

Standard

PRC-STD-FP-40404

Fire Protection Program

Revision 0, Change 3

Published: 12/03/12
Effective: 12/03/12

Project: CH2M HILL Plateau Remediation Company
Topic: Fire Protection

Administrative Use

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

CHANGE SUMMARY**AJHA:** N/A**Periodic Review Due Date:** 10/25/2016**HRB Date:** N/A**Validation Date:** N/A**Rev.0 Chg. 3** PR#: PRC-51652**USQ Screen Number:**

PFP: GCX-7

SWOC: GCX-7

100K: GCX-7

S&M: GCX-7

WESF: GCX-7

CSB/ISA: GCX-7

TP: Excluded

Description of Change

Rev 0-3: In section 3.13.4, fifth paragraph, delete the words "bonded and".

Rev 0-2: Minor changes to sub-section 3.14, Glovebox Fire Protection and miscellaneous editorial changes.

Rev 0-1: A minor change was made in Section 1.3.9, first bullet, with the addition of the word "immediately" so that it reads as follows: Notify the HFD of smoke or fire immediately whether the fire is extinguished or not by calling 911 from any Site phone or 509-373-0911 from a cell phone. [Note: The word "immediately" should be underlined and in bold font.] A minor change was made in Section 3.15.2 with the addition of a bullet that reads as follows: The heater shall(5) be equipped to de-energize electrical power to the unit when tilted or turned over."

Rev 0-0: New standard

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

TABLE OF CONTENTS

1.0 INTRODUCTION..... 7

1.1 Implementation..... 8

1.2 Applicability 8

1.3 Roles and Responsibilities 9

1.3.1 President and General Manager, CHPRC..... 9

1.3.2 Vice-Presidents, Directors, and Senior Managers..... 9

1.3.3 Managers 9

1.3.4 Manager, CHPRC Fire Protection Program..... 9

1.3.5 CHPRC Fire Protection Staff 10

1.3.6 Hanford Fire Marshal 15

1.3.7 CHPRC Project/Facility Management..... 18

1.3.8 System Engineers..... 21

1.3.9 All Site Personnel..... 21

1.3.10 Site Organizations..... 21

1.4 Fire Protection Criteria 22

1.5 Corrective Actions 22

1.6 Requirements 22

1.6.1 Code of Federal Regulations 22

1.6.2 DOE Standards and Guidance 23

1.6.3 NFPA Codes 23

1.6.4 International Building and Fire Codes..... 23

1.6.5 Hanford Specific Requirements 24

1.6.6 Factory Mutual Loss Prevention Data..... 24

1.6.7 Specialized Codes and Standards..... 24

1.7 Training 24

1.7.1 General Employees 24

1.7.2 Qualifications..... 24

1.8 Implementing Documents..... 25

2.0 FIRE PROTECTION SYSTEM DESIGN 25

2.1 Fire Protection Reviews 25

2.2 Design Configuration Control 25

2.2.1 Design Standards 25

2.3 Water Based Fire Protection Systems Design 26

2.3.1 Automatic Sprinklers..... 26

2.3.2 Underground Water Mains..... 27

2.3.3 Freeze Protection..... 28

2.4 Alarm System Design 28

2.5 Interior Finish..... 29

2.6 Foam Plastics for Construction..... 29

2.7 Containment Enclosures 29

2.7.1 Containment Enclosure General Construction 30

2.7.2 Containment Enclosure Structural Support 30

2.7.3 Containment Enclosure Windows 30

2.8 Dry Chemical System Design..... 32

3.0 FIRE PREVENTION..... 32

3.1 Fire Prevention Inspections..... 33

3.1.1 Inspection Frequency..... 33

3.1.2 Performing Inspections 33

3.1.3 Deficiencies..... 33

3.2 Permits 34

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

3.2.1	Fire Marshal Permits.....	34
3.2.2	Non-emergency Hydrant Tie-in Permits	34
3.3	Controlling the Introduction of Combustibles.....	35
3.3.1	Combustible Control Programs.....	35
3.3.2	Storage, Use, and Handling of Combustible Materials.....	35
3.3.3	Storage, Use, and Handling of Hazardous Materials.....	36
3.4	Flammable Gases	36
3.5	Fueled Equipment	36
3.6	Electrically Powered Equipment.....	36
3.7	Storage and Accumulation of Rubbish	37
3.8	Wood.....	37
3.8.1	Wooden Waste Boxes	37
3.8.2	Wooden Pallets.....	37
3.8.3	Wooden Scaffolding.....	38
3.9	Plastics (Other Than Containment Enclosures and Radiological Shielding Materials).....	38
3.9.1	General Plastics.....	38
3.9.2	Plastic Pallets.....	39
3.9.3	Plastic Secondary Containment Pans	39
3.10	Containment Enclosures	40
3.10.1	Combustibles in Containment Enclosures.....	40
3.10.2	Use of Flammable and Combustible Liquids In Containment Enclosures.....	40
3.10.3	Hot Work In Containment Enclosures.....	40
3.10.4	Maintenance of Egress in Containment Enclosures.....	40
3.10.5	Fire Extinguishers in Containment Enclosures.....	40
3.10.6	Inspection of Containment Enclosures	40
3.11	Radiological Shielding Material	41
3.12	Fixatives Used for Contamination Control.....	41
3.12.1	General Requirements.....	41
3.12.2	Fixative Material Requirements	41
3.12.3	Use of Fixatives with Automatic Sprinklers.....	41
3.13	Flammable and Combustible Liquids	42
3.13.1	Classification of Liquids	42
3.13.2	Maximum Allowable Quantity (MAQ).....	43
3.13.3	Flammable Liquids Storage Cabinets.....	44
3.13.4	Dispensing, Handling, Transfer and Use of Liquids.....	45
3.14	Glovebox Fire Protection	45
3.15	Heat Producing Appliances	46
3.15.1	Portable Electrically Heated Devices.....	47
3.15.2	Portable Space Heaters.....	47
3.15.3	Portable Cooking Appliances.....	47
3.15.4	Lighting.....	49
3.15.5	Smoking	49
3.15.6	Personal Hygiene Appliances.....	49
3.15.7	Portable Open Flame Producing Appliances.....	49
3.15.8	Portable Fuel-Fired Heaters.....	49
3.15.9	Generators	50
3.16	Hot Work	50
3.16.1	Fire Watch Requirements	51
3.16.2	Hot Work Performed in Designated Area	52
3.16.3	Hot Work Performance Outside of Designated Areas	53
3.17	Fire Department Access.....	55

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

3.18	Off-Road Vehicle Travel	56
3.19	Exterior Nuclear/Radiological Waste Storage	58
3.20	Ventilation.....	58
3.21	Portable Fire Extinguishers	58
3.21.1	Extinguisher Procurement.....	58
3.21.2	Extinguisher Distribution	59
3.21.3	Extinguisher Installation	59
3.21.4	Extinguisher Inspection, Testing, and Maintenance	59
3.21.5	Fire Extinguisher Operability.....	60
3.21.6	Annual Maintenance	61
3.21.7	Periodic Maintenance	61
4.0	FIRE PROTECTION IN ACTIVE FACILITIES.....	62
4.1	Life Safety	62
4.1.1	Travel Distance/Common Path/Dead Ends	62
4.1.2	Exit Arrangement/Capacity/Number/Means of Egress	62
4.1.3	Doors.....	63
4.1.4	Stairs	63
4.1.5	Protection of Egress.....	63
4.1.6	Exit Markings.....	64
4.1.7	Emergency Lighting	64
4.1.8	Temporary Blocking of Egress or Exits.....	65
4.2	Fire Protection Systems	66
4.2.1	Fire Protection System IT&M.....	66
4.2.2	Fire Barriers	70
4.2.3	Water Based Fire Protection Systems.....	74
4.2.4	FIRE ALARM SYSTEMS	80
4.2.5	Dry Chemical Fire Extinguishing Systems.....	82
5.0	FIRE PROTECTION IN D4 FACILITIES AND FACILITIES UNDER CONSTRUCTION.83	83
5.1	Life Safety	83
5.1.1	Construction.....	84
5.1.2	Demolition	85
5.1.3	Deactivation of Fire Systems	85
5.1.4	Deactivation Decision Requirements	87
5.1.5	Explosives.....	88
5.2	Safeguarding Underground Operations	89
5.3	Facility Transition	91
6.0	FIRE ANALYSIS	91
6.1	Facility Fire Hazard Analysis	91
6.2	Fire Protection Assessments.....	94
6.3	Exemptions and Equivalencies	95
6.4	Fire Protection Program Assessments.....	97
6.5	Interpretations/Clarification Requests.....	97
6.6	Pre-Incident Plans	98
6.7	Ignitable and Reactive Waste Inspections.....	98
6.8	Annual Fire Protection Program Summary.....	98
6.9	Miscellaneous Analysis	98
7.0	DOCUMENTS DERIVED FROM THIS STANDARD.....	99
8.0	MAINTENANCE OF THIS STANDARD	99
9.0	FORMS	99
10.0	RECORD IDENTIFICATION	100
11.0	SOURCES	101

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

11.1 Requirements 101
11.2 References 102
12.0 APPENDIXES 103

List of Tables

Table 1 – Exterior Wood Pallet Storage.....38
Table 2 – MAQ of Flammable and Combustible Liquids per Control Area44
Table 3 – Extinguisher Maintenance Frequencies.....61

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****1.0 INTRODUCTION**

The Hanford Nuclear Facility is a Government Owned, Contractor Operated (GOCO) Site administered under the auspices of the U.S. Department of Energy (DOE) and operated by Contractors.

The CH2M HILL Plateau Remediation Company (CHPRC) has contractual responsibility for completion of the Plutonium Finishing Plant (PFP) project; non-tank farm waste disposal activities: groundwater monitoring and remediation; facility and waste site characterization, surveillance and maintenance, regulatory document preparation, and remediation. The contract also includes options to remediate facilities and waste sites.

This Fire Protection Standard (STD) identifies the fire protection requirements for all CHPRC activities at the Hanford Site.

