidate shall have taken and passed a complete physical examination including an analytical back X ray, lung capacity evaluation, and stress test.

The candidate must have the following qualifications:

- High school graduate, or equivalent
- At least 21 years old
- Vision correctable to 20-20

- No physical defects (such as chronic back problems, partial amputation or disability of an arm, hand, or leg) that would affect the candidate's ability to perform the physically demanding aspects of the position

- 5 ft to 6 ft 6 in. tall, weight proportionate to height (tall enough to ride in and remove equipment from fire engine)

- Not claustrophobic (necessary for working in confined spaces and using a self-contained breathing apparatus [SCBA] in a low-visibility environment)

- High moral and ethical standards

- Pass a psychological screening test.

G.1.2 Instructor Requirements

The Firefighter II and HAZMAT First Responder courses shall be supervised by a Certified Fire Service Instructor, a person who has attended and passed Educational Methodology I and II at the National Fire Academy, or a person with a state teaching credential.

The actual instructors may not be certified instructors, but shall be technically competent, preferably with teaching experience. There shall be class outlines and/or study guides that provide detailed information on the content and expected outcome of the class.

EMT-A and paramedic courses require that DOT certified instructors teach the course (there may be assistants who are not certified).

G.1.3 Facility Requirements

The classroom of the facility will not be subject to the noise and activity of the fire station (no station alarm, radio monitor, etc. in the classroom). Facilities should allow for the safe activities of the certification program. A fire training tower would provide the ideal environment, but <u>all</u> of the following provide acceptable alternatives:

- A three or more story building (with off-street parking for fire engine and a limited access area for evolutions) that can be used for ladder access

- Ground level roof and window assembly mockups for ventilation and forcible entry evolutions with manual (axes, pike poles, etc.) and power tools (chain saws, partner saws, etc.)

- A building that can be used for search and rescue in a simulated smoke-filled environment

- A building that can be burned or burned in for live fire training, or documented access to such a facility.

G.1.4 Curriculum Requirements

The curriculum for the Firefighter II program consists of a course or series of courses covering knowledge and skill objectives with a depth of coverage as listed in NFPA 1001, Chapter 4. This standard is incorporated by reference and includes no later standards or editions.

The curriculum for the HAZMAT First Responder program consists of a course covering knowledge and skill objectives with a depth of coverage as listed by the DOT.

The curriculum for the site-specific training consists of a course or series of courses covering knowledge and skill objectives as they pertain to specific hazards and security for the specific facility.

The following shows the primary subject areas and manual references for the Firefighter II training program. The training program should be developed in a modular format, with each subject area as a separate module. This type of format will allow the teaching facility to provide the sequence of training in the order that is most expedient. Complete practical evolution testing can be accomplished at the end of each module, but the written test and a practical "spot check" test will occur at the end of the course.

Subject Areas	International Fire Service Training Association (IFSTA) Reference — Manual	Chapter
General/orientation	IFSTA Orientation, 2nd Ed.	3, 4, 6, 8
Fire behavior	IFSTA Essentials, 2nd Ed.	1
Portable fire extinguishers	IFSTA Essentials, 2nd Ed.	2
Tools and equipment	IFSTA Essentials, 2nd Ed.	10, 6
SCBA	IFSTA Essentials, 2nd Ed.	4
Ladders	IFSTA Essentials, 2nd Ed.	5
Fire hose, nozzles, and appliances	IFSTA Essentials, 2nd Ed.	10
Personal safety	IFSTA Essentials, 2nd Ed.	7, 11, 12, 14
	IFSTA Orientation 2nd Ed.	6
Ropes and knots	IFSTA Essentials, 2nd Ed.	3
Emergency medical care (basic first aid)	IFSTA First Responder 1st Edition	2, 4, 5, 6, 7 9, 13
Water supply	IFSTA Essentials, 2nd Ed.	8
Forcible entry	IFSTA Essentials, 2nd Ed.	6
Overhaul	IFSTA Essentials, 2nd Ed.	12
Fire streams	IFSTA Essentials, 2nd Ed.	9
Ventilation	IFSTA 105, 6th Edition	1, 3, 4
Rescue	IFSTA Essentials, 2nd Ed.	11
Communications	IFSTA Essentials, 2nd Ed.	15
Ventilation	IFSTA Essentials, 2nd Ed.	16
Salvage	IFSTA Essentials, 2nd Ed.	12
Fire inspections	IFSTA Essentials, 2nd	17

Ed.

	International Fire Service Training Association (IFSTA) Reference	
Subject Areas	Manual	Chapter
		13
Fire cause and origin	IFSTA Essentials, 2nd Ed.	
HAZMAT	IFSTA Haz. Mat. 1st Ed.	1, 2

The IFSTA Essentials Manual (200), 2nd Edition, is the primary reference for Firefighter II training. Each candidate should have his/her own copy of this manual during the Firefighter II training course.

The Instructor Reference Manual in Appendix B is the basis for course development and lesson plans.

U.S. DEPARTMENT OF ENERGY FIREFIGHTER II CERTIFICATION PROGRAM
INSTRUCTOR REFERENCE MANUAL

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The attached general instructional objectives, specific learning outcomes, and sample practical exams have been prepared to support educational activities designed to train fire service personnel to the Firefighter II level. Each objective is a statement of the skills and/or knowledge a person must achieve to attain this level of certification, whether through a state certification program or DOE facility program.

NFPA 1001 has been used as a <u>minimum</u> criteria. Instructional objectives and learning outcomes have been referenced to this standard, when appropriate.

Written examinations, quizzes, and performance evaluations should be correlated and referenced to specific learning outcomes or objectives. The final practical evaluation shall be given and graded by the agency providing the training. The written examination shall be requested from DOE ___________________________ at least 30 days before the scheduled exam date. The exam will be given and proctored by the Human Resources Section of the affected DOE facility or the agency having responsibility for the facility. The exam shall then be returned to DOE ______________________ ___________________________ to be graded. Results will be forwarded to the fire chief or his/her designate of the facility fire department.

A score of 70% or greater is required to pass each section of the exam. If it is necessary to retake any portion of the written exam, a reexamination may be requested from DOE _________________________ a minimum of 90 days after the original examination was taken. Anyone failing the same section twice will not be certified.

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CONTENTS

Firefighter I and II

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Section: General/Orientation (NFPA 1001, 3-1 and 4-1)

Goal Statement: On completion of this subject, the student must fulfill the following objectives and identify all reference materials used in the training program.

1. Identify the various ranks and general duties assigned to personnel in the fire department. (NFPA 1001, 3-1.1)

2. Identify the scope of services provided by the fire department. (NFPA 1001, 3-1.2)

3. Identify sources, and obtain and review standard operating procedures for Firefighter II. (NFPA 1001, 3-1.2)

4. Obtain and review rules and regulations that pertain to the position of firefighter. (NFPA 1001, 2-1.3)

5. Identify all training resources record keeping and testing procedures as they apply to the firefighter.

6. Identify the safety and security restrictions of the training facility, fire engine, and tools.

7. Define terms related to identification, use, and function of fire engine; fire department facilities; common types of installed fire protection systems; and fire ground maneuvers.

8. Identify state and local government agencies and their roles in fire protection.

9. Identify sequence of events and operations from receipt of alarm to critique.

( ) Indicates reference to NFPA 1001.

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Section: Fire Behavior (NFPA 1001 4-4 and 5-4)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Define the following terms:

   1.1 Fire (3-4.1)

   1.2 Heat

   1.3 Temperature

      a) Fahrenheit scale (4-4.1b)

      b) Celsius scale (4-4.1c)

   1.4 Ignition temperature (3-4.8)

   1.5 Flammable limits

   1.6 Flash point (3-4.8)

   1.7 Fire point (3-4.8)

   1.8 British thermal unit (4-4.1a)

   1.9 Calorie (4-4.1b)

   1.10 Law of specific heat

   1.11 Latent heat of vaporization

2. Identify the components of the fire triangle and fire tetrahedron. (3-4.2)

3. Identify the affect of oxygen concentration on fire. (3-4.9)

4. Identify chemical, mechanical, and electrical heat sources. (3-4.3)

5. Identify products of combustion which create life hazards. (3-4.10)

6. Identify the hazard of finely divided fuels as they relate to the combustion process. (3-4.7)

7. Identify four classes of fire as they relate to the type of fuel. (4-5.1)

8. Identify three methods of heat transfer. (3-4.5)

   8.1 Law of heat flow

9. Identify the three physical stages of matter in which fuels are commonly

found. (3-4.6)

10. Identify the following terms as they relate to a structural fire:

    10.1 Flame spread (3-4.4b)

    10.2 Steady state (3-4.4e)

    10.3 Thermal balance and imbalance (4-4.2)

    10.4 Incipient stage (3-4.4a)

    10.5 Free-burning stage

    10.6 Smoldering stage (3-4.4d)

    10.7 Flash over (3-4.4d)

    10.8 Back draft (3-4.6)

    10.9 Clear burning (3-4.4f)

( ) Indicates reference to NFPA 1001.

Section: Portable Fire Extinguishers (NFPA 1001, 3-5 and 4-5)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Identify the common types of fire extinguishers carried on fire engines according to NFPA 1901.

2. Identify the symbols and color coding of the fire extinguisher rating system.

3. Identify the operating characteristics of the extinguishers carried on a fire engine equipped according to NFPA 1901.

4. When given a representative group of different classes of fire extinguishers, the firefighter shall identify the appropriate extinguisher for a stated class of fire. (4-5.2).

5. Explain the portable fire extinguisher rating system. (4-5.3)

6. Explain the operation of all commonly available fire extinguishers and agents.

7. Demonstrate the extinguishment of a Class A and Class B fire. Where permitted, live fire situations are to be used. (4-5.4)

8. Identify common defects such as would be found during a visual inspection of a fire extinguisher.

( ) Indicates reference to NFPA 1001.

Sample Practical Exam for Portable Fire Extinguishers (NFPA 1001, 3-5 and 4-5)

1. The firefighter standing in front of a pumper, given the class of fire, shall select, remove, and place the proper extinguisher in front of the pumper within 45 seconds.

2. Select the correct fire extinguisher type and size for a class "A" or "B" test fire and demonstrate extinguishing the fire within 45 seconds in accordance with the situation and test fires as described below.

   2.1 Wind condition where prevailing winds do not exceed the 10 mi/h (and adversely affect free burning).

   2.2 The fire extinguisher is to be located 30 ft from the test fire(s) and where the student shall begin the test.

   2.3 Test first to be in a free-burning state, i.e., 2 1/2 minutes for Class "A," 30 seconds for Class "B," or sufficient free-burning time to ensure complete test fire area involvement.

   2.4 A test fire of the following type and dimension:

      a) A deep-seated, Class "A" fire at least 3 ft square, lying flat, and at least 2 in. deep.

      b) A flammable liquid fire using a container at least 3 ft long, 1 ft wide, and 3 in. deep, with a minimum of 1 in. of water and 1 gal of flammable liquid.

( ) Indicates reference to NFPA 1001.

Section: Tools and Equipment

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Identify and describe the purpose of all hand and power tools, hose appliances and adapters carried on an NFPA 1901 standard pumper, tanker, aerial, and salvage and rescue apparatus.

2. Locate, remove, and safely carry hose and tools from a standard pumper to a designated point 30 ft from the fire engine. Return and remount all tools, hose appliances, and adapter carried on the fire engine in the specified time for each item.

3. Demonstrate safe use of all tools, hose appliances, and adapters carried on a standard pumper apparatus.

4. Identify common defects affecting serviceability and safety of hand tools, hose appliances, and adapters carried on a pumper. Describe the measures needed to correct the associated defects.

5. Identify the equipment used to provide lighting at the scene of an incident. (3-11.4)

6. Demonstrate the safe connection and use of lighting equipment used at the scene of an incident. (3-11.5)

7. Demonstrate the starting, operation, and maintenance procedures of electric power generation devices used at the scene of an incident. (3-11.6 and 4-1.4)

( ) Indicates reference to NFPA 1001.

Sample Practical Exam for Tools and Equipment

1. The firefighter, given a command while standing in front of a standard pumper, shall locate, remove, and safely carry the specified tools, appliance, accessory, or piece of equipment to a point at least 30 ft in front of the fire engine and return it to its mounting on the fire engine.

2. The firefighter shall demonstrate the use of selected tools.

3. The firefighter, given a tool, accessory, appliance, or piece of equipment found on a standard pumper, shall identify component parts, specify common defects affecting serviceability, and demonstrate or describe corrective measures as prescribed by department policy, IFSTA manuals, or manufacturer's technical data.

4. The firefighter, given an electrical generating device, supplies, and lighting equipment, shall start the generating device and place the lighting equipment in operation 100 ft from the generator.