Code of Federal Regulations (CFR) Part 851, Worker Safety and Health Program, paragraph 851.24, "Functional Areas," specifies that Contractors must have a structured approach to their worker safety and health program which includes fire protection. This requirement is clarified by Pt. 851, App. A 10 CFR Ch. III (1–1–08 Edition):

"2. Fire Protection

(a) Contractors must implement a comprehensive fire safety and emergency response program to protect workers commensurate with the nature of the work that is performed. This includes appropriate facility and site-wide fire protection, fire alarm notification and egress features, and access to a fully staffed, trained, and equipped emergency response organization that is capable of responding in a timely and effective manner to site emergencies. (b) An acceptable fire protection program must include those fire protection criteria and procedures, analyses, hardware and systems, apparatus and equipment, and personnel that would comprehensively ensure that the objective in paragraph 2(a) of this section is met. This includes meeting applicable building codes and National Fire Protection Association codes and standards."

This STD and implementing procedures (PROs) describe actions necessary to meet DOE objectives for fire safety as required by the Plateau Remediation Contract, Contract No. DE-AC06-08RL14788, Attachment J.2, "Requirements Sources and Implementing Documents."

CHPRC's *Fire Protection Program Policy (PRC-POL-FP-40402)* asserts the commitment by CHPRC to establish and maintain a FPP consistent with Federal Regulations, DOE Orders, DOE Standards, DOE Supplemental Directives, and consensus codes and standards.

The requirements associated with the FPP criteria are applicable to CHPRC areas, structures, systems, components, services, projects, programs, and activities. These activities include, but are not limited to, design, construction, operation, maintenance, deactivation, decontamination, decommissioning and demolition, waste packaging and oversight, and environmental remediation/restoration of nuclear and non-nuclear facilities.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

The requirements of this STD were developed with the recognized dual purpose of compliance with identified contractual documents and streamlining of former requirements for implementation of the CHPRC site mission of environmental restoration. The criteria identified in this STD are considered the minimum necessary to maintain the level of fire and life safety established by contractual obligations with the DOE. Additional requirements may be necessary in a particular facility or for a specific activity depending on the impact of that facility or activity to the overall closure mission.

1.1 Implementation

Supporting information for this STD includes a number of source documents, which are identified where appropriate. Many of these documents may be updated with an identifiable lag in the corresponding update of this STD. Further, new policies may be developed that may not be immediately included in this STD. Users should examine source documents when possible to determine if there are changes to supporting information and requirements and consult with the assigned Fire Protection Engineer(s) (FPEs) to determine if any requirements outside of this STD are applicable. This STD supersedes the following Mission Support Alliance (MSA) FPP procedures and requirements documents that were previously endorsed for use by CHPRC:

- MSC-POL-36200, *Fire Protection Program Policy*
- MSC-PRO-34037, *Performance of Fire Protection Assessments*
- MSC-PRO-38421, *Fire Hazard Analysis Development and Implementation Process*
- MSC-RD-10606, *Fire Protection Program Requirements*
- MSC-RD-11227, *Use of Explosives on the Hanford Site*
- MSC-RD-9118, *Fire Protection Design/Operations Criteria*
- MSC-RD-9717, *Fire Prevention for Construction/Occupancy/Demolition Activities*
- MSC-RD-9900, *Hot Work Performance Requirements*

Many CHPRC procedures and other documents reference the superseded MSA FPP procedures and requirements documents. The affected CHPRC procedures and other documents do not need to be immediately revised to support implementation of this new STD. References within these CHPRC procedures and other documents to the superseded MSA FPP procedures and requirements documents should be revised when the documents are due for their next scheduled revision.

1.2 Applicability

This STD applies to all CHPRC activities as well as all CHPRC subcontractor activities at the Hanford Site.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****1.3 Roles and Responsibilities**

Fire protection is a shared interdisciplinary function. It involves management and individual contributors of all organizations responsible for facility management, fire protection system inspection, testing, and maintenance, emergency response, fire prevention, and design/procurement of fire protection equipment. Each individual at Hanford is responsible for fire safety, identifying fire prevention or protection deficiencies, and for complying with requirements, procedures, and policy defined in this STD. The responsibilities listed below are those of CHPRC personnel.

The MSA Contractor provides inspection, testing, and maintenance for fire protection systems, emergency response for both property and worker events and, provides the Fire Marshal function in the administration and implementation of the Hanford Site-wide FPP.

1.3.1 President and General Manager, CHPRC

The President and General Manager, CHPRC, shall establish the policy for the fire protection program and promulgate it throughout CHPRC and its subcontractors.

1.3.2 Vice-Presidents, Directors, and Senior Managers

Vice-presidents, directors, and senior managers within each CHPRC business unit shall oversee the development, implementation, and maintenance of the fire protection program, including fire prevention, and supporting documentation, as well as the associated training and drill/exercise programs, to assure that adequate levels of fire protection preparedness and response are maintained within their designated areas of responsibility.

1.3.3 Managers

Managers at all levels within CHPRC, including facility managers, shall be accountable for the implementation of the fire protection program and related documentation, as well as verifying that their employees, including subcontractor employees, participate in training and drill/exercise programs, to assure that adequate levels of fire protection, fire prevention, and response are maintained.

1.3.4 Manager, CHPRC Fire Protection Program

- Implements the CHPRC FPP in accordance with contractual requirements and this STD.
- Maintains a staff of Qualified FPEs.
- Approves and submits requests for Deputy Fire Marshal (DFM) qualification of FPEs to Hanford Fire Marshal's Office (HFMO).
- Provides at least one CHPRC representative to serve on the Hanford Fire Protection Forum (HFPF).
- Mentors and provides leadership to the CHPRC FPE staff to assure professional and career development as well as periodic refresher training to maintain a high level of technical support to assigned projects.
- Provides FPE Subject Matter Expert (SME) support to projects.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Supports the Vice President, Safety, Health, Security & Quality (SHS&Q), in making interpretations of fire protection requirements.
- Establishes lines of communication with the DOE FPE to ensure appropriate and timely communication of fire protection issues, status, corrective actions, and activities.
- Assists the HFMO relative to the administration and implementation of Hanford Site-wide FPPs. This includes participation on the Hanford Fire Marshal Advisory Board, and maintaining a staff of DFMs.
- Is the CHPRC voting representative for the HFPF.
- Plans, performs and directs performance of Fire Protection Assessments (FPAs) to promote continuous process improvement.
- Ensures release of fire protection engineering calculations, assessments and analysis as the responsible manager.

1.3.5 CHPRC Fire Protection Staff

This position provides FPE support, expertise, and direction to CHPRC management, operations, and projects. It includes functioning as an interpretive authority on fire protection related codes, standards, and contractual requirements at the local CHPRC project level. The CHPRC FPE staff is responsible for the following topical areas and associated activities:

- FPP Development, Implementation, and Administration
 - Apply FPP requirements to design, D&D, operations, and maintenance
 - Ensure project implementation of FPP revisions
 - Review and concur in FPP-related procedures and implementation documents
 - Plan and prepare fire protection documents in accordance with CHPRC fire protection procedures
 - Plan and perform implementation activities for fire protection documents including revision of project compliance matrices and procedures
- Routine Code Interpretations
 - Evaluate life safety conditions; prepare life safety analysis as required
 - Provide specific and routine consultation on code requirements
 - Prepare and submit Interpretation/Clarification Requests (ICRs) for HFMO formal review and Hanford Fire Marshal (HFM) approval when application of FPP requirements is not clear or specific

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Exemptions and Equivalencies
 - Support the preparation of exemption and equivalency requests for HFM, and DOE review and approval when compliance with requirements is not verbatim or an alternative approach is justified
 - Assure exemptions and equivalencies are issued to the HFMO for concurrence prior to submittal to DOE
 - Ensure any conditions for DOE approval are implemented and maintained
- Fire Hazards Analysis (FHA)
 - Prepare and/or oversee the development, update, and revision of FHAs for CHPRC projects, facilities, and operations as required
 - Approve FHAs
 - Coordinate Fire Hazards Analysis, Fire Hazards Analysis Implementation Plans, and National Fire Protection Association (NFPA) Code Compliance
 - Coordinate FHA review and approval prior to final review by the HFMO and DOE submittal
 - Develop FHA implementation plans and coordinate review by the HFMO prior to submittal to DOE
 - Track FHA findings and recommendation status
 - Maintain facility FHAs current relative to operations, conditions, and hazards
- Facility Fire Protection Assessments (FPAs)
 - Maintain a list of facilities requiring FPAs
 - Perform required fire protection assessments, management assessments, readiness assessments, etc. as required on a periodic basis or as driven by operational schedules
 - Track FPA actions to closure
 - Provide copies of all FPA reports to the HFMO
- Triennial Fire Protection Program (FPP) Assessment
 - Schedule and perform the triennial FPP Assessment for CHPRC
 - Assist DOE as requested in conducting FPP Assessments of other contractors
 - Document and track triennial FPP assessment corrective actions
 - Provide a copy of any FPP assessments to the HFMO for information
- Fire Marshal Permit System
 - Periodically review conditions and/or compensatory measures specified in Hanford Fire Marshal Permits as required
 - Prepare contents of permit under the direction of a DFM

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Request a permit be suspended or revoked when information is incorrect or in violation of requirements or conditions of approval
- Fire Code Related Enforcement
 - Prepare routine communication and provide enforcement of fire codes, standards, and requirements
 - Ensure routine operations and work packages, as well as emergent work, and incorporate appropriate CHPRC FPP requirements
 - Provide Contractor/Facility-level enforcement for non-compliant items
 - Support AJHA process as the FP Subject Matter Expert
 - Authority to stop work per company policies
- Inspection, Testing & Maintenance (IT&M) of Fire Systems
 - Provide monitoring and oversight of IT&M
 - Assist management in assuring that IT&M is performed on schedule
 - Track system impairments and system restrictions to resolution
 - Assist other engineers and planners with CHPRC FPP requirements in work package preparation
 - Provide fire protection review of documents, procedures and work packages for conformance with FPP requirements
 - Review work packages to assure timely integration with operations
 - Support facility Fire Protection System Engineers with the implementation of the IT&M program
 - Monitor the IT&M of all fire protection systems, including the resolution of system impairments to verify requirements are met relative to assuring the operability and reliability of systems
 - Assure compensatory measures are implemented for system restrictions and upon entry into the IT&M grace period
- Fire System Deactivations
 - Assure appropriate planning and timing for system shutdown
 - Prepare requests and analyses for the deactivation of fire protection system deactivations
- Design, Installation, and Modification of Fire Systems
 - Review and approve design media
 - Perform, support, and/or oversee modification work and testing
 - Assure revision of as-built documentation