Section: Self-Contained Breathing Apparatus (NFPA 1001, 3-6 and 4-6)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Know respiratory hazards. (3-6.1)

   1.1 List four major respiratory hazards and their impact on the human body.

2. Knows SCBA parts and terminology.

   2.1 Identify from actual equipment or diagram the basic parts of an SCBA unit.

   2.2 Describe the operating principle of certain types or parts of an SCBA unit.

3. Identify the physical requirements of the wearer, limitations of the SCBA, and safety features of all types of SCBA. (3-6.3)

4. Demonstrate donning and doffing of SCBA while wearing full protective equipment. (3-6.4)

   4.1 Don 30- to 60-minute demand-type SCBA from case or holder according to manufacturer's recommendations or as illustrated in IFSTA Essentials.

5. Demonstrate the use of all types of SCBA used by the firefighter's department. (3-6.2)

6. Demonstrate or identify the procedure for cleaning and sanitizing the SCBA using approved manufacturer's procedures. (3-6.6)

7. Know procedures for daily inspection and maintenance of SCBA. (4-6.1)

   7.1 Describe and demonstrate the daily inspection procedures for the following components of SCBA according to manufacturer's recommendations or procedures illustrated in IFSTA Essentials:

      a) Air cylinder
      b) Carrying harness
      c) Regulator
      d) Facepiece

8. Demonstrate procedures for recharging and exchanging air cylinders. (4-6.2)

   8.1 Demonstrate air cylinder exchange while SCBA is on another firefighter according to procedures discussed in class or illustrated in IFSTA Essentials.

   8.2 Demonstrate air cylinder exchange while SCBA is off firefighter according to procedures discussed in class or illustrated in IFSTA Essentials.

8.3 Demonstrate proper procedures for recharging air cylinders used by the fire department according to manufacturer's recommendations or procedures outlined in IFSTA Essentials.

9. Demonstrate repositioning of SCBA.

9.1 Demonstrate propping SCBA according to procedures discussed in class.

9.2 Demonstrate dumping SCBA according to procedures taught in class.

10. Demonstrate emergency procedures while wearing SCBA.

10.1 Demonstrate emergency buddy-breathing techniques as taught in class or illustrated in IFSTA Essentials.

10.2 Demonstrate restricted use of bypass valves as discussed in class or illustrated in IFSTA Essentials. (4-6.3)

( ) Indicates reference to NFPA 1001.

Self-Contained Breathing Apparatus Practical Exam, Part 1

OBJECTIVE: To test a candidate's ability to put the SCBA into operation within a specified time period. The candidate will be given adequate free time to inspect and ready the apparatus to his or her approval before starting time begins. (Some of the items to consider checking are position of straps, valves, connection of high pressure hose, etc. When the inspection is finished, the apparatus should be in its original condition.) The candidate should be told to follow the sequence of steps learned in class, and that time will begin when the candidate is ready and the evaluator says begin. Time will end when the candidate secures the breathing tube to the regulator and begins to draw air. On completion of the drill, the candidate will be required to put the SCBA unit back in service.

Recommended sequence:

1. Check pressure reading on cylinder gauge. (Candidate should notify evaluator if gauge reads below fire department-approved minimum pressure.) *Start timed maneuver*.

2. Check coupling nut for tightness.

3. Open cylinder valve fully.

4. Tighten harness straps in correct order. (Shoulder, waist, chest)

5. Remove regulator outlet protective cap if present. Open main line valve with right hand and cover regulator outlet with left hand. Check regulatory gauge, pressure should be the same as cylinder pressure. (With a difference of over 100 psi, high or low, instructor should be notified).

6. Tighten facepiece straps in correct order (chin, temple, top).

7. Tighten facepiece for adequate seal and operation of exhalation valve.

8. Crack open bypass valve to clear regulator orifice.

9. Place breathing tube into regulator inhale again.

10. Open main line valve — *End of timed evolution*.

11. Shut off cylinder valve while wearing unit.

12. Bleed down regulator by opening main line and then closing main line.

13. Put harness and/or mask back in service.

Self-Contained Breathing Apparatus Practical Exam, Part 2

Skills to be Performed

Air Pack Donning

1. Overhead method
2. Coat method

Cylinder Change

1. On firefighter
2. Off firefighter

Air Consumption Exercise

Tank Pressure Time

Tank Pressure	Time
Start ________________psi	Start ________________psi
Finish _______________psi	Finish _______________psi
Used _________________psi	Used _________________psi

Work Load

Light
Medium
Heavy

Use of Breathing Equipment

1. Actual smoke-filled environment

2. Simulated smoke-filled environment

    a. Situation given:

    b. Changes in situation:

Emergency Situations

1. Regulatory malfunction

2. Damaged facepiece

3. Buddy breathing (optional)

    a. Common regulator
    b. Common facepiece
    c. Kominsky method

Section: Ladders (NFPA 1001, 3-12 and 4-12)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Know basic ladder information.

   1.1 Identify from pictures or actual ladders the various types of ladders described in IFSTA Essentials. (3-12.1)

   1.2 Define the use of each ladder discussed in IFSTA Essentials. (3-12.1)

   1.3 Describe various components of ladders as described in IFSTA Essentials.

2. Know ladder cleaning techniques.

   2.1 Demonstrate and describe proper ladder cleaning techniques as illustrated in IFSTA Essentials. (3-12.8)

3. Demonstrate laddering techniques.

   3.1 Demonstrate ladder carrying with one through six firefighters. (3-12.2)

   3.2 Demonstrate each type of raise with a variety of ground ladders as illustrated in IFSTA Essentials. (3-12.3)

   3.3 Demonstrate climbing techniques described in IFSTA Essentials. (3-12.4)

   3.4 Demonstrate tool carries up and down ground ladders and appropriate aerial devices as described in IFSTA Essentials. (3-12.5)

   3.5 Demonstrate working off ladders using appropriate safety devices or leg locks as described in IFSTA Essentials. (3-12.7)

   3.6 Demonstrate moving "injured" people down a ladder using methods described in IFSTA Essentials. (3-12.6)

4. Know ladder construction and load factors.

   4.1 Identify materials used in ladder construction according to IFSTA Essentials. (4-12.1)

   4.2 Identify load safety features on ground and aerial ladders using manufacturer's recommendations or IFSTA Essentials. (4-12.2)

   4.3 Demonstrate inspection and maintenance procedures for ground and aerial ladders according to manufacturer's recommendations or IFSTA Essentials. (4-12.3)

5. Demonstrate methods of placing and carrying an unconscious victim on different types of ladders according to the ladder construction and IFSTA Essentials.

( ) Indicates reference to NFPA 1001.

Ladders Sample Practical Exam, Part 1

Ladder Raises

OBJECTIVE: The candidate will be evaluated on the ability to carry, raise, set, and lower an extension ladder. If one candidate is to be evaluated, then the 24-ft extension ladder raise will be used. If more than one candidate is to be evaluated, then the 38-ft extension ladder will be used. A ladder can be raised more than once for a complete evaluation (Keep in mind that one evaluator will evaluate one candidate. The candidate will be given points for proper procedure according to the schedule below).

	One-Person Evaluation 24-ft Extension Ladder		Four-Person Evaluation 38-ft Extension Ladder
1.	Selects correct ladder	1.	Selects correct ladder
2.	Carries ladder properly	2.	Carries ladder properly
3.	Proper position for raise (heel against building--fly up)	3.	Proper position for raise
4.	Raises ladder correctly	4.	Correctly positions hands and feet
5.	Moves heel away from building (approximately 1 ft)	5.	Watches top of ladder
6.	Correctly secures ladder with foot outside beam and knee against beam	6.	Raises fly correctly and locks dogs
7.	Fully extends fly	7.	Correctly ties safety hitch
8.	Sets ladder to right side of opening	8.	Places ladder to right side of opening
9.	Correctly ties safety hitch	9.	Correctly sets heel
10.	Rolls ladder over	10.	Correctly removes ladder from building
11.	Sets heel correctly (1/4 length of raise)	11.	Correctly lowers fly
12.	Lowers ladder in reverse sequence	12.	Correctly lowers and grounds ladder

Ladders Sample Practical Exam, Part 2

Ladder Carries

Remove from fire engine and carry 25 ft, return and remount ladder on fire engine.

1. 16-ft roof, one person

2. 16-ft roof, two persons

   a. Under arm
   b. Arm's length
   c. Shoulder

3. 24-ft extension, two persons

   a. Arm's length
   b. Under arm

4. 28-ft extension, two persons

   a. Arm's length
   b. Under arm

5. 35-ft extension, three persons

   a. Arm's length flat
   b. Shoulder flat

6. 40 ft or larger pole or bangor, six persons

   a. Shoulder

Ladder Raises

Ladders flat on ground at the position at which they are to be raised. Start time when ladder is picked up. Stop time when ladder touches building, fully extended.

7. 16-ft roof, one man

8. 16-ft roof, two persons

9. 16-ft roof (beam raise), two persons

10. 24-ft extension, one person

11. 24-ft extension, two persons

12. 28-ft extension, two persons

13. 35-ft extension, three persons

14. 40-ft pole or bangor, four persons

15. 40-ft pole or bangor, six persons
(parallel to building)

Climbing Ladder

16. Climbing ladder with roof ladder (two persons) and straight ladder in position at one-story building. Roof ladder in position at the base of ladder to be climbed. Start time when roof ladder is picked up. Stop time when roof ladder is in position on the roof.

17. Move vertically positioned 35-ft extension ladder (extended position) 8 ft by rolling. (one person)

18. Move vertically positioned 20-ft ladder 8 ft by lifting and carrying. (one person)

19. Raise a ladder to compensate for overhead obstacle. (two persons)

20. Carry 35-ft extension ladder through narrow spaces at least 10 ft long. (two persons)

21. Climb the full length of every type of ladder in the department.

22. Carry a pick head axe to the third floor window level, secure with leg lock, simulate breaking out a window, and return to the ground.

23. Inspect ground ladders, explaining areas susceptible to damage and proper procedure for cleaning.

24. Climb 100 ft aerial fully extended, wearing full turnout clothing and SCBA and carrying a pike pole.

Ladders Sample Practical Exam, Part 3

Carry and Raise

1. Choose correct type and size of ladder according to instructions.

2. Position persons for carry.

3. Ladder pickup or dismount.

4. End of ladder to use in lead.

5. Position ladder for raise designated.

6. Ladder raise.

    a. Butt persons
    b. Beam persons
    c. Halyard pulled hand over hand
    d. Height and position of ladder
    e. Tie of halyard
    f. Spacing.

7. Carry tool while climbing ladder.

8. Leg lock or "tie-in" as instructed.

9. Lowering ladder to ground position.

10. Returning ladder to designated place.

11. Overall safety.

Move Vertically Positioned Ladder by Rolling or Lifting

1. Select correct position to begin operation.

2. Perform operation designated correctly.

3. Realign ladder properly.

Under Wire Raise

1. Select correct position for raise.

2. Move correctly according to command.

3. Position correctly for raise.

4. Clear obstacles.

5. Lower ladder to correct position.

Section: Hose, Nozzles, and Appliances (NFPA 1001, 3-13 and 4-13)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Know construction features of fire hose.

    1.1 Identify or select from samples, descriptions, or actual items, various sizes of fire hose as described in IFSTA Essentials.

    1.2 Describe construction features of hose as illustrated in IFSTA Essentials.

    1.3 Describe or list uses of fire hose as described in IFSTA Essentials.

    1.4 Identify or select the dimensions of fire hose as described in IFSTA Essentials. (3-13.1)

2. Know construction features of fire hose couplings.

    2.1 Describe construction features of fire hose couplings as illustrated in IFSTA Essentials.

    2.2 Identify parts and dimensions of selected hose couplings according to IFSTA Essentials.

    2.3 Demonstrate three coupling procedures as illustrated in IFSTA Essentials. (3-13.10)

3. Know procedures for basic loads (3-13.7).

    3.1 Describe general loading considerations as described in IFSTA Essentials.

    3.2 Identify from actual load, diagrams, or pictures the various hose loads as described in IFSTA Essentials.

    3.3 Demonstrate selected loading and unloading of hose loads according to prescribed procedures illustrated in IFSTA Essentials.

4. Know hose rolls (3-13.8).

    4.1 Describe uses of hose rolls illustrated in IFSTA Essentials.

    4.2 Demonstrate at least three types of hose rolls described in IFSTA Essentials.

5. Demonstrate at least two hose carries illustrated in IFSTA Essentials. (3-13.9)

6. Know hose and hose coupling maintenance procedures. (3-13.5)

   6.1 List the four main causes of fire hose injuries as described in IFSTA Essentials.

   6.2 Demonstrate cleaning and inspecting couplings as described in IFSTA Essentials.

   6.3 Demonstrate the proper technique for inspecting gaskets used in fire hose and appliances according to illustrations provided in IFSTA Essentials.

7. Demonstrate the proper procedure for making hydrant connections as described in IFSTA Essentials. (3-13.6)

8. Know procedures for replacing a burst section of fire hose or extending a line. (3-3.13), (3-13.14)

   8.1 Demonstrate procedures for lengthening a line using a hose clamp or break-apart nozzle as described in IFSTA Essentials.