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Coordinate DFM oversight of the review and approval process and DFM peer review, including acceptance test procedures (ATPs), and fire protection system changes for compliance
- Changes to Existing Water Supplies
 - Prior to any changes to existing water supplies coordinate with HFMO for peer review and approval of water system changes for compliance
- Evaluation of Fire Hydrant Needs for Buildings with MPFL Less Than \$3 Million
 - Provide initial review and submit requests for evaluation to HFMO
- Non-Emergency Tie-ins to Fire Hydrants
 - Support the initiation of *Nonemergency Hydrant Tie-In Permit* (Site Form A-6003-681) for assigned facilities
- Fire Protection Systems, Equipment, Materials, Installation and Initial Acceptance Testing
 - Ensure compatibility and consistency with existing systems
 - Coordinate with HFMO for review and approval of components and procedures
- Fire Protection Support in Conceptual and Detailed Design Processes for New Projects
 - Participate as a member of the design review team for new projects to ensure inclusion of fire and life safety code requirements
 - Participate as a member of the Safety in Design Integration Team (SDIT) on projects managed under the requirements of DOE-STD-1189, *Integration of Safety into the Design Process*
 - Coordinate oversight by the DFM of evolving designs for new and significantly modified projects to assure compliance with fire protection requirements
- Routine Support
 - Be involved in project planning activities, including conceptual and detailed design to assure fire protection requirements are integrated early in the project (e.g., DOE-STD-1066-99, *Fire Protection Design Criteria*)
 - Provide technical support and guidance
 - Perform periodic walk-downs to remain current relative to operations and hazards
 - Participate in pre-job planning, Automated Job Hazards Analysis (AJHA), etc. to represent fire safety
 - Coordinate conflict resolution on fire protection related issues with HFMO
- Use of Electric (>1500 Watts), Fuel-Fired, and LPG Fired Heaters
 - Review and approve portable heater use
- Perform Ignitable and Reactive Waste Site Inspections per WAC-173-303-395, *Dangerous Waste Regulations*, "Other general requirements"

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Perform and maintain documentation for these annual inspections
- Fire Watch/Surveillance Requirements
 - Ensure frequency, documentation, and scope are appropriate
 - Develop and implement specific fire watch/surveillance requirements
- Fire Protection Compensatory Measures to Mitigate Emergent or Temporary Hazards
 - Prescribe compensatory measures to mitigate temporary fire hazards or risks
 - Document compensatory measures to ensure requirements are met and risks/hazards minimized
 - Coordinate recovery plans with the HFMO for concurrence
- Investigation of Fire, Explosions, and Other Hazardous Conditions
 - Conduct preliminary investigations of events and support HFMO representatives
- Use of Explosives On Site
 - Ensure request for the use, detonation, or storage of explosives is submitted to the HFMO at least 30 days prior to the actual need date
- Fire Protection Issue Identification, Documentation, Tracking and Resolution
 - Utilize the established system for identification, corrective action planning, and resolution for fire protection issues from FHAs, FPAs, or other assessment processes
 - Participate in the closure process of FP related issues
- Fire Protection Training and Communication
 - Review and approve fire protection training materials and content relative to specific projects (e.g., operator certifications)
 - Be a project-specific conduit for site-wide fire protection and prevention information
- Hanford Fire Department (HFD) Technical Support
 - Provide support and technical information valuable to emergency response crews (e.g., Pre-Incident Plans, roadway closures, non-emergency hydrant use, security fence changes)
 - Ensure appropriate notifications are made to the HFD for system outages, hazardous shipments, etc.
 - Provide technical support to HFD Operations to assure they are knowledgeable of facility design and operations and changes thereto
- Interface with Other Safety and Regulatory Functions (e.g., Emergency Preparedness, Industrial Safety, Industrial Hygiene, Safeguards and Security [SAS], Patrol, Environmental)
 - Ensure that other safety or regulatory functions or requirements do not negatively impact fire protection (e.g., Life Safety)

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Review facility/project EP response plans as the FP Subject Matter Expert
- Participate as an Active Member of the Hanford Fire Protection Forum
 - Actively participate in site fire protection forums and meetings including the Hanford Fire Protection Forum, Hanford Fire Marshal Advisory Board, and the Hanford Water Supply for Fire Protection Meeting
- Qualify as a DFM Candidate and Qualified FPE
 - Complete DFM qualification card as requested and submit to CHPRC Fire Protection Program Manager
 - Work towards meeting the requirements of a Qualified Fire Protection Engineer in accordance with Subsection 1.7.2 of this STD
- Advisory Bulletins
 - Suggest topical bulletins to the HFMO as appropriate
 - Assure appropriate communication of bulletins within assigned projects and facilities
 - Implement requirements of issued Advisory Bulletins
- Fire Protection Support to DOE Client
 - Respond to requests for information from DOE/DNFSB representatives
 - Accompany clients, when requested on facility tours, walk-downs, and assessments
 - Interface with DOE fire protection and project personnel in resolution of fire protection issues
- Records
 - Maintain records of fire protection issues, corrective actions, and compensatory measures

1.3.6 Hanford Fire Marshal

CHPRC **SHALL**1 institutionalize and recognize the HFM's authority as contained in the Authority, Responsibilities, Duties and Enforcement section of the DOE approved Hanford Fire Marshal Charter. CHPRC **SHALL**1 form an agreement or memorandum of understanding with the HFM to implement this authority.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

The HFD **SHALL** develop, administer, and enforce the FPP for the Hanford Site, as identified in the Authorities, Responsibilities, Duties, and Enforcement of the Hanford Fire Marshal contained in the DOE-approved Hanford Fire Marshal Charter. The FPP shall apply to all site activities, including operations, demolition, and construction. In order to accomplish the activities of the Fire Marshal's Office, qualified FPEs and Fire Protection Staff **SHALL** be provided within the Fire Marshal's organization as necessary to perform functions and meet the objectives of this STD. The Fire Marshal or his representative **SHALL** participate in the investigation of fires, explosions, and other hazardous conditions and shall maintain the case files on each investigation. Additionally, changes to the existing water supplies shall be coordinated with the approval of the Hanford Fire Marshal. The HFM **SHALL**:

1. Review and approve acceptance test procedures for site fire alarm and fire suppression systems and equipment, including new and modified installations.
2. Have the authority to review and approve site construction documents and shop drawings for new construction, modification, or renovation.
3. Perform initial reviews of facility hazards analysis, fire safety exemptions, equivalencies, and deviations in the administration of the Site FPP.
4. Provide routine fire protection code interpretations and clarification of fire code requirements and maintain records of these decisions for DOE Richland Operations Office (DOE-RL) review.

In addition to the roles and responsibilities detailed for the CHPRC Fire Protection Staff, CHPRC FPEs may also assume the roles and responsibilities of a DFM in support of the HFM and the overall Hanford Site FPP as it applies to CHPRC. Appointment as a DFM requires passing an oral board administered by the HFMO and meeting the experience requirements for a qualified FPE. CHPRC's DFMs are responsible for the following topical areas and associated activities:

- Routine Code Interpretations
 - Review ICRs developed by others for validity and process compliance
- Exemptions and Equivalencies
 - Prepare and approve any Fire Marshal Permits that may be required to support the exemption or equivalency
 - Ensure all exemption and equivalencies follow the approved format and process prior to submittal to the HFMO.
- Hanford Fire Marshal Permit System
 - Prepare and approve permits
 - Administer the Hanford Fire Marshal Permit system within the authority vested as a DFM by the HFM
 - Assure projects, facilities, and/or operations comply with the conditions and compensatory measures specified by approved permits

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Suspend or revoke permits if issued in error, with incorrect information, or for violation of requirements or conditions of approval
- Fire Code Related Enforcement
 - Implement requirements of NFPA 1, including occupancy and hazard control requirements
 - Initiate draft Fire Marshal Findings for non-compliant items or unresolved fire protection findings per HFM Charter
 - Elevation of unresolved fire protection findings to contractor senior management and HFM
 - Support contractor specific training and communication of fire related codes and standards
 - Contractor/Facility level enforcement for non-compliant codes
- Inspection, Testing & Maintenance of Fire Systems
 - Assure compensatory measures are implemented for system restrictions and impairments and upon entry into the ITM grace period
- Fire System Deactivations
 - Coordinate with HFD, the cognizant FPE, and facility management the preparation of fire system deactivation permits for approval of fire system deactivations
- Design, Installation, and Modification of Fire Systems
 - Review, approve, and coordinate with the cognizant FPE and facility management the preparation of permits and ATPs for fire system installations and modifications
 - Review and approve plans, drawings, and specifications for fire system and applicable facility modifications
- Changes to Existing Water Supplies
 - Review and concur with plans, drawings, and specifications for water system modifications
 - Develop and approve permits associated with specific water system changes for assigned areas
- Non-emergency Tie-ins to Fire Hydrants
 - Review and approve Site Form A-6003-681 for assigned facilities
- Fire Protection Systems, Equipment, Materials, Installation, and Initial Acceptance/Testing
 - Review and approve systems, components, design, ATPs, and testing/operating procedures
- Fire Protection Support in Conceptual and Detailed Design Processes for New Projects
 - Review/approve systems design

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Develop and approve permits associated with facility design
- Routine Facility/Project Support
 - Provide support for special hazard permits (e.g., hot-work, HFM permits)
 - Assure the appropriate communication of site-wide fire protection information, topical bulletins, and Fire Marshal Advisory Bulletins (FMAB) within the assigned projects and facilities
 - Work with the assigned facility and project to determine required reading
- Use of Electric (> 1500 Watts), Fuel Fired, and LPG Fired Heaters
 - Approval of heater use that deviates from criteria contained in Section 3.15 and all fuel fired heater use
 - Develop and approve permits associated with portable heater use
- Fire Watch/Surveillance Requirements
 - Develop and approve permits associated with specific fire watch and surveillance requirements
 - Fire protection compensatory measures to mitigate emergent or temporary hazards
 - Prescribe compensatory measures to mitigate temporary fire hazards or risks when prescribed in FM permit
- Investigation of Fire, Explosions, and Other Hazardous Conditions
 - Conduct investigations of events as requested by the HFMO
- Use of Explosives on Site
 - Develop and approve permits associated with explosive storage magazines