   8.2 Demonstrate procedures for replacing a section of hose using the kink or clamp method described in IFSTA Essentials.

9. Know procedure for dry line advancement.

   9.1 Demonstrate procedures for advancing <u>dry</u> 1 1/2-in. or larger line in the following situations: (3-13.1)

      a) Into a structure

      b) Up a ladder into a structure

      c) Up an inside stairway

      d) Down an interior stairway

      e) Up and down an outside stairway

      f) To an upper area of a structure.

   All procedures will conform to illustrations or practices described in IFSTA Essentials.

10. Know procedure for charged line advancement.

   10.1 Demonstrate procedures for advancing a <u>charged</u> line according to the following conditions: (3-13.4)

      a) Into a structure

      b) Up and down an interior stairway

c) Up and down an exterior stairway

d) Work from a ladder

e) In an open area environment as described and illustrated in IFSTA Essentials.

11. Demonstrate procedures for standpipe advancement per IFSTA Essentials or local standard operating procedures. (3-13.12)

12. Demonstrate, select, or identify any nozzle according to size and usage in accordance with IFSTA Essentials. (4-13.1)

13. Knows hose lays and loads. (4-13.2)

13.1 Describe the difference between a forward and reverse hose lay as illustrated in IFSTA Essentials.

13.2 Demonstrate loading and unloading of the following hose loads as illustrated in IFSTA Essentials:

a) Minuteman load

b) Triple layer load

c) Nonconnected wyed lines.

13.3 Demonstrate the shoulder load according to procedures taught in class or illustrated in IFSTA Essentials.

14. Demonstrate proper maintenance activities for hose, hose appliances, and nozzles according to IFSTA Essentials. (4-13.3)

15. Demonstrate hose connections to fire engine. (4-13.4)

15.1 Demonstrate "small" intake line connections to fire engine according to IFSTA Essentials.

15.2 Demonstrate "large soft" intake line connections to fire engine according to IFSTA Essentials.

15.3 Demonstrate "hard" intake line connections to fire engine according to IFSTA Essentials.

16. Demonstrate appliance selection based on specific fireground needs using descriptions provided in IFSTA Essentials. (4-13.5)

( ) Indicates reference to NFPA 1001.

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Hose, Nozzles, and Appliances Sample Practical Exam, Part 1

Attaching Hose Appliance

1. Select correct appliance.
2. Attach appliance by approved method.
3. Determine if appliance is operable as attached.
4. Choose correct operating position(s) for appliance.

Replacing a Section of Hose

1. Place hose clamp properly to remove burst section.
2. Remove burst section.
3. Insert good section.
4. Remove hose clamp.

Securing Hose Jacket

1. Place jacket at correct location for operation.
2. Make necessary adjustments for hose jacket operation.
3. Properly secure hose jacket.
4. Return hose line to operation.

Hydrant Connection

1. Pull off necessary hose to reach hydrant.
2. Take necessary wrenches with hose.
3. Tell driver to proceed.
4. Wrap hydrant correctly.
5. Make connection to hydrant.
6. Charge line by opening hydrant all the way.

Standpipe and Sprinkler Connection

1. Choose correct hose line(s) for connection.
2. Locate specified connection and check for obstructions.
3. Make hose connection.

4. Provide for correct hose line position.

Hose Roll Designation

1. Make designated hose roll.

2. Start roll with correct coupling.

3. Arrange hose to be rolled in proper position.

Hose Load or Finish Designation

Loads for maneuver: Horseshoe, reverse horseshoe, accordion, divided hose bed, skid load finish, donut roll finish.

Each load should be constructed with six sections of hose within time limits set for each load.

1. Start hose load properly.

   a. Reverse
   b. Forward.

2. Make designated load or finish.

   a. Correct procedure
   b. Make dutchman as required
   c. Start tier correctly
   d. Stagger ends of folds.

3. Attach nozzles and adapters to load as finish requires.

Hose Advances and Carries

1. Unload hose in manner necessary to make designated drag or carry.

2. Advance hose using proper carry or drag designated.

   a. Hose pays off the top of shoulder or underarm carry.
   b. Backup persons space themselves properly.
   c. Hose pays off in proper sequence.
   d. Hose pays off on same side of nozzleman and backup persons.
   e. Length of hose loop on ladder advancement is between 20-25 ft
   f. Hose is lashed to ladder.
   g. Bends in hose on stairway advancement not too sharp.
   h. Proper amounts of hose removed from hose bed to meet needed requirements.

Hose, Nozzles, and Appliances Sample Practical Exam, Part 2

Pump Intake Connections with Hard Intake Hose

1. Take hydrant wrench, remove hydrant cap, put hydrant wrench on hydrant away from the outlet used.

2. Remove hard intake hose from fire engine and place it on the ground with male coupling toward hydrant.

3. The driver elevates the male end of the hose while the other person connects the nonswivel end of the adaptor to the male coupling.

4. Align the adaptor swivel with the hydrant outlet, and the person at the hydrant makes the connection.

5. Pick up the female end of the hose and make necessary curves to direct the end toward pump intake.

6. Finish making connection at the pumper.

Pump Intake Connections with Soft Intake Hose

1. Remove hose, necessary adapters, and hydrant wrench from fire engine.

2. Place cap and hydrant wrench away from hydrant opening being used.

3. Unroll intake hose from hydrant.

4. Make connection to hydrant.

5. Make connection to pump.

Hose, Nozzles, and Appliances Sample Practical Exam, Part 3

Skills to be performed:

1. Hose rolls – each student uses 150 ft length of 1 1/2-in. hose to make the following:

   - Donut roll
   - Double donut roll
   - Self-locking hose roll.

2. Appliances - attach the following:

   - 1 3/4-in. line to a solid bore nozzle
   - 1 1/2-in. line to an adjustable stream nozzle
   - 2 1/2-in. line or larger, to an adjustable stream nozzle
   - 2 1/2-in. line or larger, to a distributor nozzle
   - 2 1/2-in. line or larger, to a wye
   - 2 1/2-in. line or larger, to a siamese
   - 2 1/2-in. line or larger, to a double female
   - 2 1/2-in. line or larger, to a double male
   - 2 1/2-in. line or larger, to a reducer
   - 2 1/2-in. line or larger, to a hose jacket.

3. Coupling

   - Couple two lengths of 3-in. line
     - 1 person
     - 2 person

   - Make a storz to storz connection using one section of 5-in. hose
     - 1 person
     - 2 person

   - Demonstrate uncoupling 3-in. hose using the knee press method.

4. Hose testing

   a. Lay out all hose to be tested--not more than 300-ft sections, no kinks, record numbers.

   b. Connect manifold to water and pressure source.

   c. Connect lines to manifold, mark each hose with a line where it meets each coupling (use a soft pencil).

   d. Fill all lines with water.

   e. Bleed all air out of the hose.

   f. Raise internal pressure to 250 psi, hold the test pressure for 5 minutes, observe hose.

g. Reduce pressure slowly, bleed off lines.

h. Observe all marks and observe hose. If any section fails, mark what is wrong and take it out of service.

5. Fire department connections

a. Connect the 5-in. hose to a fire hydrant with the fire engine in position as in forward lay (1 person).

b. Connect the 5-in. hose to a fire hydrant with fire engine in position as in a reverse lay (1 person).

c. Remove two 50-ft sections of hose from the fire engine and connect to the hydrant and intakes of the fire engine simulating a duel drop (1 person).

d. Connect the hard suction with the strainer as in drafting (2 persons).

6. Supply lines

a. Make sprinkler connection, drop duels, and make a hydrant connection at a distance no shorter than 75 ft (2 persons).

b. Drop a deck gun and duels, and make a hydrant connection at a distance no shorter than 75 ft to simulate a 600 gpm flow (2 persons).

7. Anchoring Hose

a. Anchor a 2 1/2-in. hose line in a circle (street loop) for a one-person operation (1 person).

b. Anchor a 2 1/2-in. line with a nozzle to a ladder using:

- A hose strap (1 person)
- A rope hose tool (1 person).

8. Tools

a. Hoist one end of 50 ft of 2 1/2-in. fire hose onto a roof, using the following: (1 person)

- Secured hose roller
- 100 ft of 5/8-in. rope.

b. Place a hose clamp in the following manner: using three lengths of charged hose, place the clamp on the length nearest the water supply, replace the center section of hose (simulated burst hose section, and remove the clamp [2 person]).

9. Line advancement — all with full gear and air packs

   a. Advance a 1 1/2-in. line up a ladder to the roof (1 person).

   b. Advance a 1 3/4-in. line up a ladder to the roof (1 person).

   c. Advance a 2 1/2-in. line up a ladder to the roof (1 person).

   d. From the ground floor, carry the 1 1/2-in. line with 50 ft of 2 1/2-in. hose from the doorway to the second floor (2 person)

   e. Up an inside stairway to the second floor landing, carry the following:

1 1/2-in. dry	1 person
1 3/4-in. dry	1 person
2 1/2-in. dry	1 person

   f. Advance a charged 1 1/2-in. line 50 ft into a structure (1 person).

   g. Advance a charged 1 3/4-in. line 50 ft into a structure (1 person).

   h. Advance a charged 2 1/2-in. line 50 ft into a structure (1 person).

10. Hose loads

   a. Demonstrate a horseshoe load with four sections of 2 1/2-in. line.

   b. Demonstrate a reverse horseshoe load with four sections of 2 1/3-in. line.

   c. Demonstrate an accordion load with four sections of 2 1/2-in. line.

   d. Demonstrate a rural lay.

   e. Demonstrate the mall skid finish.

   f. Rack 200 ft of 5-in. hose on the hose bed (2 person).

   g. Demonstrate the minuteman with two lengths of 1 3/4-in. hose.

Section: Personal Safety (NFPA 1001, 3-11 and 4-11) Note: NFPA 101 has no objectives for safety at the Firefighter II level.

Reference: IFSTA Firefighter Occupational Safety (Current) Chapter 4-6-14

Goal Statement: On completion of this subject, the student shall be able to fulfill the following objectives.

1. Know dangerous building conditions created by fire. (3-11.1)

   1.1 Describe the effects of the following items in a burning building: [IFSTA 200]

      a) Intense heat

      b) Dense smoke

      c) Large volume of water poured into and on the structure.

   1.2 Define the term "building collapse." [IFSTA 200]

2. Describe techniques for action when trapped or disoriented in a fire situation or in a hostile environment. (3-11.2)

3. Know procedures to be used in any electrical emergency. (3-11.3)

   3.1 List electrical emergencies that may be encountered.

   3.2 Identify proper actions to take in the case of an electrical emergency.

4. Know personal protective equipment. (3-11.7)

   4.1 Identify components of an approved turn-out coat and the type of protection supplied by the coat.

   4.2 Identify the components of an approved helmet and the protection supplied to the wearer.

   4.3 Identify the proper gloves and the type recommended for fire service use.

   4.4 Identify the components of an approved boot and the protection supplied to the wearer.

5. Know safety procedures for riding and working around a fire engine. (3-1.7)

   5.1 List and define the proper precautions when riding and working around a fire engine. (3-11.7)

6. Know precautions when working on the fire ground. (3-11.7)

    6.1 List and define five precautions to take when working at the fire scene.

7. Demonstrate proper safety procedures when working at a fire scene. (3-11.7)

8. Describe and demonstrate safety procedures when using portable tools and equipment including lighting equipment. (3-11.5 and 3-11.7)

9. Describe procedures for responding to hazardous material incidents. (3-11.7)

10. Understand the safe use of facilities. [Ref. Chapter 4 - IFSTA 209]

11. Understand the needs and uses of personal protective equipment. [Ref. Chapter 6 - IFSTA 209]

12. Understand health considerations. [Ref. Chapter 11 - IFSTA 209]

( ) Indicates reference to NFPA 1001.

[ ] Indicates IFSTA manual reference.

Section: Ropes and Knots (NFPA 101, 3-9 and 4-9)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. The firefighter, when given the name, picture, or actual knot, will identify it and describe the purpose for which it would be used. (3-9.1)

2. The firefighter, when given the proper size and amount of rope, shall demonstrate tying the following knots (need not be limited to these knots): (3-9.2)

   2.1 Bowline knot (tie within 15 seconds)

   2.2 Clove hitch (tie within 15 seconds)

   2.3 Becket or sheet bend (tie within 15 seconds).

3. The firefighter, given the proper rope, shall demonstrate the bight, loop, round turn, and half hitch as used in tying knot hitches. (3-9.3)

4. The firefighter, using an approved knot, shall hoist any selected forcible entry tool, ground ladder, or appliance to a height of at least 20 ft. (3-9.4)

5. The firefighter shall demonstrate the techniques of inspecting rope for the following: (3-9-5)

   5.1 Chemical damage

   5.2 Cuts and abrasions

   5.3 Internal damage

   5.4 Mildew and rot

   5.5 Stretch

   5.6 Thermal damage.

6. The firefighter shall demonstrate the proper cleaning and maintenance of rope as illustrated in IFSTA Essentials. (3-9.6)

7. Differentiate rope selection procedures.

   7.1 Demonstrate ability to select proper size, construction features, and length for selected task according to class discussion or IFSTA Essentials. (4-9.1)

   7.2 Select and tie a rope between two objects at least 15 ft apart that will support the weight of a firefighter. (4-9.2)

   7.3 Select and use the rope to tie ladders, hose, and other equipment so as to secure them to immovable objects. (4-9.3)

8. Describe appropriate method(s) of rope storage as described in IFSTA Essentials.

9. Indicate the method of marking a rope to remove from service according to manufacturer's recommendations or as illustrated in IFSTA Essentials.