1.3.7 CHPRC Project/Facility Management

- Implement and adhere to the requirements of the CHPRC FPP for facilities, programs, projects, and/or operations under their jurisdiction
- Act as the single point of contact for activities affecting the operation and maintenance of a project or facility under their jurisdiction to ensure that work integration and execution is managed and controlled
- Promote and comply with the fire prevention provisions contained in this STD
- Provide technical expertise as necessary to support the FPE and achieve DOE fire protection goals and requirements
- Provide personnel to perform fire protection system inspection and testing activities that are assigned to the CHPRC Building Manager as described in this STD
- Request Fire Marshal permits for required activities and ensure the implementation of the permit

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Provide all necessary support for the IT&M of all in-service fire protection systems under their jurisdiction as required by this STD
- Ensure that all required IT&M activities for in-service fire protection systems under their jurisdiction are performed and completed in accordance with the frequency established by MSC-RD-7899, *Fire Protection System Testing/Inspection/Maintenance/Deficiencies*, including those activities scheduled by the HFD

NOTE: *The Building Manger is specifically responsible for ensuring the completion of IT&M items identified in MSC-RD-7899 with an asterisk (*).*

- Implement compensatory measures, as directed by the cognizant FPE, for fire protection systems that are overdue for required IT&M
- Ensure that FPAs are performed in accordance with the requirements of this STD
- Assist fire protection personnel with FPAs, investigations, and analyses
- Assist fire protection personnel with functional testing and preventive and corrective maintenance including administration of the lock and tag program for fire protection system work
- Provide notification to the HFD at least two (2) working days in advance of the following planned or anticipated conditions or events (except for emergency drills as noted below):
 - Fire system impairments
 - Water outages
 - Power outages
 - Road closures
 - Any condition that prevents fire suppression, detection and alarm systems from operating
 - Any planned condition that could delay or obstruct emergency vehicle access
 - Emergency drills, exercises, etc. in with HFD participation is anticipated (two [2] weeks prior notification is required)
- Ensure that designs, specifications, modifications, fire system acceptance test procedures and fire equipment procurements are submitted to the assigned DFM or to the HFMO for review and approval as required by this STD
- Develop corrective action plans, promptly implement corrective actions, and support the timely resolution of emergency impairments, system restrictions and deficiencies, facility assessment findings, FHA findings, and adverse trends as required by this STD
- Ensure that activities for correction of emergency impairments, system restrictions and fire protection system deficiencies are funded and completed with minimum delay
- Report fire and property losses in accordance with CRD M 231.1A, *Environment, Safety, and Health Reporting Manual*
- Ensure that an FHA is prepared for the project/facility under their jurisdiction as required by this STD

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Ensure that CHPRC employees (including subcontractor personnel) receive basic fire prevention training including the following items (as a minimum) upon initial employment and annually thereafter:
 - Instruction on the use of portable fire extinguishers
 - Good housekeeping practices
 - Proper response/notification in the event of a fire, medical emergency and/or hazardous material spill or release
 - Recognition of potential fire hazards

NOTE: *An employee's successful completion of the fire protection lessons contained in CHPRC General Employee Training (CGET) satisfies this requirement.*

- Ensure that employees (including subcontractor personnel) designated for assignment as a fire watch (such as for welding and cutting operations) receive the necessary training, including hands-on portable fire extinguisher training once every three (3) years
- Ensure that new and existing structures under their jurisdiction have an approved building identification number placed in a position to be plainly legible and visible from the street or road fronting the property in accordance with MSC-PRO-2827, *Facility & Mobile Office Number Management*
- Ensure that all modifications and/or additions to site water distribution systems are reviewed by the DFM and approved by the HFMO
- For nuclear facilities, assure that the accident analyses for fire and explosion events are consistent in both the FHA and nuclear safety documentation
- Provide resources to update the current FHA when required
- Provide current facility FHAs to DOE-RL concurrently with the facility Documented Safety Analysis (DSA) as part of the set of key supporting documents when the DSA is submitted to DOE for approval
- Submit the FHA Implementation Plan to DOE-RL for information only
- If explosives will be stored or used in the vicinity of nuclear facilities under their jurisdiction, ensure that all required reviews, including screening under the Unreviewed Safety Question (USQ) process, are completed prior to proceeding with the activity
- Provide effective compensatory measures, in consultation with the cognizant FPE, for adverse fire protection conditions such as fire protection system outages
- Maintain documentation of facility surveillances performed of fire protection systems and features
- Ensure procedures are available for performance of fire protection system surveillances
- Provide support and assistance to fire protection system engineers and design authorities relative to the implementation of vital safety system (VSS) program requirements and the performance of fire protection system IT&M activities

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****1.3.8 System Engineers**

Provide technical support to HFD Operations to assure they are knowledgeable of facility design and operations regarding fire protection systems and changes thereto.

NOTE: *Chapter V, Section 3.a.1 of the HQ CRD Specifies, "...nuclear facilities must have a System Engineer Program as well as a qualified cognizant system engineer (CSE) assigned to each system within the scope of the Program." A primary as well as an alternate CSE shall be assigned to each VSS. A listing of assigned primary and alternate CSE for each VSS shall be published (i.e., documented, controlled, and maintained), and readily accessible to DOE (CRD O 420.1B, Chg. 1 (Supplemented Rev. 0)).*

1.3.9 All Site Personnel

- Notify the HFD of smoke or fire **immediately** whether the fire is extinguished or not by calling 911 from any site phone or 509-373-0911 from a cell phone
- Notify the HFD if an unexpected and/or unidentified odor is discovered that may be a physical or health hazard as determined by a safety or health professional and that cannot safely be controlled with local resources or if the odor is the result of an action that requires emergency response
- Perform activities safely to prevent the occurrence of a fire
- Notify the HFD and immediate manager or supervisor of hazardous conditions that could result in a hazardous material spill, emergency rescue, or need for medical assistance
- Notify the HFD of any hazardous material spill, or any other incident or emergency requiring response by the HFD
- Direct, if possible, the HFD to the scene of the emergency
- Report to the cognizant FPE, DFM, or HFMO any life safety concerns such as locked exit doors and blocked or partially blocked egress routes
- Park and drive all vehicles (private and government) so that they do not block fire department equipment access or delay emergency response vehicles

1.3.10 Site Organizations

The Hanford Fire Protection Forum (HFPF) is a medium for open discussion of fire protection issues to assist DOE-RL in maintaining a uniform FPP on the Hanford Site. The forum is made up of contractor FPEs, managers, staff, designers, fire protection staff, the HFM, HFD staff, fire system maintenance managers and engineers, and the DOE-RL FPE.

The HFPF is a DOE-RL chartered organization. The HFPF writes the duties of the HFM and forwards the HFM's duties to DOE-RL for review and approval.

The HFPF is also responsible for the review of all changes to Site-wide fire system IT&M requirements and for the maintenance of the Site-specific fire protection design requirements found in HNF-36174, *DOE Fire Protection Handbook – Hanford Chapter*.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

CHPRC is expected to provide fire protection representation at HFPF meetings.

1.4 Fire Protection Criteria

CHPRC **SHALL**⁶ develop, implement, and maintain comprehensive written fire protection criteria that reflect additional Site-specific aspects of the fire protection program, including the organization, training, and responsibilities of the fire protection staff, administrative aspects of the fire protection program, and requirements for the design, installation, operability, inspection, maintenance, and testing of fire protection systems.

Site-specific criteria for CHPRC's fire protection organization, including organization description and responsibilities, and position or staff responsibilities, are described in Section 1.3.

Administrative aspects of the Site-specific FPP are described throughout individual chapters of this STD, addressing individual subprograms, work activities, or processes within the program.

Fire protection design requirements are based on DOE-STD-1066-99 and are defined in Section 2.0, "Fire Protection System Design."

Periodic IT&M, and criteria for determining the operational status of fire protection systems are based on NFPA Codes and Standards and are defined in Section 5.2, "Safeguarding Underground Operations."

1.5 Corrective Actions

Fire protection system impairments, system restrictions and deficiencies are prioritized and addressed as described in Subsection 4.2.1.1 of this STD. The appropriate priority for correction of impaired, restricted and deficient fire protection systems is determined according to Appendix C of PRC-PRO-WKM-12115, *Work Management*.

Findings, recommendations, and observations that are generated through audits, assessments, and analyses (including FHAs) of fire protection programs or features, are screened, trended, tracked and prioritized through the Condition Reporting and Resolution System (CRRS).

When necessary, appropriate compensatory measures are initiated in response to discrepant fire protection systems or findings resulting from inspections, audits, assessment or other analyses that result in unacceptable fire or life safety risks. Compensatory measures coincide with and support applicable safety basis requirements or are otherwise implemented as required by Section 4.2, "Fire Protection Systems," of this STD. The cognizant FPE **SHALL**⁵ be consulted regarding the establishment of appropriate compensatory measures, including the level of Fire Surveillance required, in every case.

1.6 Requirements

The following list of codes, standards, and guides are applicable but may not be all inclusive of CHPRC FPP requirements.

1.6.1 Code of Federal Regulations

Compliance with the following Code of Federal Regulations **SHALL**² be required:

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- 29 CFR 1910, *Occupational Safety and Health Standards*
- 29 CFR 1926, *Safety and Health Regulations for Construction*
- 10 CFR 851, *Worker Safety and Health Program*
- 10 CFR 830, *Nuclear Safety Management National Fire Protection Association Codes and Standards*

1.6.2 DOE Standards and Guidance

Compliance with the following DOE standards, requirements documents and guidance **SHALL** be required:

- CRD O 420.1B, *Facility Safety*
- CRD O 420.1B, Chg. 1 (Supplemented Rev. 0), *Facility Safety*
- DOE-STD-1066-99, *Fire Protection Design Criteria*
- DOE-STD-1088-95, *Fire Protection for Re-locatable Structures*
- DOE G 420.1-3, *Implementation Guide for DOE Fire Protection and Emergency Services Programs for Use with DOE O 420.1B*
- DOE M 231.1-1A (property loss evaluation), *Directive System Management*
- DOE M 251.1-1B (Equivalencies, Exemptions and Variances), *Departmental Directives Program Manual*

1.6.3 NFPA Codes

Appendix A contains a listing of all NFPA Codes, Standards, Guides, and Recommendations (Codes) that directly apply to the CHPRC FPP. Compliance with the most recent edition of the applicable NFPA Code and Standard **SHALL** be required for operational aspects of fire protection. See Subsection 2.2.1 for facility design standards.