NOTE: Information to the following will be found in the IFSTA Rescue Manual.

10. The firefighter, when given the proper size and amount of rope, shall demonstrate tying the following knots:

    10.1 Rescue knot (tie within 1 minute)

    10.2 Figure 8 (tie within 15 seconds).

( ) Indicates reference to NFPA 1001.

Ropes and Knots Sample Practical Exam, Part 1

OBJECTIVE: The candidate will be tested on the ability to select the correct size rope, tie the appropriate knot, and use the various knots to their practical application. The evaluator will select five of the following drills and/or knots and have the candidate demonstrate the ability in performing the drill or tying the specific knot.

DRILLS	KNOTS
1. Hoisting roof ladder	1. Half hitch
2. Hoisting straight ladder	2. Clove hitch
3. Hoisting axe	3. Guy line
4. Hoisting pike pole	4. Square knot
5. Hoisting hose	5. Becket
6. Tie hose roller	6. Bowline
7. Tie unequal ropes together	7. Running bowline
8. Rescue victim	8. Rescue knot
9. Draw knot	
10. Cradle (life) knot	
11. Bowline-on-a-bight	
12. Greasy Pole (up or down)	

Ropes and Knots Sample Practical Exam, Part 2

Knots to be Tied as Directed within Time Limits

1. Square knot
2. Becket bend
3. Clove hitch
   a. End of line
   b. Middle of line
4. Timber hitch
5. Sheepshank
6. Bowline around self or object
7. Bowline — on-a-bight
8. Chimney hitch
9. Half sheepshank with a safety
10. Rescue knot

Hoisting, Lowering, Roping Off, and Storage

1. Tie and hoist axe to 3rd floor.
2. Tie and hoist pike pole to 3rd floor.
3. Tie and hoist fire extinguisher to 3rd floor.
4. Tie and hoist roof ladder to 3rd floor.
5. Tie rescue knot on victim and lower from 3rd floor.
6. Rope off area between two immovable objects so that rope supports firefighter weight.
7. Make rope coil with 100 ft of rope.
8. Bag 100 ft of rope.

Section: Emergency Medical Care (NFPA 1001, 3-3 and 4-3)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Identify steps in a primary survey.

2. Know procedures for opening an airway.

   2.1 (Identify) or (demonstrate) methods to determine if an airway is open or closed. (3-3.2)

   2.2 Demonstrate procedures for opening an airway. (3-3.3)

3. Know bleeding emergencies.

   3.1 Identify three types of external bleeding and characteristics. (3-3.8)

   3.2 Demonstrate techniques for controlling external bleeding. (3-3.9)

4. Know ventilation procedures.

   4.1 Demonstrate mouth-to-nose ventilation. (3-3.4)

   4.2 Demonstrate oro-nasal ventilation. (3-3.5)

   4.3 Demonstrate mouth-to-mouth ventilation. (3-3.6)

5. Know cardiac arrest situations.

   5.1 Identify three signs of cardiac arrest. (3-3.6)

   5.2 Demonstrate cardiopulmonary resuscitation (CPR). (3-3.7)

6. Know injury-producing mechanisms and their relationship to the victim.

   6.1 Identify four sources that provide information concerning the nature of the victims' injuries according to class discussion. (4-3.1)

   6.2 Identify suspected injuries from information provided concerning the mechanics of the accident plus the obvious injuries. (4-3.2)

   6.3 Identify and demonstrate care of traumatic shock victims according to recognized standards. (4-3.15)

7. Know secondary survey procedures.

   7.1 Describe the secondary survey procedures according to class discussion. (4-3.3)

   7.2 Demonstrate a secondary survey on an "injured" person within

60 seconds. (4-3.3)

7.3 Demonstrate sequential emergency care for an accident victim according to recognized procedures. (4-3.7)

8. Know internal bleeding.

8.1 Identify signs and symptoms of internal bleeding according to standardized practices. (4-3.4)

8.2 Demonstrate emergency care for victims of suspected internal bleeding according to recognized practice. (4-3.5)

9. Know burns and the distinction between certain types of burns.

9.1 Identify characteristics of thermal burns according to class discussion or IFSTA Essentials. (4-3.6)

9.2 Identify characteristics of a chemical burn according to class discussion. (4-3.8)

9.3 Demonstrate procedures for handling thermal burns according to recognized procedures. (4-3.6)

9.4 Demonstrate procedures for emergency care of chemical burns according to recognized procedures. (4-3.8)

9.5 Describe and demonstrate the flushing of eyes for suspected chemical burns according to recognized procedures. (4-3.8)

10. Know fractures.

10.1 Identify from an illustration, diagram, or picture, the type of fracture according to recognized practices. (4-3.9)

10.2 Describe the difference between certain types of fractures according to recognized practices. (4-3.9)

10.3 Describe three general signs of a fracture according to recognized practices. (4-3.10)

10.4 Demonstrate proper splinting techniques illustrated in class. (4-3.11)

11. Know the basic breathing system used by the human body.

11.1 Identify and describe the anatomical process of breathing according to class discussion. (4-3.12)

11.2 Describe the heart, lung, and brain relationship according to class discussion. (4-3.13)

11.3 Demonstrate two-person CPR according to recognized standards.

(4-3.14)

11.4 Demonstrate the use of breathing aid equipment in accordance with recognized standards or manufacturer's recommendations. (4-3.16)

( ) Indicates reference to NFPA 1001.

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Emergency Medical Care Sample Practical Exam

Blood pressure

1. Place cuff in correct location.
2. Place stethoscope in correct location.
3. Use inflation bulb and valve correctly.
4. Obtain accurate readings.

Resuscitation Practical

1. Position patient.
2. Check airway.
3. Clear airway.
4. Suction airway.
5. Insert airway.
6. Administer
   a. Mouth to mouth
   b. Mouth to nose.
7. Apply mask.
8. Perform cardiac massage
   a. Hand position
   b. Rhythm
   c. Compression depth.
9. State correct rhythm or rate (CPR)
   a. Child (10 years)
   b. Child (3 years)
   c. Two rescuers.

Splinting

1. Identify location.
2. Keep extremity in place.
3. Obtain proper material or splint.

4. Place splint on correctly.

5. Check circulation.

Bleeding Control

1. Check for foreign body.

2. Use direct pressure.

3. Use correct pressure point.

4. Apply tourniquet correctly.

Section: Water Supply (NFPA 1001, 3-15 and 4-15)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Indicate knowledge of water distribution systems.

   1.1 Identify sources of water used in distribution systems according to local conditions or as described in IFSTA Essentials. (4-15.1)

   1.2 State the parts of a water distribution system including distributors, primary feeders, and secondary feeders. (4-15.2)

   1.3 Identify the various pressures that effect water distribution. (4-15.4)

2. Indicate knowledge of hydrant operation and maintenance procedures.

   2.1 Identify dry and wet barrel hydrants according to descriptions in IFSTA Essentials. (4-15.3)

   2.2 State maintenance procedures that include the following according to American Water Works Association Standards of IFSTA Essentials. (4-15.6)

      a) Obstruction to use of hydrant

      b) Direction of outlets to suitability of use

      c) Mechanical damage

      d) Corrosion problems

      e) Flow ability

      f) Ability to drain.

   2.3 Identify the following valves according to IFSTA Essentials. (4-15.5)

      a) Indicating

      b) Nonindicating

      c) Postindicating

      d) OS&Y.

3. Indicate knowledge of color coding and mapping of water distribution systems.

   3.1 Describe the NFPA system of hydrant color coding relative to flow capability.

   3.2 Interpret a water map describing local water distribution systems.

( ) Indicates reference to NFPA 1001.

Section: Forcible Entry (NFPA 1001, 3-7 and 4-7)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Identify forcible entry tools and their use under direct supervision. (3-7.1)

2. Demonstrate the safe use of forcible entry tools under direct supervision. (3-7.1)

3. Identify the methods for the following: (3-7.2)

    - Cleaning forcible entry tools

    - Inspecting forcible entry tools.

4. Indicate knowledge of specific features and materials used in building construction.

    4.1 Identify materials and construction features of doors as described in IFSTA Essentials. (4-7.1)

    4.2 Identify materials and construction features of windows as illustrated in IFSTA Essentials. (4-7.1)

    4.3 Identify materials and construction features of roofs as illustrated in IFSTA Essentials. (4-7.1)

    4.4 Identify materials and construction features of vertical barriers as illustrated in IFSTA Essentials. (4-7.1)

    4.5 Define the dangers associated with doors, windows, roofs, and vertical barriers as described in IFSTA Essentials. (4-7.1)

5. Indicate knowledge of forcible entry techniques.

    5.1 Identify or describe the procedures to use in forcing doors, windows, ceilings, roofs, floors, and vertical barriers as described in IFSTA Essentials. (4-7.2)

6. Demonstrate the proper techniques in forcing doors, windows, ceilings, roofs, floors, and vertical barriers as described in IFSTA Essentials. (4-7.2)

( ) Indicates reference to NFPA 1001.

Forcible Entry Sample Practical Exam

Forcible Entry Methods and Procedures to be Performed

1. Select proper tool(s) for operation.
2. Carry tool(s) safely and properly.
3. Follow preliminary procedures before forcing entry.
4. Use tool(s) safely and properly.
5. Maintain safe working area after forcing entry.

Forcible Entry or Small Tool Practical Exam

1. Choose correct tool for job assigned or tool designated by evaluator.
2. Carry tools safely and properly.
3. Follow preliminary procedure before forcing entry.
4. Use a particular tool safely and properly.
5. Maintain safe working area after forcing entry.

NOTE: For small tool practice, use a method that involves cutting with an axe or breaking glass.

Section: Overhaul (NFPA 1001, 3-18 and 4-18)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Know the purpose of overhaul.

    1.1 Identify the term overhaul provided by IFSTA Essentials. (3-18.5)

2. Know safety precautions during overhaul. (4-18.2)

    2.2 Identify appropriate safety equipment and clothing for performing overhaul activities.

    2.3 Identify hazards associated with overhaul operations.

3. Demonstrate procedures for searching for hidden fires by sight, touch, and smell. (3-18.1)

4. Demonstrate techniques for opening walls, ceilings, and floors. (3-18.3)

5. Demonstrate how to separate burned from unburned materials. (3-18.3)

6. Identify duties of firefighters left at the fire scene for fire and security surveillance. (3-18.4)

7. Indicate knowledge of overhaul procedures. (4-18.1)

    7.1 Identify and describe functions of tools and equipment used in overhaul procedures as described in IFSTA Essentials.

8. Describe factors that influence the structural stability of a building.

    8.1 Identify methods of using the senses to determine unsafe conditions and detect hidden fires.

9. Explain the methods of protecting and preserving evidence during overhaul operations as described in IFSTA Essentials.

( ) Indicates reference to NFPA 1001.

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Section: Fire Streams (NFPA 1001, 3-14 and 4-14)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Identify the term "fire stream" described in IFSTA Essentials. (3-14.1)

2. Identify the four purposes of a fire stream.

3. Identify advantages of using water as an extinguishing agent.

4. Identify disadvantages of using water as an extinguishing agent.

5. Identify the three types of fire streams described in IFSTA Essentials.

6. Identify the difference between a straight stream and a solid stream as defined in IFSTA Essentials.

7. Identify the five categories of fire stream nozzles as described in IFSTA Essentials.

8. Identify "water hammer" and provide one method of prevention. (3-14.3)

9. Identify nozzle reaction.

10. Demonstrate how to open and close a nozzle as described in IFSTA Essentials. (3-14.4)

11. Demonstrate attacking a Class A and Class B fire under direct supervision. (3-14.2)

12. Identify methods of preventing damage to a nozzle and associated equipment as described in IFSTA Essentials.

13. Identify safe procedures in the handling of fire hose and directing fire streams.

14. Identify all reference material, record keeping procedures, and testing procedures.

15. Indicate knowledge of nozzle characteristics.

    15.1 Identify the characteristics of the following streams in accordance with illustrations provided in IFSTA Essentials:

    a) Solid stream

    b) Fog stream

    c) Broken stream (4-14.3).

    15.2 Identify the flow capacity of hand-held 1-in., 1 1/8-in., and 1 1/4-in. tips; master stream 1 1/4-in. to 2-in. tips; and 3/4-in.

to 1-in., 1 1/2-in., and 2 1/2-in. handheld line fog nozzles according to IFSTA Essentials.

15.3 Select the nozzle pressure for solid stream and fog nozzles according to manufacturer's recommendations or IFSTA Essentials.

15.4 Demonstrate the use of each type of nozzle as illustrated in IFSTA Essentials. (4-14.2)

16. Indicate knowledge of fire stream application.

16.1 Define direct, indirect, and combination methods of applying water according to definitions provided in IFSTA Essentials. (4-14.1)

16.2 Select appropriate nozzle and hose line for specific fire situations according to IFSTA Essentials.

16.3 Describe precautions to follow when advancing a hose line according to IFSTA Essentials. (4-14.4)

16.4 Identify three conditions that result in pressure loss in hose lines according to IFSTA Essentials. (4-14.5)

16.5 Identify four special purpose nozzles and demonstrate the application of two according to manufacturer's recommendations or illustrations provided in IFSTA Essentials. (4-14.6)

17. Indicate knowledge of fire foam application. (4-14.7)

17.1 Identify the three basic types of foam agents.

17.2 Identify and define foam-making appliances.

17.3 Describe or demonstrate foam stream characteristics from various nozzles.

18. The firefighter will identify three observable results that are obtained when the proper application of a fire stream is accomplished. (4-14.8)

19. The firefighter will identify and define those items required to develop three types of fire streams and shall demonstrate each. (4-14.9)

( ) Indicates reference to NFPA 1001.

Fire Streams Sample Practical Exam

Task: Handling and control of 1 1/2-in., 1 3/4-in., 2 1/2-in., and 3-in. hose lines. The candidate will be tested on the following.

1. Hold 1 1/2-in. hose alone.

2. Hold 1 1/2-in. hose using two people.

3. Hold 2 1/2-in. hose using high pressure loop.

4. Hold 2 1/2-in. hose using two-person method.

5. Hold 1 1/2-in. hose using three-person method.

6. Maneuver the nozzle.

7. Demonstrate proper handling of 1 1/2-in. and 1 3/4-in. hose line.

8. Demonstrate proper handling of 2 1/2-in. and 3-in. hose line.

9. Correctly apply 1 1/2-in. and 1 3/4-in. fog stream to simulated structure fire, being careful not to "over fog" the area, thereby upsetting the thermal balance.

10. Demonstrate the following stream applications:

    a. O pattern
    b. Z pattern
    c. Crisscross pattern

11. Explain the venturi principle for foam systems and demonstrate proper foam application.

12. Demonstrate the use of streams in the following situations:

    a. Ventilation techniques
    b. Water curtain
    c. Master stream situation

13. Demonstrate proper opening and closing of nozzles so as to avoid a water hammer.

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Section: Ventilation (NFPA 1001, 3-8 and 4-8)

Goal Statement: On completion of this subject, the student will fulfill the following objectives.

1. Know basic ventilation theory and practices.

    1.1 Identify the principles of ventilation including advantages and disadvantages as described in IFSTA Essentials. (3-8.1)

    1.2 Identify dangers present and precautions to take in performing ventilation as described in IFSTA Essentials. (3-8.2)

    1.3 Identify the theory of a "backdraft explosion" as defined in IFSTA Essentials. (3-8.6)

2. Know basic ventilation procedures.

    2.1 Demonstrate opening various windows with and without fire department tools or according to procedures outlined in IFSTA Essentials. (3-8.3)

    2.2 Demonstrate breaking glass and removing obstructions as described in IFSTA Essentials. (3-8.5)

    2.3 Demonstrate proper roof opening techniques using appropriate tools and procedures described in IFSTA Essentials. (3-8.5)

    2.4 Demonstrate floor ventilation procedures as described in IFSTA Essentials. (3-8.5)

3. Indicate knowledge of building construction applied to ventilation procedures.

    3.1 Identify roof features for ventilation purposes according to IFSTA Essentials. (4-8.2)

    3.2 List precautions to take when venting a structure according to class discussion or IFSTA Essentials. (4-8.2)

    3.3 Describe size of opening and appropriate location for vent opening according to prescribed procedures or IFSTA Essentials. (4-8.3)

    3.4 Describe methods used to vent a structure according to class discussion or IFSTA Essentials.

4. Demonstrate ventilation techniques.

    4.1 Demonstrate the use of different types of power saws and power tools according to manufacturer's recommendations or IFSTA Essentials. (4-8.4)

    4.2 Demonstrate the removal of skylights, scuttle covers, and other roof openings according to class discussion or IFSTA Essentials. (4-8.4)

4.3 Demonstrate equipment used in forced ventilation procedures according to manufacturer's recommendations or IFSTA Essentials. (4-8.5)

4.4 Demonstrate ventilation using water fog according to IFSTA Essentials. (4-8.6)

( ) Indicates reference to NFPA 1001.

Ventilation Sample Practical Exam

1. Indicate opening size and location required for a given fire problem involving vertical ventilation by going to the roof of the building and marking the outline of the decided opening on the roof.

2. Carry all needed ventilation equipment to the roof and explain how you would ventilate. Include all safety precautions and safety measures associated with the equipment.

3. Place equipment in a smoke-filled room and ventilate using horizontal methods.

4. Ventilate a smoke-filled room with a water stream.

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Section: Rescue (NFPA 1001, 3-10 and 4-10)

Goal Statement: On completion of this subject, the student will fulfill the following objectives.

1. Demonstrate the removal of injured persons from the immediate hazard by the use of carries, drags, and stretchers.

    1.1 Describe different methods of improvising a litter.

    1.2 Demonstrate the proper method of carrying a litter.

2. Demonstrate searching for victims in burning, smoke-filled buildings or other hostile environments.

    a. Primary search.
    b. Secondary search.

3. Identify the use of a life belt. (3-10.3)

4. Demonstrate techniques of removing debris, rubble, and other materials found at cave-ins or building collapse using prescribed methods described in class or IFSTA Essentials. (4-10.1)

5. Demonstrate the use of tools using manufacturer's recommendations and procedures described in IFSTA Essentials. (4-10.2)

6. Demonstrate techniques of preparing a victim for emergency transportation using standard equipment or improvised methods according to manufacturer's recommendations or descriptions provided in IFSTA Essentials.

7. Identify areas of danger in the following situations according to class discussion or IFSTA Essentials. (4-10.4)

    7.1 Tunnels and caves

    7.2 Water rescue

    7.3 Construction sites

    7.4 Building collapse

    7.5 Confined spaces

    7.6 Toxic atmospheres

    7.7 Industrial processes

    7.8 Transportation accidents.

8. Demonstrate auto extrication procedures. (4-10.5)

   8.1 Remove tempered glass according to the procedures discussed in class.

   8.2 Remove laminated glass according to procedures discussed in class.

   8.3 Pull a steering wheel.

   8.4 Open an inoperative door.

   8.5 Open a crushed top.

   8.6 Stabilize an automobile vehicle.

   8.7 Pull a seat.

   8.8 Proper care removing a victim from a vehicular accident.

9. Demonstrate lowering a victim from a third floor level using prescribed practices or the description provided in IFSTA Essentials. (4-10.6)

( ) Indicates reference to NFPA 1001.

Rescue Sample Practical Exam

Rescue Carry

1. Prepare victim for carry or drag.
2. Perform carry or drag designated.
3. Remove victim to area designated. Victim must be moved at least 10 ft.

Ladder Rescue

1. Perform rescue procedure designated.
2. Prepare victim for rescue designated.
3. Tie knot correctly if rope is used.
4. Space ladder and anchor for rescue.
5. Use correct procedure for designated procedure.

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Section: Communications (NFPA 1001-1987, 3-2 and 4-2)

Goal Statement: On completion of this subject, the student will fulfill the following objectives.

1. Identify the various methods of receiving alarms.

2. Identify the steps involved in the receiving and processing of an alarm at the local level.

3. Identify local fire department engine alarm response orders.

4. Demonstrate a knowledge of local geography and routing procedures.

5. Identify mobile, portable, and base station radio equipment.

6. Identify fire department radio, fireground, and mutual aid communication procedures.

( ) Indicates reference to NFPA 1001.

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Section: Sprinkler Systems (NFPA 1001, 3-16 and 4-16)

Goal Statement: On completion of this subject, the student will fulfill the following objectives.

1. Identify and operate the main drain and main control valve on an automatic sprinkler system.

2. Identify the dangers associated with the premature closure of the sprinkler main control valve.

3. Identify the problems associated with both the automatic sprinkler system and fireground water flow when they are from the same water source.

4. Identify at least three sources of water for supply to an automatic sprinkler system.

5. Identify the following:

   5.1 Wet sprinkler system

   5.2 Dry sprinkler system

   5.3 Deluge sprinkler system.

6. Demonstrate proper method of replacing a sprinkler head.

( ) Indicates reference to NFPA 1001.

Sprinkler Systems Sample Practical Exam

1. Connect hose lines to pump and installed fire sprinkler system.

   a. Make proper selection of device.

   b. Break caps, if necessary.

   c. Check for obstructions.

   d. Check gasket.

   e. Make connection. At least 100 ft of hose should be used.

   f. Straighten out hose line.

2. Demonstrate the proven method of replacing a sprinkler head.

3. The firefighter must stop the flow of water from an activated sprinkler head with the water turned on.

Section: Salvage (NFPA 1001, 3-17)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Identify the purpose of salvage and its value to the public and the fire department.

2. Identify the three values of good salvage practices when salvage operations begin in the firefighting sequence:

   a. In public relations
   b. To the building owner
   c. As it relates to firefighting.

3. Given salvage equipment, demonstrate the ability to protect both stationary and movable property from damage.

4. Demonstrate the covering or closing of openings made during firefighting operations.

( ) Indicates reference to NFPA 1001.

Salvage Sample Practical Exam, Part 1

One-Person Fold or Roll

1. Make designated roll or fold:

    a. One person roll
    b. One person fold.

2. Arrange materials to be covered correctly.

3. Carry and position salvage cover correctly.

4. Spread cover correctly:

    a. Roll
    b. Fold.

Two-Person Fold

1. Make two-person fold.

2. Arrange materials to be covered correctly.

3. Carry and position salvage cover correctly.

4. Spread cover correctly:

    a. Balloon throw
    b. Single-edge snap throw
    c. Double-edge snap throw
    d. Cross-over throw.

Specialized Salvage Operations

1. Construct catch-alls correctly.

2. Construct chutes correctly:

    a. Correct direction for water flow
    b. Splices cover correctly.

3. Construct dike correctly.

4. Construct bag-all correctly.

Salvage Sample Practical Exam, Part 2

In this evaluation, the candidate will be evaluated on his/her ability to function within a team and individually perform various salvage cover operations. The evaluator will select five of the rolls, folds, or usages below.

Rolls

1. One-person spread.

Folds

1. One-person spread.
2. Two-person spread.

Usages

1. One-person spread from roll.
2. One-person spread from fold.
3. Two-person spread from fold.
4. Water chute downstairs.
5. Water chute using pike poles.
6. Dikes.
7. Floor runner.

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Section: Fire Inspections (NFPA 1001, 3-19 and 4-19)

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Identify the common causes of fires and their prevention.
2. Identify the fire inspection procedures.
3. Define the importance of public relations relative to the inspection programs.
4. Define dwelling inspection procedures.
5. Prepare surveys of buildings to record the location of items of concern during prefire planning operations.
6. Collect and record, in writing, information required for preparing a report on a building inspection or survey.
7. Identify building exit drill procedures.
8. Identify life safety programs for the home.
9. Identify common fire hazards and make recommendations for their correction.

( ) Indicates reference to NFPA 1001.

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Section: Fire Cause and Origin [IFSTA - Fire Cause Determination, Chapters 5-7]

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Identify responsibilities of the firefighter in determining fire cause and its point of origin.

2. Identify the importance of their responsibility in the protection of evidence at a fire scene.

[ ] Indicates reference to IFSTA Training Manual.

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Section: Hazardous Materials

Goal Statement: On completion of this subject, the student must fulfill the following objectives.

1. Safety

   1.1 Describe how HAZMAT incidents are different from other emergencies.

   1.2 Describe at least six ways HAZMAT is harmful to people at HAZMAT incidents.

   1.3 Describe the general routes of entry for human exposure to HAZMAT.

   1.4 Describe the limitations of street clothes or work uniforms at the scene of HAZMAT incidents.

   1.5 Describe the threats posed to property and the environment by HAZMAT releases.

   1.6 Describe precautions necessary when rendering emergency medical care to victims of HAZMAT incidents.

   1.7 Identify typical ignition sources found at the scene of HAZMAT incidents.

   1.8 Define the following chemical and physical properties.

      a. Boiling point
      b. Flash point
      c. Specific gravity
      d. Vapor density
      e. Water solubility.

2. Resources and planning

   2.1 Describe the local procedures for requesting additional resources for dealing with HAZMAT incidents.

   2.2 Describe the role of the first responder at the scene of a HAZMAT incident, as identified in the local contingency plan for HAZMAT incidents.