1.6.4 International Building and Fire Codes

New facilities and facility modifications **SHALL** conform to the fire resistance requirements, allowable floor area, building height limitations, and building separations of the International Building Code (IBC). Consistent with Chapter II of the CRD, the provisions of the IBC takes precedence over NFPA 5000, *Building Construction and Safety Code*. Building construction related to egress and life safety **SHALL** comply with the NFPA 101, *Life Safety Code*. Conflicts between the IBC and NFPA 101 related to the fire resistance rating **SHALL** conform to the more restrictive body of requirements contained in either document. Compliance with the Life Safety Code **SHALL** be considered to satisfy the exit requirements of OSHA 29 CFR 1910.

Typically the International Fire Code (IFC) is a companion document to the IBC. However, for DOE operations, the IFC **SHALL** only be applied when the generation, treatment, storage, and disposal of ignitable and reactive wastes, defined in WAC 173-303, is required by the Tri-Party Agreement. The NFPA 1, *Fire Code*, takes precedence over other situations. Other

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

requirements of the IFC are not considered criteria but may be used as a guide when established criteria do not address a specific situation.

1.6.5 Hanford Specific Requirements

Compliance with the provisions contained in the following Hanford specific documents **SHALL**1 additionally be required:

- Hanford Fire Marshal's Charter
- HNF-36174, *DOE Fire Protection Handbook—Hanford Chapter*
- Fire Marshal Advisory Bulletins (FMAB)

NOTE: See your project FPE for current Hanford Fire Marshal Advisory Bulletins.

1.6.6 Factory Mutual Loss Prevention Data

Appendix A contains a limited list of Factory Mutual (FM) standards (Codes) that directly apply to the CHPRC FPP. This Code Set is the lowest recognized Code Set in the program. Generally, these Codes are used to supplement NFPA Codes and Standards when applicable.

1.6.7 Specialized Codes and Standards

The CHPRC FPP may utilize specialized Codes and Standards to address unique applications or hazards not specifically covered by the Code Sets identified Sections 1.6.1 thru 1.6.6. These Code Sets are established by such organizations as Underwriters Laboratories (UL), Compressed Gas Association (CGA), American National Standard Institute (ANSI), and American Society for Testing and Materials (ASTM). These Codes and Standards may be utilized within the CHPRC FPP as reference or guidance during routine activities, or, at the discretion of the RL AHJ, may be invoked as a required Code for a specific fire protection related application.

1.7 Training**1.7.1 General Employees**

Site employees and subcontractors, including visiting subcontractors, **SHALL**5 be provided an overview of the Hanford Site and CHPRC FPP including procedures and policy governing safe fire practices, egress and evacuation, reporting fire or other emergencies, and portable fire extinguisher use and operations. This overview **SHALL**5 be provided initially, with annual retraining through HGET/CGET.

1.7.2 Qualifications

A qualified fire protection engineer **SHALL**1 be an engineer that is a graduate of an accredited university or college with a Bachelor of Science in an engineering or related technical field and meets the qualifications for Professional Member Grade in the Society of Fire Protection Engineers, or an engineer that has a professional member grade in the Society of Fire Protection Engineers, or an engineer that is a Registered Professional Fire Protection Engineer.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

1.8 Implementing Documents

- PRC-PRO-FP-40420, *Fire Protection Analysis*
- PRC-PRO-FP-40421, *Hot Work*
- PRC-PRO-FP-40422, *Fire Marshal Interface*
- PRC-PRO-FP-40424, *Equivalencies, Exemptions, and Interpretation/Clarification Requests (ICRs)*
- PRC-PRO-FP-40425, *Fire Protection System Inspection, Testing, and Maintenance*
- PRC-PRO-FP-40426, *Fire Protection System Discrepancies*

2.0 FIRE PROTECTION SYSTEM DESIGN

This Section defines the requirements for the design of facilities and fire protection systems by and for CHPRC.

2.1 Fire Protection Reviews

Facility design, including modifications to existing designs which impact fire protection features within the facility **SHALL** be reviewed and approved by a qualified FPE.

PRC-PRO-EN-8336, *Design Verification*, describes the design review process for CHPRC.

2.2 Design Configuration Control

The fire protection design process **SHALL** include appropriate oversight by a DFM of plans, specifications, and testing of fire protection features.

All fire protection designs and components used in fire protection systems **SHALL** use equipment tested for its intended use and listed or approved by a Nationally Recognized Testing Laboratory (NRTL) (as defined by 29 CFR Section 1910.159 and 1910.165). The cognizant FPE should coordinate with the HFMO to obtain written approval for substitute, equivalent items if no listed or approved item can be procured because the equipment has never been tested for the proposed application.

Work packages that affect fire protection systems, features, or means of egress **SHALL** be reviewed by the cognizant FPE in accordance with PRC-PRO-WKM-12115. The cognizant FPE **SHALL** review the work activity for consistency with CHPRC Engineering Standards and the applicable Code Set identified in Section 1.6 of this STD.

2.2.1 Design Standards

New facilities, modifications to existing facilities that increases the hazard to the remainder of the facility, or changes in facility use or occupancy **SHALL** integrate the requirements of the IBC, applicable NFPA codes and DOE-STD-1066-99. All references to the word "should" in DOE-STD-1066-99 **SHALL** be interpreted as a "shall" unless otherwise modified by CRD O 420.1B, Chg. 1 (Supplemented Rev. 0).

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

Re-locatable structures, defined by DOE-STD-1088-95, **SHALL**1 comply with DOE-STD-1088-95 and other applicable requirements specified by this STD. All references to the word "should" in DOE-STD-1088-95 **SHALL**1 be interpreted as a "shall" unless otherwise modified by CRD O 420.1B, Chg. 1 (Supplemented Rev. 0).

Fire protection-related codes and standards in effect when facility design commences (Code of Record) **SHALL**1 remain in effect for the life of the facility. Exceptions would include when there is a significant hazard that endangers building occupants or the public, or when a national code or standard, such as the Life Safety Code, specifically requires retroactive compliance. In such cases the specific requirements of the current code applies respective to mitigation of the hazard.

When substantial modifications to a facility or changes in occupancy types or hazards occur within a facility, the current edition of codes and standards **SHALL**1 apply to the modification or change.

For older facilities for which the Code of Record may be unknown, the current edition of the code or standard **SHALL**5 be applied with judgment in the assessment of the adequacy of fire protection. A Code of Record may be established by the AHJ given known construction dates for the facility or systems.

Drawings **SHALL**1' 7 be approved by a DFM with oversight by the HFMO prior to installation.

As-built drawings **SHALL**1' 7 be approved by a DFM and issued prior to acceptance of the system from the contractor.

Acceptance Test Procedures (ATPs) **SHALL**1' 7 be reviewed and approved by a DFM with oversight by the HFMO prior to installation.

2.3 Water Based Fire Protection Systems Design

The design requirements for water-based fire protection systems vary depending on the system and often require the use of multiple references. If a new system design or existing system modification is to occur, then the cognizant FPE **SHALL**5 be consulted to determine the applicable codes and standards.

All water based fire protection systems **SHALL**1' 7 be designed, installed and accepted in accordance with HNF-36174.

2.3.1 Automatic Sprinklers

Complete automatic fire suppression system per NFPA standards **SHALL**1 be required in all structures having a maximum possible fire loss (MPFL) (defined by DOE-STD-1066-99) in excess of \$3 million, when required by an NFPA standard, or when the IBC requires it for construction height, allowable square footage size, construction type, or occupancy classification.

When the MPFL exceeds \$50 million, a redundant fire protection system (defined by DOE-STD-1066-99) **SHALL**1 be required.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

When the MPFL exceeds \$150 million, a redundant fire protection system plus engineered fire barriers **SHALL** be required to limit the MPFL to \$150 million.

Application of these requirements to existing facilities that have a short remaining service life **SHALL** be applied on a case-by-case basis utilizing the FHA process.

2.3.2 Underground Water Mains

Distribution mains, either sanitary or raw water, that are being extended to supply water for domestic and/or process water and will provide water for fire suppression systems (sprinklers and/or hydrants, **SHALL** be at least 12 inches in diameter.

Underground distribution systems for fire protection water supplies **SHALL** be of the looped type arranged with two-way flow and sectional valving to provide alternate flow paths from the source to any point in the distribution system for Category 1, 2, and 3 nuclear facilities and buildings or groups of buildings with an MPFL exceeding \$15 million. The loop **SHALL** be provided with a second independent source of water supply for Category 2 nuclear facilities or where the MPFL exceeds \$50 million. Application of this requirement to existing facilities will be made on a case-by-case basis after consultation with the DOE-RL AHJ.

Multiple sectional isolation valves **SHALL** be provided at each intersection between a supply source and a main loop (one valve for each leg). Sectional valves **SHALL** be installed in accordance with a point system, such that no more than six points accumulate between sectional valves. The points for this arrangement are: one point for a fire hydrant, and two points for an automatic sprinkler system.

For new buildings, each building fire sprinkler riser **SHALL** be served by an independent underground water supply connection controlled by a supervised indicating control valve. Multiple system risers supplied by a single supply riser manifold are prohibited. A wet pipe system **SHALL** be permitted to supply an auxiliary (secondary) dry pipe, preaction, or deluge system, provided the water supply is adequate (i.e., computer room, loading dock, freezer, etc.).

Fire flows **SHALL** be available for a period of at least 2 hours. A minimum 4-hour supply **SHALL** be provided for large buildings, buildings with special public or physical hazards, multiple building sites, or groups of combustible buildings. For combined systems serving fire protection and other water demands (domestic and/or process), the supply and its distribution system **SHALL** be adequately sized to serve the combined peak flow for all uses. When storage tanks are used for combined service water and fire protection water, dedicated tank(s) or other physical means, such as a vertical standpipe, **SHALL** assure the minimum volume for fire uses.

For new facilities, one fire hydrant of the minimum number required, **SHALL** be provided within 100 feet of any sprinkler system fire department connection, but no closer than 40 feet from a building or 50 feet from a Re-locatable structure. Additional hydrants **SHOULD** be provided and spaced with consideration given to accessibility and obstructions in accordance with the following criteria:

- a. A minimum of two operational fire hydrants **SHALL** be provided such that parts of the exterior of the building or buildings can be reached by hose lays of not over 300 feet for all Category 2 or 3 nuclear facilities, or where the MPFL exceeds \$15 million.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- b. A minimum of one fire hydrant **SHALL**¹ be provided such that parts of the exterior of the building or buildings can be reached by hose lays of not over 300 feet where the MPFL is \$3 million to \$15 million,
- c. For buildings having a MPFL less than \$3 million, the need for fire hydrants **SHALL**¹ be based on a documented Hanford Fire Marshal's Office evaluation as to the effectiveness of adequately controlling a fire without hydrants.
- d. Hydrants **SHALL**¹ be of the standard type used at Hanford.

2.3.3 Freeze Protection

All areas where fire systems are installed **SHALL**^{26, 32} have heat and/or noncombustible insulation installed to prevent freezing and/or equipment damage.

Permanent freeze protection such as forced hot air, fixed radiant heaters or insulation **SHALL**^{26, 32} be used.

Use heat tape and portable heaters to winterize existing fire protection systems only if engineered protection measures are not readily available or feasible. If such measures must be used, the following restrictions **SHALL**^{26, 32} apply:

1. The portable heaters **SHALL**^{26, 32} comply with Subsection 3.13.8.
2. Heat Tape installation **SHALL**^{26, 32} comply with the following:
 - a. All new and/or replacement heat tape installed **SHALL**^{26, 32} be Underwriter's Laboratory (UL) listed for its intended use (that is, specifically tested for use on fire protection systems as well as the piping material being protected).
 - b. The heat tape **SHALL**^{26, 32} be self-regulating.
 - c. Noncombustible insulation **SHALL**^{26, 32} be used over the pipe and heat tape.
 - d. The fire system pipe temperature **SHALL**^{26, 32} be monitored by a system including a mechanism to transmit a trouble alarm to the HFD if the pipe temperature drops below 40°F.
 - e. Heat tape **SHALL NOT**^{26, 32} be used to prevent freezing of sprinkler system branch lines.
 - f. Heat tape **SHALL**^{26, 32} not be used for new system designs.

NOTE: *An exception to rule 2.f is heat tape that is in compliance with the other requirements of this STD may be used to protect fire system risers in unheated trailer crawl spaces from freezing.*

All heat tape installations **SHALL**^{26, 32} be approved by the facility FPE.

2.4 Alarm System Design

The design requirements for fire detection and alarm systems vary depending on the type of system and often require the use of multiple references. However, the primary references used are NFPA 72, *National Fire Alarm Code*, and HNF-36174. If a new system design or existing

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

system modification is to occur, then the cognizant FPE **SHALL**⁵ be consulted to determine the applicable codes and standards.

All fire alarm and detection systems **SHALL**¹ be designed, installed and accepted in accordance with HNF-36174.

2.5 Interior Finish

Nuclear facilities and laboratories **SHALL**¹ have interior finish materials that have an Underwriters Laboratories (UL) (ASTM E-84/NFPA 255) flame spread rating of 25 or less, and smoke developed rating of 50 or less, except for acoustical materials, which **SHALL**¹ have a smoke developed rating of 100 or less. The minimum average critical radiant flux for floor covering material **SHALL**¹ be 0.45 watts per square centimeter, when tested in accordance with ASTM E-648 (NFPA 253, *Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source*). All other facilities or structures, except those specifically identified in Section 5.4 of DOE-STD-1088-95, **SHALL** have interior finish as required by NFPA 101.

Any materials with unusual fire characteristics, such as urethane foams, and any materials that develop significant quantities of toxic or harmful products of combustion (as delineated in Material Safety Data Sheets and other sources of product information), **SHALL NOT**³ be used as interior finishes or other interior applications without the approval of the AHJ.

Interior finish for non-nuclear facilities **SHALL**¹¹ comply with NFPA 101 requirements based on the specific occupancy type.

2.6 Foam Plastics for Construction

The use of foam plastics in construction **SHALL**³ be prohibited unless it fully complies with FM Loss Prevention Data Sheet 1-57, *Plastics in Construction*.

2.7 Containment Enclosures

Containment enclosures **SHALL**⁵ include those used to act as a limiting barrier to the spread of contamination or hazardous materials, including radiological, asbestos, and beryllium operations. Containment enclosures utilized for conditions other than reduction of contamination spread **SHALL**⁵ be reviewed by the cognizant FPE to determine the need for application of this Section.

For the purposes of this Section, these requirements are applicable to those structures that are designed for human habitation (tents) or that are connected directly to permanent enclosures (gloveboxes, C-Cells, etc.) or other temporary enclosures. Glovebags, large containments for decontamination and decommissioning (D&D) use, and structures used to connect two existing enclosures are examples. Enclosures designed for a point specific use (e.g., wrapping a valve or conduit) and incidental uses (e.g., bag-in/bag-out ports) are exempt from this Section.

Temporary containment enclosures **SHALL NOT**⁴ remain in place for more than 180 days onsite, **SHALL NOT**⁴ contain significant fire hazards, and **SHALL**⁴ have no programmatic importance or significant value, as determined by the cognizant FPE.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

Permanent containment enclosures (i.e., that remain in place for more than 180 days) **SHALL**⁴ comply with DOE-STD-1088-95.

When installed within a structure that is protected by an automatic fire sprinkler system, a containment enclosure that prevents overhead sprinklers from reaching a fire hazard within the enclosure **SHALL**⁵ be considered to be an obstruction. Appropriate compensatory measures **SHALL**⁵ be implemented as determined by the cognizant FPE for use of the enclosure

2.7.1 Containment Enclosure General Construction

IF materials other than plastic sheeting are to be used for containment enclosures, **THEN** the materials **SHALL**⁵ be reviewed and pre-approved by the cognizant FPE.

Surface materials or coverings used for walls, ceilings, and floors of containment enclosures, other than those excepted above, **SHALL**^{10, 14} be constructed of noncombustible or fire-retardant material in accordance with NFPA 701, *Standard Methods of Fire Tests for Flame-Resistant Textiles and Films*, or equivalent.

If plastic sheeting or films are utilized, then only those which have been pre-approved by the cognizant FPE **SHALL**^{10, 14} be used. Sheet plastic **SHALL**^{14, 10} be tested and documented as meeting NFPA 701, Test 2.

Tape used within the structure and used to assemble or repair the structure **SHALL**⁵ be noncombustible or of fire-retardant material in accordance with NFPA 701 or equivalent.

2.7.2 Containment Enclosure Structural Support

Freestanding containment enclosure structural supports **SHALL**⁵ be noncombustible or **SHALL**⁵ be approved by the cognizant FPE. Sash cord used for support framework or other components of plastic containment enclosures **SHALL**⁵ be cotton or nylon.

Containment enclosures erected within a facility **SHALL NOT**¹⁵ be structurally supported by piping arrangements designed for automatic sprinkler systems or any other fire protection equipment.

Wire or metal supporting systems **SHALL NOT**⁵ come into contact with any electrically charged systems, for example, conduits, power panels, transformers, or switchgear.

2.7.3 Containment Enclosure Windows

Windows and doors for plastic containment enclosures **SHALL**⁵ be either non-combustible or fire-retardant in accordance with NFPA 701 or equivalent with one exception. Non-fire retardant materials may be used for wall window materials if all of the following criteria are met:

Window size is limited to two (2) square feet. Multiple windows located within the region defined by the figure below **SHALL**⁵ be considered a single window.

Windows or groups of windows in a common wall **SHALL**⁵ be separated by a distance equal to the greatest dimension of the largest window:

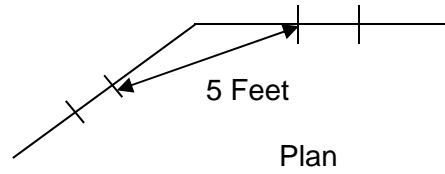
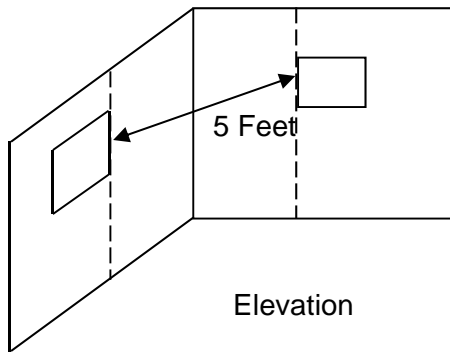
Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

A separation distance of five (5) feet **SHALL** be maintained between window or groups of windows in opposing walls, as indicated below:

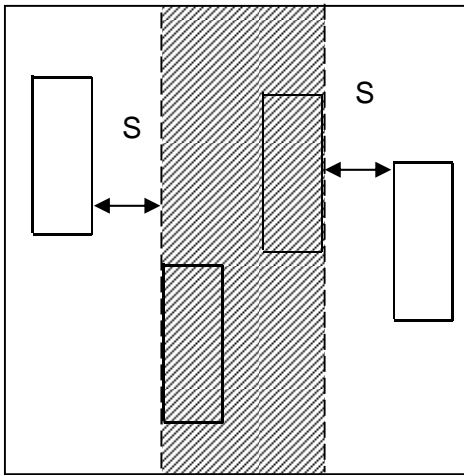
A separation distance of five (5) feet **SHALL** be maintained to combustibles exterior to the enclosure.



Fire Protection Program

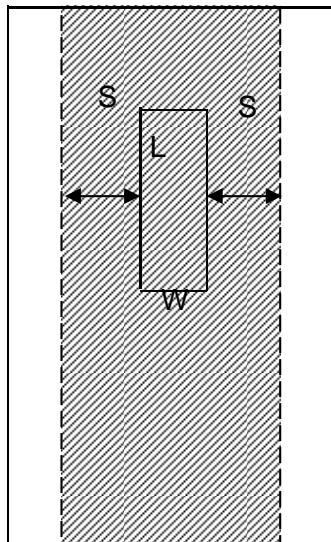
Published Date: 12/03/12

Effective Date: 12/03/12



Adjacent Windows
Within Shaded
Area Considered
Single Window.

S = Largest
Dimension Of Any
Window In
Shaded Area



Adjacent Windows
Within Shaded Area
Considered Single
Window.

S = Larger of L and
W

2.8 Dry Chemical System Design

Dry chemical fire extinguishing systems **SHALL** be designed per NFPA 17, *Standard for Dry Chemical Extinguishing Systems*.

3.0 FIRE PREVENTION

This Section defines Fire Prevention requirements for the CHPRC.