3. Incident management

   3.1 Describe the purpose, need, and benefits of an Incident Command System at the scene of a HAZMAT incident.

   3.2 Describe the process for implementing the Incident Command System at HAZMAT emergencies.

   3.3 Describe the basic techniques used to deny site entry.

3.4 Describe the basic techniques used to isolate the immediate site.

3.5 Describe the techniques for evacuation in HAZMAT incidents.

4. Recognition of HAZMAT

4.1 Given a list of nine HAZMAT classes, describe the primary hazards of each class and give examples of each.

4.2 Use the six groups of clues to detect the presence of HAZMAT.

4.3 Identify typical locations on the site or facility where HAZMAT is manufactured, transported, stored, used, or disposed of.

4.4 Describe placards, labels, and shipping papers used in the transportation of HAZMAT and explain their advantages and limitations in recognizing HAZMAT.

4.5 Identify the shipping papers found in various modes of transportation, the individuals responsible for the papers, and the location where carried and found during an incident.

4.6 Given various examples of containers and packaging, identify the containers and packages by name and give an example of the materials that may typically be found inside.

4.7 Describe the types of specialized marking systems found at fixed facilities (such as military or special hazard communication markings [NFPA 704]).

5. Classification, identification, and verification

5.1 Define HAZMAT.

5.2 Identify the specific name of HAZMAT involved in an emergency, or at least classify the material by its primary hazard using container markings, placards, labels, pesticide labeling, shipping papers, MSDSs, or personal contacts.

5.3 Identify three sources of obtaining response information about HAZMAT and describe the types of information provided in each.

5.4 Demonstrate the use of the DOT *Emergency Response Guidebook* [ERG] *1990: Guidebook for First Response to Hazardous Material Incidents* in assessing hazards and response actions, and determining isolation and evacuation distances.

5.5 Demonstrate the use of an MSDS in obtaining hazard and response information in an emergency.

5.6 Explain the difficulties encountered in identifying the specific name of HAZMAT and its hazard and response information in an emergency.

5.7 Describe the risk associated with HAZMAT located and transported through the community or facility and its potential threat to people, property, or the environment.

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APPENDIX H

PREFIRE PLANS

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CONTENTS

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APPENDIX H

H.1 FIRE DRILLS

There are two aspects of fire drills that should be addressed in the fire department and emergency response program. First, fire drills are required to be conducted in several occupancies per National Fire Protection Association (NFPA) 101. The program should discuss these drills and which buildings are required to have drills to satisfy this requirement. The other aspect are fire drills that are performed within the fire department and emergency response organization for training purposes. All the drills should be documented and critiqued. The drills should be coordinated with the fire and emergency response department.

H.2 SALVAGE PLANS

General salvage plans should be in place for post firefighting activities. For those facilities where added precautions must be taken due to the facility contents, e.g. computer equipment, the plan should be expanded to include the specific actions to be taken to reduce equipment damage and downtime.

H.3 PREFIRE PLANS

Prefire plans should be developed for all facilities, although their length and detail may vary depending on the facility's size and complexity. The prefire plans should be updated on a regular schedule to ensure firefighters are kept abreast of any changes to the facilities. NFPA 13E should be used to assist in developing the plans. Since there is no mandated schedule for updating prefire plans, one may consider using the same frequency required for facility fire protection appraisals as required in U.S. Department of Energy (DOE) 5480.7A, or a modified frequency of 1 year, 3 years, and 5 years may be more appropriate for these plans. Provided below is an example of how this requirement could be implemented as well as an example of what a prefire plan should include.

Prefire plans will be performed for facilities based on the following frequency:

- Annually for facilities having a replacement cost value (including contents) $\geq$ \$50 million.
- Every 2 years for facilities having a replacement cost value (including contents) from \$10 million to \$50 million.
- Every 3 years for facilities having a replacement cost value (including contents) < \$10 million.

The prefire plans shall address the following items as a <u>minimum</u>:

- Building occupancy
- Special hazards
- Fire protection systems provided for the building
- Location of fire hydrants
- Location of fire department connections (FDC)
- Water supply available
- Exposures
- Plan of attack

H.3.1 Writing Prefire Plans

FRONT PAGE

Building:

If the plan is for multiple buildings sharing a common alarm system, list all involved buildings.

Box No:

If there is more than one box on the building, all box numbers should be listed. Annunciator panel locations should also be listed.

Special Hazards:

This is very important information and efforts should be made to ensure that all special hazards are listed. Examples would include physical hazards, such as radioactive sources; chemical hazards (hazardous material [HAZMAT]); and configuration hazards, such as pits with low oxygen content.

Exposures:

This should be a list of any buildings and/or other exposures that might possibly be affected in an emergency situation.

Special Exposures:

Included in this category would be anything that increases hazard potential, such as propane tanks, contaminated structures with a high possibility of particle releases to the atmosphere, transformers, polychlorinated biphenyls (PCB), overhead power lines, HAZMAT, hazardous waste, etc.

Equipment Response:

Note what equipment would normally respond to alarms in this facility, as well as any special equipment that might be needed. Also list backup equipment for second alarm response.

Electrical Disconnect:

Note the location of the MAIN electrical disconnect on the building. Its location should also be pinpointed on the building floor plan.

Nearest Hydrant:

Give the hydrant number, direction and distance from the building, and show all hydrants on the area plan.

Water Available:

Document the water supply available.

Type of Automatic Alarm Systems:

This section may be general or deleted since the same information is listed in greater detail under Annunciator and/or Fire Zones.

Sprinkler Systems:

If applicable, describe the type of sprinkler systems in the building.

Composition of Facility:

Provide a description of the construction of the building.

Plan of Attack:

This will vary from plan to plan. This section should include where each fire engine is to be located, and any special information necessary for attacking fires in the building. Areas that are difficult to access should be noted also.

If information is needed for special access information, such as key location or the need to notify a certain individual to gain access, this should be noted here. If any special notifications are required, this should also be listed.

Entry:

The entry section should include a list of <u>all</u> entrances to the building. If a special key is needed or if a particular person needs to be notified to gain access, that should be listed here. Types of entries should be listed, such as a 12-ft rollup door or a 3-ft personnel door. A recommendation should be included as to what door would provide the best access to the building under emergency conditions. Approach this section as if you had very little personal knowledge of the building and had to decide how to enter the building based on what is written in the plan.

Electrical Service and Hazards:

Voltage of the electrical service in the building should be listed as well as locations of main electrical disconnects. Any special hazards, such as extremely high voltage or battery rooms, should also be noted.

Radiation and Contamination:

Areas that are contaminated should be listed here in such a manner that they can be identified from the floor plan. Types of contamination should be identified, such as airborne, surface, etc. Radioactive sources contained in the building should also be noted. If special firefighting techniques need to be used, that information should also be listed (i.e., <u>no water</u>, or <u>water fog only</u> areas).

Toxic Gases and Hazardous Chemicals:

Note locations and types of gases and chemicals. Any special precautions to be taken because of such gases or chemicals also need to be listed. If antidotes are necessary to offset effects of chemicals, or special cleanup methods are required, this information should be included. Any HAZMAT problems should be listed here in detail, along with product names, manufacturers, etc. where practical.

Protective Clothing:

Types of clothing required for emergency entry, such as bunker gear, bunker gear with air pack, HAZMAT suits, etc. should be listed here. Minimum clothing requirements include full bunker gear and self-contained breathing apparatus (SCBA) for all building entries anytime the cause of alarm is not known.

Rescue:

If there are any special considerations to take into account in a rescue situation, they should be listed here. Examples could include pits with low oxygen content, extremely high radiation areas, difficult to enter places, confined space areas, etc. Do not be concerned about repeating information found in other sections of the plan. Someone using the plan should be able to locate information they need in any category. For example, high radiation areas can be listed both here and in the Radiation and Contamination section.

Extinguishment:

Any unusual materials or methods required for extinguishment should be listed here. Examples include: water fog only, or dry-chemical only. If there are no unusual requirements, simply state that all agents are acceptable.

Combustibles:

Classes of combustibles may be listed, particularly if they include unusual types, such as flammable metals. Other combustibles not normally found in buildings, such as solvents in quantity and flammable liquids, should be noted here. It is NOT necessary to list normal cleaning agents and thinners unless they are present in unusual quantities, such as paint storage warehouses, or janitorial supply warehouses.

Ventilation:

Recommended ventilation methods should be listed here. For example, in many contaminated buildings, ventilation should be through the building system if possible, to filter out all radioactive particles. This needs to be noted here. Another example would be whether or not the building ventilation automatically shuts down when an alarm is activated. Any other unusual ventilation requirements should also be listed in this section.

Salvage Operations:

High-value equipment that can be removed from the building or protected in a fire situation should be listed in this section. Also included might be sensitive files and/or irreplaceable paperwork. Building administrators and managers are good sources for this information. If no special information is necessary, simply list that normal salvage operations are required.

Fire Detection and Protective Equipment:

Types of systems, their location, riser numbers, and other pertinent information, should be noted in this section. Specific details as to what areas of the building they cover can go in Annunciator and/or Fire Zones, but locations of risers, drain valves (particularly on dry systems), inspector's test valves, FDCs, etc. should be listed. These should also be noted on the building floor plan. Any unusual protective equipment, such as Halon[1] systems, foam systems, and carbon dioxide (CO_2) systems, needs to be listed here.

Heating and Ventilation:

List the types of heating and ventilation systems such as heat pumps, gas, and steam. If special operating instructions for ventilation systems are necessary, describe them here, or explain where to locate them. Anything unusual that might be pertinent to a fire situation should be noted, such as gas shutoff location, heating, ventilation, and air conditioning (HVAC) reset, or bypass location.

[1]Halon is a trademark of Allied Chemical Corporation.

Annunciator and/or Fire Zones:

This section should list each zone and what areas of the building are covered. It should also tell what types of detection systems are in each zone. This information should also be on building maps. An example would be:

Zone 1 - Covers office wing of building. Sprinklers from riser one cover the section and auxiliary boxes are also in the zone, one by each exterior door. (See map).

H.3.2 Miscellaneous Information

Area maps should be included with all prefire plans. These should show all pertinent details, including hydrant location, radio box location, and annunciator panel. Floor plans should be attached, if available. Sprinkler system locations and FDCs should also be listed.

FACILITY PREFIRE PLAN

Building No.: 224-U Master Box No.: 2960

C Platoon Area: 200W Date: March 1991

WP MC Entered Contractor: WHC Th: X F: Year: 1994

Occupancy: UO_3

Special Hazards:

Exposures: 224-UA, 277-U, 222-U, 203-UX, 2715-U, 2715-UA

Special Exposures: 2300 V transformer bank at the southeast end of building

Equipment Response: Fire engine 2, Fire engine 1, Unit 3, HAZMAT 1, if chemicals involved

Location of Electrical Disconnect:

Nearest Hydrant: U-3 - 85 ft

Water Available: 2,000 gpm sanitary
Type of Automatic Alarm Systems: ????
2,000 gpm raw water

Sprinkler Systems: Wet pipe and deluge

COMPOSITION OF FACILITY

Length: 200 ft Width: 87 ft, SE end/61 ft, NE end Height: 52-ft

Type Construction: Steel and concrete Framing: Steel and concrete and transite Interio

Partitions: Concrete block and metal Exterior Covering: Concrete

Roof Construction: Concrete Roof Covering: Tar and gravel

PLAN OF ATTACK

First company will respond west of building and conduct size-up to ascertain correction location of fire. Second company will respond west of building and stand by until notified of desired hose lay or lays. Due to arrangement of the building, correct hose lays cannot be executed without information from the first company.

____
Building Management Representative

____
Fire Department Officer's Concurrence

1. ENTRY

There are numerous doorways on the first level. There are six on the northwest side of the structure and seven on the southeast side. One doorway exists on both southwest and northeast ends of the building.

2. ELECTRICAL SERVICE and HAZARDS

There is a 2300-V transformer bank at the southwest end of the building. The southwest end of the second floor contains a small transformer and switch gear. Also, on the second floor near the switchgear room is a battery backup room. The third floor has a control panel for all operations. Fan room and major switchgear panels are located centrally on the first floor.

3. RADIATION - CONTAMINATION

There is radiation and contamination in all cell areas and in the storage and scale room. Mostly low levels in these areas.

4. TOXIC GASES - HAZARDOUS CHEMICALS

There is a phosphoric acid and sulfuric acid pumping room on the second floor of the building. Also the 203-UX tanks on the south side of the building contain uranium nitrate hexahydrate (UNH). The 203-U tanks have three tanks containing UNH, one tank containing dilute nitric acid, and one tank with potassium hydroxide (caustic).

5. PROTECTIVE CLOTHING

Firefighters' turnouts plus Scott air masks.

6. RESCUE

Upper limits of the building rescue would be done by rope sling or stairwells. Normal rescue procedures would prevail on the first floor.

7. EXTINGUISHMENT

Water is acceptable in all parts of the building. Use caution where high voltage may be present. May use HAZMAT team in chemical related situations.

8. COMBUSTIBLES

Class "A", "B", and "C" material may be found.