This Section is a consolidation of applicable basic requirements for fire protection common to the entire site, and is not intended to fully replicate the requirements of the source documents. Activities not addressed herein **SHALL** be conducted in accordance with the requirements of the appropriate Code, Standard, and/or DOE requirement.

The following Section applies to both D&D/Construction and active facilities.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****3.1 Fire Prevention Inspections**

Fire prevention inspections are encouraged.

The primary objective of a fire prevention inspection is to perform a general assessment of safe fire practices within a facility or occupancy, and to identify facility conditions that adversely affect employee or emergency responder safety. Inspections may include observations of any fire protection element defined in this STD, but are not inclusive compliance assessments of all elements.

Fire prevention inspections **SHOULD** be performed by a designated Fire Safety Officer (FSO), where provided, or other facility representative in accordance with the requirements defined in this STD.

3.1.1 Inspection Frequency

The inspection **SHOULD** occur on a periodic basis with input from the cognizant FPE.

3.1.2 Performing Inspections

The inspector **SHALL** notify the cognizant facility Manager of the building or area and request that a building representative be present before beginning the inspection. The cognizant facility Manager or designee **SHALL** provide access to all areas required for inspection.

Inspection criteria **SHOULD** include the following minimum areas and topics:

- Exterior of the building - access roads, fire-lanes, fire hydrants, valves, fire department connections
- Exits and passageways
- Life safety
- Fire protection systems, appliances, and components
- Flammable liquids and cabinets
- Compressed gas cylinders
- Heat producing devices
- Resource Conservation and Recovery Act (RCRA) areas
- Permissible welding areas
- Compensatory agreements
- Egress routes
- General hazards
- Open violations from previous inspections

3.1.3 Deficiencies

Any deficiencies noted by the inspector **SHALL** be entered into CRRS.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

3.2 Permits

3.2.1 Fire Marshal Permits

The responsible manager or supervisor in charge **SHALL**¹² ensure that a request for a Fire Marshal Permit is communicated to the cognizant DFM for the activities identified in Appendix B, "Permit Requirements," of the STD (per NFPA 1-2009).

NOTE: *It is recognized that, additional, unique, situations may arise that may constitute the need for a Fire Marshal Permit.*

The HFMO is the organization responsible for the Fire Marshal Permit System; therefore permits **SHALL**²⁶ be requested and obtained in accordance with MSC-RD-8589, *Hanford Fire Marshal Permits*.

A copy of the permit **SHALL**⁴⁰ be posted or otherwise made readily available at each place of operation or carried by the permit holder.

3.2.2 Non-emergency Hydrant Tie-in Permits

Site Form A-6003-681 **SHALL**^{16,26} be prepared by the requester with assistance from and approval by the cognizant water purveyor. The completed form **SHALL**^{16,26} be forwarded to HFD Operations for review and approval. The permit also requires approval by the cognizant DFM for permits exceeding 90 days in duration.

Non-emergency tie-ins to fire hydrants located within or associated with Hazard Category 1, 2 or 3 nuclear facility boundaries require the performance of an Unreviewed Safety Question (USQ) review in accordance with an established process. Where fire suppression systems are credited with performing a nuclear safety function by the facility safety basis documentation, the USQ review requires a supporting engineering evaluation of the configuration and impact to the fire suppression system operability and performance by the fire hydrant tie-in. The USQ number **SHALL**^{16,26} be recorded on the *Nonemergency Hydrant Tie-In Permit* site form.

The user **SHALL**^{16,26} install a non-rising-stem gate valve with a 6.4 cm (2.5 in.) National Hose (NH) female inlet and a NH male or female outlet on the hydrant being used and either a 6.4 cm (2.5 in.) or an 11.5 cm (4.5 in.) non-rising stem gate valve with a NH female inlet and a NH male outlet on one of the remaining hydrant outlets.

The user **SHALL**^{16,26} provide and use only approved fire hydrant wrenches to open and close a fire hydrant. Pipe wrenches **SHALL NOT**^{16, 26} be used to open a hydrant.

The user **SHALL**^{16,26} observe all precautions specified on the permit to prevent damage to the fire hydrant and hoses, including freezing weather conditions.

To protect the site water systems from contaminants backflow prevention devices **SHALL**^{16,26} be installed as required per MSC-RD-10361, *Controlling Cross Connections*. The water purveyor **SHALL**^{16,26} approve all backflow prevention device installations.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

3.3 Controlling the Introduction of Combustibles

This Section provides combustible material controls that are mandatory for all CHPRC projects and facilities.

Combustible material control is only a part of a project's or a facility's fire prevention requirements.

This Section does not apply to materials used in the design and construction of a building.

3.3.1 Combustible Control Programs

Combustible control programs that have been elevated to Technical Safety Requirement (TSR) status **SHALL** comply with the following:

- The combustible program intent and bases **SHALL** be clearly defined and **SHALL** include the following:
 - Objective of the program
 - Key elements of the program such as surveillance requirements, combustible threshold criteria and bases for the criteria and recover actions when surveillance requirements are not met
- If a combustible loading threshold cannot be determined, then an acceptable alternative limit **SHALL** be established with a basis to ensure that hazardous conditions are controlled.
- When combustible controls are selected to control potentially hazardous conditions in order to achieve necessary risk reduction, it **SHALL** be verified that the program or project can control the combustible materials within the derived threshold values or is capable of enforcing other appropriate combustible control methods.

NOTE: • *Appropriate combustible control methods include:*

- *Establishing threshold quantities*
- *Establishing combustible material spacing/separation/location requirements*
- *Identify surveillances to demonstrate combustible quantities are below threshold quantities*
- *Using alternative storage locations*
- *Establishing a means for controlling ignition sources*
- *Establishing a qualitative combustible control program (such as As Low As Reasonably Achievable [ALARA]) when a basis is developed that demonstrates that combustibles can be maintained below derived threshold quantities*

3.3.2 Storage, Use, and Handling of Combustible Materials

Combustible materials **SHALL NOT**¹¹ be stored in areas not intended for the storage of combustible materials; e.g., storage **SHALL NOT**¹¹ be in the aisles of office areas, under stairs, electric equipment rooms, computer rooms, or mechanical rooms.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

The control of combustible material **SHALL**⁵ be maintained ALARA and noncombustible or fire retardant substitutes **SHOULD**⁵ be used whenever possible.

Combustible materials **SHALL NOT**¹¹ be stored in building stair wells or corridors

NOTE: *Combustibles stored in closed metal cabinets are permitted in corridors if the cabinets do not reduce the width of the exit corridors beyond the code requirement.*

3.3.3 Storage, Use, and Handling of Hazardous Materials

Hazardous materials **SHALL**¹² be stored in designated locations and in proper containers.

The Fire Department **SHALL**²⁶ be kept informed of the presence of hazardous materials via the Fire Marshal Permit System in accordance with the HFM permitting procedure. This information is to include material identification, amounts, and storage location.

Cabinets, cargo containers, hazardous materials storage buildings, and hazardous materials storage rooms inside buildings containing hazardous materials **SHALL**⁴³ be identified with the appropriate signage with the material identification number in accordance with NFPA 704, *Standard System for the Identification of the Fire Hazards of Materials*.

Flammable and combustible liquids **SHALL**¹⁷ be stored, used, and handled in accordance with Section 3.13 of this STD.

3.4 Flammable Gases

Flammable gases **SHALL**⁵ be prohibited inside buildings, except for uses allowed by the applicable DOE Standard, Code of Federal Regulations (CFR), or NFPA Code or Standard. When flammable gases are allowed in buildings, the quantity **SHALL**⁵ be approved by the cognizant FPE.

3.5 Fueled Equipment

NOTE: *Due to the variety of fueled equipment (i.e., propane, gasoline, diesel fuel, etc.) and the conditions of use (e.g., CFRs, NFPA 505, etc.), indoor use of fueled vehicles is restricted via this STD to ensure adequate analysis is performed.*

Fueled equipment (e.g., propane, gasoline, diesel fuel, etc.) **SHALL NOT**⁴⁴ be stored, operated, refueled or repaired within a building classified as a hazardous location in accordance with NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations*, unless approved by the cognizant FPE.

3.6 Electrically Powered Equipment

Electrically powered equipment (e.g., electric forklifts, scissors lifts etc.) **SHALL NOT**⁴⁴ be allowed to be stored, operated, or repaired in buildings classified as hazardous locations in accordance with NFPA 505, unless approved by the cognizant FPE.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

3.7 Storage and Accumulation of Rubbish

Combustible rubbish kept or accumulated within or adjacent to buildings or structures **SHALL**¹² be in approved noncombustible containers with lids. (Lids are not required for office waste cans.)

Combustible waste either manmade or dry vegetation (i.e., tumbleweeds) **SHALL NOT**¹² be allowed to accumulate adjacent to buildings.

Oily rags and similar materials **SHALL**¹² be stored in approved and listed disposal containers.

3.8 Wood**3.8.1 Wooden Waste Boxes**

Wooden waste boxes **SHALL**⁵ be treated and maintained so as to be flame-resistant in accordance with nationally recognized standards such as NFPA 703, *Standard for Fire Retardant Impregnated Wood and Fire Retardant Coatings for Building Materials*. Metal waste boxes **SHOULD**⁵ be considered as an alternative to wooden waste boxes.

When defined in a project or facility specific FHA, silica blankets may be used over wooden waste boxes for additional fire protection if the following conditions are met:

- The FHA **SHALL**⁵ include the conditions of use of the silica blankets and other controls necessary to provide protection.
- Silica blankets **SHALL**⁵ be inspected daily to ensure proper placement, including verification that the fabric covers the entire box and a portion of the floor surrounding the box.
- Silica blankets **SHALL**⁵ be inspected monthly to verify that the fabric is free of holes, cuts, tears or abrasions, or excessive thinning of the material that would expose the wooden box.

3.8.2 Wooden Pallets

NOTE: *Due to the high hazard presented by wooden pallets, both Factory Mutual and the NFPA recommend against storing wooden pallets in buildings not protected by fire sprinkler systems. For those buildings provided with protection, specific requirements for the suppression system apply.*

Metal pallets **SHOULD**¹² be considered as an alternative to wooden pallets.

Idle wooden pallets (i.e., **NOT** used in a storage rack or array) **SHALL**¹² be stored outside or in a separate building designed for pallet storage. Idle wooden pallets **SHALL NOT**¹² be stored in facilities.