9. VENTILATION

This would best be accomplished through the building ventilation system and exhaust system. Smoke ejectors and doors may be used. There are no windows in this structure.

10. SALVAGE OPERATIONS

Normal salvage operations will apply.

11. FIRE DETECTION AND PROTECTION EQUIPMENT

The building is protected by wet pipe sprinkler system, smoke detectors, and auxiliary boxes. The transformer bank outside the northwest end of the building is protected by a dry pipe deluge system. The main wet pipe sprinkler system is located in the second office to the left from the main entrance. The inspector's test valves for the wet pipe are located at these places: first floor at system, second floor northeast end of building, and third floor at northeast end of building.

At the northwest end of the building is a deluge system located in the scale room by the special work permit (SWP) lobby. This system covers the transformers at the northwest end of the building.

12. HEATING AND VENTILATION

The building is heated by steam. There is a ventilating system and duct work on all floors with exhaust louvers on each floor level. Ventilating system is not an automatic shutdown-type system connected into the alarm system in the building. This is a new alarm system.

13. ANNUNCIATOR AND/OR FIRE ZONES

Zone 1 - Postindicator valve (PIV) tamper

Zone 2 - 1st floor - Three auxiliary boxes are located at the following places: the panel, the men's SWP change room, and the complex south end. This area also covered by sprinkler 8.

Zone 3 - 1st floor loading room.

Zone 4 - 2nd floor - Two smoke detectors are located in the south end electrical room, one auxiliary box in the north end by the stairs, and one auxiliary box at the south end by the stairs. The area is also sprinklered.

Zone 5 - 3rd floor - Five smoke detectors: 1) south end, 2) south end middle, 3) north end middle, 4) north end middle, and 5) north end. The area is also sprinklered.

Zone 6 - Roof--antifreeze loops flow switch and hoseline.

Zone 7 - Deluge for transformers.

Zone 8 - Pressure switch on wet pipe sprinkler system.

Zone 9 - Duct work 1st floor--one smoke detector above main entry.

H.4 PHYSICAL FITNESS PROGRAM

The physical fitness program for firefighters and emergency personnel must be consistent with the applicable NFPA Standards and should be tailored to meet the specific requirements unique to the site. Training records must be maintained for each person. Following is an example of a physical fitness policy and program.

FITNESS POLICY AND PROGRAM

1.0 PURPOSE

1.1 To establish and implement an ongoing program of physical exercise and health education that will promote improved physical agility, endurance, and mental alertness of members for the safe and sound performance of their duties.

1.2 To develop and implement an evaluation process that will determine the physical fitness level of members of the Fire Department and that will monitor the progression of change in each member's level of fitness.

1.3 To establish physical fitness guidelines.

1.4 To develop personally designed schedules of progress for members to meet their individual goals.

1.5 To provide the means for members to improve and maintain their physical fitness and well being.

2.0 ORGANIZATION AFFECTED

2.1 The Fire Department

3.0 REFERENCES

3.1 Fire departments
Arlington, VA
Bellevue, WA
Dade County, FL
Fairfax, VA
Los Angeles, CA
Phoenix, AZ
San Francisco, CA
Seattle, WA
Spokane, WA
U.S. Forest Service

3.2 Other references

Allsen, Harrison, Vance; *Fitness for Life*, 2nd Edition, Wm. C. Brown Co., 1980.

Astrand, Per-Olaf, M.D., *Work Tests with the Bicycle Ergometer*.

Cooper, Kenneth, *The Aerobics Way*, Lippincott Co., Philadelphia, 1982.

4.0 PROGRAM SPECIFICS

4.1 Body fat analysis: Using the caliper method. Interim body fat assessments may be performed using the tape measure method.

4.2 Strength, endurance and flexibility:

Push-ups	Sit and reach
Curl-ups	Arm hang

4.3 Health risk appraisal: Individuals are free to use the appraisal at any time.

4.4 Exercise prescription: Each participant being evaluated will be categorized according to performance by age and sex. After the fitness level is determined, the areas in need of improvement will be identified. On request, a goal (exercise prescription) will be set up for the individual to work towards. The exercise prescription is <u>purely</u> <u>optional</u> and will in no way cause job jeopardy for that individual.

4.5 Following their yearly physical examinations, an annual Fitness Evaluation will be given to all participants that exercise during their duty day. The fitness specialist or trained volunteers will administer the evaluations. Training consists of a fitness orientation given by the fitness specialist. Results from the evaluations will be tracked and kept confidential on request by the participants. Departmental progress will be tracked but NO NAMES WILL BE USED FOR THESE REPORTS.

4.6 The annual fitness evaluation shall consist of the same items as the initial fitness evaluation, with the following additional cardiovascular evaluation options:

4.6.1 National Fitness Test 3-Minute Bench Step.

4.6.2 Astrand Submaximal Bicycle Test.

Administered by fitness specialist only.

4.6.3 National Fitness Test 1 1/2 mile Run.

Administered by the fitness specialist only. The participant must have had a recent Astrand Submaximal Bicycle Ergometer Test, scoring <u>at</u> <u>least</u> 30 ml/kg.min.02 and have a special physician approval to take the test.

4.6.4 National Fitness Test 3-mile Walk.

This can be administered during the annual fitness evaluation by the fitness specialist or trained personnel in place of the other cardiovascular evaluations offered.

4.6.5 Treadmill Test

The tread mill test will be administered by one of the local cardiologists, on request, and will be paid for by the fire department. This test is limited to those 35 years or older, or to those having a family history of heart disease.

4.6.7 All personnel who have been through the Fitness Equipment Orientation will be issued a pair of sweatsuits, on request and when available.

4.6.8 All fire department personnel shall be given, on request, a copy of the Physical Fitness Manual.

5.0 GENERAL RULES

5.1 In case of an alarm, all personnel will take their assigned positions on the various fire engine.

5.2 Other fitness activities may be approved, but those requesting them should submit them to the fitness committee for evaluation.

5.3 Training, classes, emergencies, work requirements, and unusual circumstances will supersede the exercise period.

5.4 The exercise period will include shower time, if needed. Those participating will be ready to work at the end of the exercise period. (This does not apply to Platoon personnel exercising from 3:00 p.m. to 4:00 p.m.)

5.5 Participation will be voluntary for all members. There will be no job jeopardy involved in failure to meet the goals.

5.6 Those members not exercising during their work day (8-4 p.m. for Platoon; 7 a.m.-5 p.m. for Testing and Services) will be expected to take up the regular station duties, including radio watches and box maintenance, although there will be no make-work-type activities assigned to punish those who choose not to participate.

5.7 Personnel working overtime are not allowed to exercise during their work day. The only exception is for fire fighters who are on suppression holdovers to meet the minimum personnel requirements.

5.8 Participants may use their own exercise accessories, but are not allowed to use their own personal exercise equipment. For clarification on these items, please contact the fitness specialist or a fitness committee member.

6.0 RESPONSIBILITIES

6.1 Tracking

a. Individual log--each participant will be issued an exercise card to track their individual workouts.

b. Shift log--each shift captain will fill out a weekly participation log for each participant and will tally and submit the total hours for recording in the monthly report.

c. Department log--the fitness specialist will tally the monthly, quarterly, semiannual, and annual report on participation for the fire department.

d. Annual fitness evaluation--The fitness specialist or trained personnel will administer the annual fitness evaluation to those participating during their work day.

e. Annual fitness orientation--The fitness specialist will conduct annual fitness orientations for all participants.

H.5 HAZARDOUS MATERIAL PROGRAM

The HAZMAT program should comply with Occupational Safety and Health Administration (OSHA) 1910.120, NFPA 472, and Department of Transportation (DOT) requirements. When developing a HAZMAT program, special attention should be given to coordinating with the other disciplines that may be required to support the program, or who may be directly affected by an emergency response (e.g. Site Patrol). Provided below is a reference manual that may be helpful in accomplishing this task.

The attached instructional objectives and learning outcomes have been prepared to support educational activities designed to train DOE fire service personnel to the DOT HAZMAT First Responder level. Each objective is a statement of the skills and/or body of knowledge a person must achieve to attain this level of competence.

The International Fire Service Training Association (IFSTA) HAZMAT First Responder Manual shall be used as the textbook for this course. Selected reading assignments may be made to supplement classroom instruction, and the students shall be responsible for all material in this manual.

Written examinations, daily quizzes, and performance evaluations shall be correlated to specific objectives. The final practical and written examinations shall be given by the agency providing the training. A score of 70% or greater is required to pass the written and practical exams. If a person fails either the written or practical exam, they may retake the exam no sooner than 14 days after the exam was taken. If the exam is failed a second time, the student shall retake the class before being allowed to take the exam a third time. Anyone failing the exam a third time shall not be certified as a DOE firefighter. The results of the exam shall become a permanent part of the firefighter's training record.

A complete instructor's manual including daily lesson plans, overheads, quizzes, and final exams is available for a minimal fee from the Illinois Fire Service Institute in Champaign, Illinois. The organization presenting the 40-hour training course also has the option of preparing their own package for the program.

Section: Awareness

Goal Statement: On completion of this section, the student will fulfill the following objectives.

1. Describe how HAZMAT incidents are different from other emergencies.

2. Describe at least six ways HAZMAT is harmful to people at HAZMAT incidents.

3. Describe the general routes of entry for human exposure to HAZMAT.

4. Describe the limitations of street clothes or work uniforms at the scene of HAZMAT incidents.

5. Describe the threats posed to property and the environment by HAZMAT releases.

6. Describe precautions necessary when rendering emergency medical care to victims of HAZMAT incidents.

7. Identify typical ignition sources found at the scene of HAZMAT incidents.

8. Describe the local procedures for requesting additional resources for dealing with HAZMAT incidents.

9. Describe the role of the first responder at the scene of a HAZMAT incident, as identified in the local contingency plan for HAZMAT incidents.

10. Describe the purpose, need, and benefits of an Incident Command System at the scene of a HAZMAT incident.

11. Describe the process for implementing the Incident Command System at HAZMAT emergencies.

12. Describe the basic techniques used to deny site entry.

13. Describe the basic techniques used to isolate the immediate site.

14. Describe the techniques for evacuation in HAZMAT incidents.

15. List the nine HAZMAT classes, describe the primary hazards of each class, and give examples of each.

16. Use the six groups of clues to detect the presence of HAZMAT.

17. Identify typical locations in the community or facility where HAZMAT is manufactured, transported, stored, used, or disposed of.

18. Describe placards, labels, and shipping papers used in the

transportation of HAZMAT and explain their advantages and limitations in recognizing HAZMAT.

19. Identify the shipping papers found in various modes of transportation, the individuals responsible for the papers, and the location where carried and found during an incident.

20. Given various examples of containers and packaging, identify the containers and packages by name, and give an example of the materials that may typically be found inside.

21. Describe the types of specialized marking systems found at fixed facilities (such as military, special hazard communication markings, and NFPA 704).

22. Define HAZMAT.

23. Identify the specific name of HAZMAT involved in an emergency or at least classify the material by its primary hazard using container markings, placards, labels, pesticide labeling, shipping papers, Material Safety Data Sheets (MSDS), or personal contacts.

24. Identify three sources of obtaining response information about HAZMAT and describe the types of information provided in each.

25. Demonstrate the use of the DOT *Emergency Response Guidebook 1990: Guidebook for First Response to Hazardous Material Incidents* in assessing the hazards and response actions and determining isolation and evacuation distances.

26. Demonstrate the use of an MSDS in obtaining hazard and response information in an emergency.

27. Explain the difficulties encountered in identifying the specific name of HAZMAT and their hazard and response information in an emergency.

28. Describe the risk associated with HAZMAT located and transported through the community or facility and its potential threat to people, property, or the environment.

Section: Operations

Goal Statement: On completion of this section, the student will fulfill the following objectives.

1. Describe the importance of the buddy system in controlling HAZMAT incidents.

2. Identify the advantages and dangers of search and rescue missions at HAZMAT incidents.

3. Identify the advantages and hazards associated with the rescue, extrication, and removal of a victim from a HAZMAT incident.

4. Describe the precautions to be taken to protect oneself when fighting fires involving HAZMAT.

5. Define BLEVE [boiling liquid expanding vapor explosion] and describe what happens to the container when a BLEVE occurs and how a BLEVE can be prevented.

6. Describe when it may be prudent to pull back from a HAZMAT incident.

7. Describe the hazards and precautions to be observed when approaching a HAZMAT incident.

8. Describe the levels of HAZMAT incidents and incident responders identified in the local contingency plan.

9. Describe the need for a HAZMAT response plan and describe the major elements of the plan.

10. Describe the importance of coordinating between various agencies at the scene of HAZMAT incidents.

11. Describe the importance of preemergency planning related to specific sites.

12. Describe the elements of the Incident Command System to ensure coordination of response activities at HAZMAT incidents.

13. Given a simulated HAZMAT incident, demonstrate the ability to

    a. Assume command
    b. Establish scene control through control zones
    c. Establish a command post.

14. Identify the criteria for determining the location of the control zones for a HAZMAT incident.

15. Describe your organization's standard operating procedures relating to HAZMAT.

16. Given a pesticide label, identify and explain the significance of the following:

    a. Name of pesticide
    b. Signal word
    c. EPA registration number
    d. Precautionary statement
    e. Hazard statement
    f. Active ingredient.

17. Describe the assistance provided by a chemical transportation emergency center (CHEMTREC), how to contact CHEMTREC, and what information the first responder should furnish CHEMTREC.

18. Given an MSDS, select and interpret information that is useful in determining the hazards of the chemical.

19. Define the following chemical and physical properties and describe their importance in the risk assessment process:

    a. Boiling point
    b. Flammable or explosive limits
    c. Flash point
    d. Ignition or autoignition limits
    e. Specific gravity
    f. Vapor density
    g. Vapor pressure
    h. Water solubility.

20. Define the following terms:

    a. Alpha radiation
    b. Beta radiation
    c. Gamma radiation.

21. Identify the physical requirements of the wearer of an SCBA.

22. Describe the limitations of personnel working with an SCBA.

23. List the types of SCBA and describe the advantages and limitations of each at HAZMAT incidents.

24. Identify the procedure for cleaning and sanitizing SCBA for future use.

25. Identify the operational components of the types of SCBA provided by the authority having jurisdiction (AHJ) and explain their function.

26. Describe the need for specialized protective clothing used at HAZMAT incidents.

27. Describe the application, use, and limitations of the following levels of protective clothing used at HAZMAT incidents:

    a. Structural firefighting clothing
    b. Nonencapsulating chemical protective clothing
    c. Encapsulating chemical protective clothing
    d. High temperature clothing.

28. Demonstrate the proper donning, doffing, and use of all personal protective equipment provided to the first responder by the AHJ for use in normal response activities.

29. Describe the factors to be considered in the selection of the proper respiratory protection at HAZMAT incidents.

30. Describe the techniques for controlling HAZMAT releases available to the first responder.

31. Describe the need of decontamination procedures at HAZMAT incidents.

32. Describe the ways that personnel, personal protective equipment, apparatus, tools, and equipment become contaminated and the importance and limitations of decontamination procedures.

33. Demonstrate the basic decontamination procedures as defined by the AHJ for victims, personnel, personal protective equipment, tools, equipment, and apparatus at HAZMAT incidents.

34. Describe the importance of documentation for a HAZMAT incident including training records, exposure records, intent reports, and critique reports.

35. Demonstrate the ability to keep an activity log and exposure records for HAZMAT incidents.

H.6 MUTUAL AID

Although it is not specifically required by a DOE directive, each site should evaluate their need for a mutual aid agreement with other local and community emergency response forces. This will ensure adequate equipment and personnel are available if conditions warrant additional resources beyond the capability of the site's department. Provided below is an example of a mutual aid agreement.

MUTUAL AID AGREEMENT

THIS AGREEMENT, made and entered into on this ____________ day of ________, 19___ by and between the cities of Richland, Kennewick, and Pasco and the Fire Protection Districts Benton County 1, Benton County 2, Benton County 3, Benton County 4, Benton County 5, Benton County 6, Franklin County 3, Walla Walla County 5, and the Hanford Fire Department.

WITNESSETH:

WHEREAS, each of the parties hereto maintains equipment and personnel for suppressing fires within its own jurisdiction and areas, and

WHEREAS, the parties hereto desire to augment the fire and emergency medical protection available in their various establishments, districts, agencies, and municipalities in the event of large fires, conflagrations, or other disaster, and

WHEREAS, the lands or districts of the parties hereto are adjacent or contiguous so that mutual assistance in a fire or medical emergency is deemed feasible, and

WHEREAS, it is the policy of the above municipalities or other districts and of their governing bodies to conclude such agreements wherever practicable, and

WHEREAS, it is mutually deemed sound, desirable, practicable, and beneficial for the parties to this agreement to render assistance to one another in accordance with these terms:

THEREFORE, BE IT AGREED THAT:

1. Whenever it is deemed advisable by the commanding officer of a fire department belonging to a party of this agreement, or by the commanding officer of any such fire department actually present at any fire or other emergency including any medical emergency, to request assistance under the terms of this agreement, the commanding officer is authorized to do so. The commanding officer, or authorized subordinates, of the department receiving the request shall immediately take the following actions.

A. Immediately determine if fire engine and personnel can be spared in response to the call.

B. Determine what fire engine and personnel might be most effectively dispatched.

C. Determine the exact mission to be assigned in accordance with the detailed plans and procedures of operation drawn in accordance with this agreement by the technical heads of the fire departments concerned.

D. Immediately dispatch such fire engine and personnel as, in the judgment of the responsible officer receiving the call, should be sent. Include complete instructions as to the mission, in accordance with the terms of this agreement.

2. The rendering of assistance under the terms of this agreement shall not be mandatory, but the party receiving the request for assistance should immediately inform the requesting agency if, for any reason assistance cannot be rendered.

3. A. Each party to this agreement waives all claims against the other party or parties for compensating any loss, damage, personal injury, or death occurring in consequence of the performance of this agreement.

   B. All service performed under this agreement shall be rendered without reimbursement of either party or parties.

4. The commanding officer of the fire department requesting assistance shall assume full charge of the operations. If the officer specifically requests a senior officer of a fire department furnishing assistance to command, the officer shall not, by relinquishing command, be relieved of the responsibility for the operation. This is providing that the fire engine, personnel, and equipment of the agency rendering assistance shall be under the immediate supervision of, and shall be the immediate responsibility of, the senior responding fire officer or the commanding officer of the department rendering assistance.

5. The chief fire officer and personnel of the fire departments of all parties to this agreement are invited and encouraged on a reciprocal basis to frequently visit each other's activities for guided familiarization tours. This should be consistent with local security requirements and, as feasible, to jointly conduct prefire planning inspections and drills.

6. The commanding officers of the fire departments of the parties to this agreement are authorized to meet and draft any detailed plans and procedures of operation necessary to effectively implement this

agreement. Such plans and procedures of operation shall become effective on ratification by the signatory parties.

7. This agreement shall become effective upon the date hereof and shall remain in full force and effect until canceled by mutual agreement of the parties hereto or by written notice from one party to the other party giving ten (10) days' notice of said cancellation.

8. SIGNATURES

____

____

____

____

H.7 BUILDING TOURS

Building tours are necessary to assist emergency response and fire department personnel in developing the prefire plans and to enhance building familiarity. The tours should be documented and performed annually on a minimum number of the total buildings at the site. The actual number of tours performed each year will vary depending on the size of the site, but the minimum goal should be at least 25% of the total number of buildings per year. Provided below is an example of a Building Tour Form that may be used for documentation and to assist in identifying problems while conducting the tour.

INSPECTION FORM

<u>Code Compliance</u>
Yes No N/A

MISCELLANEOUS

( ) ( ) ( ) Prefire plan posted
( ) ( ) ( ) Fire lanes properly posted and maintained (NFPA 1,3-1.1.10)
( ) ( ) ( ) Vacant buildings locked and barricaded (NFPA 1,3-1.1.9)
( ) ( ) ( ) Perimeter of building free of combustible materials (NFPA 1,3-1.1)

EXITS

( ) ( ) ( ) Ample in number (NFPA 1,3-4.1.1 and NFPA 101)
( ) ( ) ( ) Exit signs posted (NFPA 1,3-4.1.1 and NFPA 101)
( ) ( ) ( ) Stairway and hallway doors operable and unlocked (NFPA 1,3-4.1.1 and NFPA 101)
( ) ( ) ( ) Storage of combustible materials near exits (NFPA 1,3-4.1.1 and NFPA 10
( ) ( ) ( ) Exit access clear (NFPA 1,3-4.1.5)
( ) ( ) ( ) Emergency lighting operable (29 CFR 1910 b7)
( ) ( ) ( ) Nonexits clearly marked (29 CFR 1910 b4 and b6)

FIRE DOORS

( ) ( ) ( ) Closed and operable (NFPA 80, 15-1.2)

ELECTRICAL

( ) ( ) ( ) Main electrical shutoff (location________________)
( ) ( ) ( ) Proper use of small appliances, power cords, and outlets (NFPA 1,3-1.2.2)
( ) ( ) ( ) Proper location of above (NFPA 1,3-1.2.2)

ALARM OR DETECTION SYSTEMS

( ) ( ) ( ) Specify type ____________________

FIRE ALARM CONTROL PANEL

( ) ( ) ( ) Accessible and locked
Location (zone no.) ____________________
RFAR Box No. ____________________

STORAGE CONCERNS

Explanation ____________________

EXTINGUISHERS

( ) ( ) ( ) Annual inspection performed (NFPA 10)
( ) ( ) ( ) Unobstructed from view or access (29 CFR 1910 d3)
( ) ( ) ( ) Located properly (NFPA 10)
( ) ( ) ( ) Has monthly inspection been completed? (NFPA 10)

SPRINKLER SYSTEM(s)

Type:	Wet	Dry	Deluge	Preaction
No. of	______	______	______	______

Location(s) ____________________
( ) ( ) ( ) FDC accessible (NFPA 13)
( ) ( ) ( ) Hydrant(s) accessible

SPECIAL SUPPRESSION SYSTEMS

Type(s) ____________________

Location(s) ____________________

Comments ____________________

Battalion Commander Signature ____________________

Fire Department Members Performing Inspection ________________________________

____

____

____

________Note any hazardous conditions or concerns ___________________________

____

____

____

____

____

____

____

____

Copy left with Building Manager   Yes____ No____ N/A___

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H.8 EMERGENCY MEDICAL RESPONSE

If medical response is part of the organization's responsibility, a procedure should be prepared that explains the general actions that should be taken during a response. The following serves as an example.

When ambulance calls are received, the station officer and the ambulance crew are responsible for verifying the location with the radio operator before response. Two firefighters will respond on all ambulance runs. One of the two must be an EMT.

Ambulance reports must be filled out on all ambulance runs, even if no patient is transported. Information on these reports is considered confidential and should be released only to the proper authorities. Patients refusing treatment should sign the ambulance report to document the refusal. If the patient will not sign the form, note that information on the form.

Patient status information will be transmitted to the hospital by radio. In general, the EMT should transmit the information, although the nurse may perform this duty on request. Patient names must not be transmitted over the radio, although payroll numbers may be used, when necessary. Status information should include the following.

a. Description of accident or illness.

b. Severity or priority of information, i.e., immediately life threatening, urgent, or nonurgent.

c. Radiation concerns, if any.

d. Vital signs, to include: age, sex, mechanism of injury, blood pressure, pulse, respirations, level of consciousness, estimated time of arrival, and any other pertinent information.

e. Any medications or other compounds that may have contributed to the patient's illness. If possible, the bottle or container should be delivered to the hospital with the patient to aid in identifying the proper antidote.

Should an unattended death occur, the County coroner and the Sheriff's Office must be notified. Permission must also be obtained to move the body, except when medical personnel determine there may be a possibility of saving the victim. Transportation of deceased persons will be performed at the request of the county coroner.

H.9 INTERNAL OPERATIONAL HANDBOOK

An internal handbook is recommended to address the general conduct of operations within the fire department or emergency response organization. Provided below is an example of the types of items that could be addressed in the handbook.

Preface

1.0 General Information
- 1.1 Significant Organizational Changes
- 1.2 Officer Assignments
  - 1.2.1 Acting Lieutenant
- 1.3 Firefighter Assignments
  - 1.3.1 Hours of Work
  - 1.3.2 Requests for Transfer
  - 1.3.3 Station Assignments
- 1.4 Emergency Response
  - 1.4.1 Buildings
  - 1.4.2 Grass Fires
  - 1.4.3 Mutual Aid Response
  - 1.4.4 Fire Watch
- 1.5 Offsite Class Attendance
- 1.6 Building Tours
  - 1.6.1 Purpose
  - 1.6.2 Responsibilities
  - 1.6.3 Definitions
  - 1.6.4 Procedure
  - 1.6.5 Hazardous Facilities or Areas
- 1.7 Overtime Meals
- 1.8 Uniforms and Bunker Gear
  - 1.8.1 Uniforms
  - 1.8.2 Patches and Emblems
  - 1.8.3 Collar Insignia - Supervision
  - 1.8.4 Name Plates
  - 1.8.5 Breast Shield
  - 1.8.6 Ties
  - 1.8.7 Sweatsuits
  - 1.8.8 Hats and Caps
  - 1.8.9 Suspenders
  - 1.8.10 Shower Clogs
  - 1.8.11 Glasses Cases
  - 1.8.12 Belts and Shoes
  - 1.8.13 Requisitioning Uniforms, Equipment, and Supplies
- 1.9 Uniform Laundry and Repairs
- 1.10 Protective Clothing Inspections
- 1.11 Grooming Standards
- 1.12 Telephone Usage During Duty Hours

2.0 Safety
- 2.1 Occupational Safety and Health Committee
- 2.2 Critical Incident Stress Debriefing