NOTE: *Storage of idle wooden pallets may be allowed in facilities with approval from the cognizant FPE in accordance with NFPA 13 unless otherwise prohibited by a TSR level control.*

Exterior storage of idle wooden pallets **SHALL**¹² be in accordance with Table 1 (NFPA 1-2009).

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Idle pallet stacks **SHALL NOT**¹² exceed 15 feet in height and **SHALL NOT**¹² cover an area greater than 400 ft². A distance of not less than eight feet **SHALL**¹² separate stacks.

Table 1 – Exterior Wood Pallet Storage

Table 34.10.3(b) Required Clearance Between Outside Idle Pallet Storage and Building							
Minimum Distance of Wall From Storage							
Wall Construction	Under 50 Pallets		50 to 200 Pallets		Over 200 Pallets		
	Ft	M	Ft	M	Ft	M	
Masonry with no openings	0	0	0	0	15	4.6	
Masonry with wire glass in openings, outside sprinklers, and 1 hour doors	0	0	10	3	20	6	
Masonry with wired or plain glass, outside sprinklers, and ¾-hour doors	10	3	20	6	30	9	
Wood or metal with outside sprinklers	10	3	20	6	30	9	
Wood, metal, or other	20	6	30	9	50	15	

3.8.3 Wooden Scaffolding

Wooden scaffolding used in nuclear and radiological facilities **SHALL**⁵ be treated and maintained so as to be fire retardant in accordance with nationally recognized standards such as NFPA 703. Fire retardant wood bearing the mark of Underwriters Laboratories (UL) or other NRTL meets this requirement.

3.9 Plastics (Other Than Containment Enclosures and Radiological Shielding Materials)

3.9.1 General Plastics

The cognizant FPE **SHALL**⁵ be consulted when plastics are used under the following conditions:

- In locations where plastics will be used in facility construction elements (e.g., flooring systems, temporary walls, insulation, etc.)

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

- In areas where plastics will be used that affect physical access or egress (e.g., scaffolding, temporary entries, roof opening enclosures, etc.)
- Where storage of plastic construction materials occurs, including materials otherwise considered flame- or fire-retardant (e.g., insulation, plastic sheeting, component parts, shielding materials, etc.)
- Any use or storage condition beyond component parts (e.g., body components for tools, hard hats in use, transfer carts in use, etc.) where required automatic fire suppression has been abandoned in place or removed
- Those conditions utilizing products specified in Subsections 3.9.2 and 3.9.3

All other uses of plastics **SHOULD** be reviewed by the Project/Facility FPE to determine the impact to the expected levels of protection otherwise identified in this STD.

Sheet plastic **SHALL**^{10,14} be tested and documented as meeting NFPA 701, Test 2.

Sheet plastic not meeting NFPA 701 requirements may be used with cognizant FPE concurrence when it is determined that the material is more suited to the application, supports the principles of ALARA, and does not present an unacceptable increase in fire risk.

3.9.2 Plastic Pallets

NOTE: *Due to the high hazard presented by plastic pallets, both FM and the NFPA recommend against storing plastic pallets in buildings not protected by fire sprinkler systems. For those buildings provided with protection, specific requirements for the suppression system apply.*

Plastic pallets **SHALL NOT**⁵ be used or stored inside areas posted for radiological control, unless such configuration is analyzed in the FHA and safety basis documentation.

Metal pallets **SHOULD**¹² be considered as an alternative to plastic pallets.

Idle plastic pallets (i.e., **NOT** used in a storage rack or array) **SHALL**¹² be stored outside or in a separate building designed for pallet storage. Idle plastic pallets **SHALL NOT**¹² be stored in buildings.

NOTE: *Storage of idle plastic pallets may be allowed in buildings with approval from the cognizant FPE in accordance with NFPA 13 unless otherwise prohibited by a TSR level control.*

Exterior storage of idle plastic pallets **SHALL**¹² be in accordance with NFPA 1.

3.9.3 Plastic Secondary Containment Pans

Plastic secondary containment pans **SHALL NOT**⁵ be used or stored inside areas posted for radiological control, unless such configuration is analyzed in the FHA and safety basis documentation.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

3.10 Containment Enclosures**3.10.1 Combustibles in Containment Enclosures**

Miscellaneous transient combustibles (up to 1-cubic foot) may be stored inside a containment enclosure provided no hot work is conducted.

Flammable or combustible liquid-soaked clothes, rags, or waste **SHALL**¹² be stored in UL-listed or FM-approved safety containers.

All combustible waste **SHALL**⁵ be removed from the plastic containment enclosure after each work day. Placement of used combustibles into sleeved metal waste containers is considered acceptable.

3.10.2 Use of Flammable and Combustible Liquids In Containment Enclosures

Flammable and/or combustible liquids used or stored in containment enclosures **SHALL**¹² be minimized and stored in and dispensed from UL listed or FM approved safety cans.

3.10.3 Hot Work In Containment Enclosures

A *Hot Work Permit* (Site Form A-6006-115) **SHALL**¹⁹ be obtained when performing cutting, welding, grinding, or open-flame operations within a plastic containment enclosure, or the area **SHALL**¹⁹ be a designated hot work area in accordance with Subsection 3.16.2 of this STD.

Hot work **SHALL NOT**⁵ be performed in plastic containment enclosures, located in radiological areas, without an approved Radiological Work Permit (RWP).

During hot work activities, combustible materials that are used in plastic containment enclosure operations (for example, rags and paper products) **SHALL**⁵ be removed from the plastic containment prior to the start of hot work activities or stored in metal containers with lids, if the containers are approved by the cognizant FPE.

3.10.4 Maintenance of Egress in Containment Enclosures

Exits **SHALL**¹¹ remain unobstructed at all times. Exit from the room in which the enclosure is located **SHALL**¹¹ remain unobstructed.

3.10.5 Fire Extinguishers in Containment Enclosures

Portable fire extinguishers **SHALL**²⁵ be provided and positioned for easy visibility and access, as determined by the cognizant FPE.

3.10.6 Inspection of Containment Enclosures

The containment enclosure configuration **SHOULD**⁵ be inspected monthly to ensure that any modifications or repairs performed are consistent with the requirements of this subsection.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

3.11 Radiological Shielding Material

No new plastic or polymer based shielding materials **SHALL5** be used unless specifically analyzed and allowed by the project or facility FHA that considers combustible loading impacts.

New or replacement glovebox shielding materials **SHALL3** be noncombustible.

3.12 Fixatives Used for Contamination Control**3.12.1 General Requirements**

Fixatives used for contamination control **SHALL5** be approved by the cognizant FPE.

3.12.2 Fixative Material Requirements

Fixatives in their uncured form (i.e., prior to application) **SHALL5** be evaluated based on the hazards presented by the material (i.e., flammable or combustible liquid or solid).

All fixatives in their cured form **SHALL5** meet the following interior finish requirements:

- Flame spread rating of 25 or less in accordance with ASTM E84
- Smoke development rating of 450 or less in accordance with ASTM E84

Foams or plastics **SHALL5** pass the FM Research Standard 4880, *Class 1 Insulated Wall or Wall & Roof/Ceiling Panels; Plastic Interior Finish Materials; Plastic Exterior Building Panels; Wall/Ceiling Coating Systems; Interior or Exterior Finish Systems* (Corner Test). Modified versions of the Corner Test may be used at the discretion of the cognizant DFM with the concurrence of the HFMO.

Fixatives used in enclosed spaces (i.e., gloveboxes, ducts, tank interiors, conveyors, chases, etc.) and/or areas subject to combustible controls designed to minimize fire spread between combustible materials or to limit the amount of material involved in a single fire **SHALL5** meet the above requirements and **SHALL5** have an average heat release rate not exceeding 150 kW/m² and a peak heat release rate not exceeding 350 kW/m² as determined using ASTM E1354, *Test Method for Heat Release and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*. If the heat release rate requirements cannot be met, then the allowable quantity of material used in any location and any associated work controls **SHALL5** be determined by the cognizant FPE as part of the evaluation for use identified above to ensure continued conformance to applicable combustible control limits or accident scenarios.

Capture coatings may be exempted from testing requirements (i.e., flame spread and heat release rate determination) if the evaluation identified above concludes that the application thickness is not expected to contribute to fire spread during pre-flashover conditions.

3.12.3 Use of Fixatives with Automatic Sprinklers

Fixatives used for contamination control **SHALL NOT5** be applied to automatic sprinklers.

If fixatives used for contamination control that are utilized in locations where sprinklers could be inadvertently coated, then one of the following **SHALL5** occur:

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Sprayed sprinklers SHALL⁵ be replaced
- Sprinklers SHALL⁵ be covered with bags of the types noted below prior to fixative application and the bags SHALL⁵ be removed after application is complete
- Sprinklers **SHALL⁵** be determined to be “Abandoned In Place” and uniquely identified as being out of service

If sprinklers are to be covered with bags for protection from application of fixatives, then one of the following types of bags **SHALL⁵** be used:

- Cellophane bags having a thickness of 0.003 inch or less
- Thin paper bags

If automatic sprinklers are inadvertently coated, regardless of the precautions taken, then they **SHALL⁵** be replaced. Coated sprinklers **SHALL NOT⁵** be cleaned and reused.

3.13 Flammable and Combustible Liquids

This Section is a consolidation of applicable basic requirements for flammable and combustible liquid operations common to the Hanford Site, and is not intended to fully replicate the requirements of the source documents. Additional requirements may be applicable to specific situations.

Where safety basis requirements are different from those listed herein, the more conservative requirements **SHALL⁵** be implemented.

Flammable and combustible liquids used in laboratories **SHALL⁴⁵** follow the requirements of NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*.

3.13.1 Classification of Liquids

Combustible liquids **SHALL¹⁷** be classified in accordance with the following:

1. Class II -- Any liquid that has a closed-cup flash point at or above 100°F and below 140°F.
2. Class III -- Any liquid that has a closed-cup flash point at or above 140°F
 - a. Class IIIA -- Any liquid that has a closed-cup flash point at or above 140°F, but below 200°F.
 - b. Class IIIB -- Any liquid that has a closed-cup flash point at or above 200°F.

Flammable liquids **SHALL¹⁷** be classified in accordance with the following:

1. Class IA -- Any liquid that has a flash point below 73°F and a boiling point below 100°F.
2. Class IB -- Any liquid that has a flash point below 73°F and a boiling point at or above 100°F.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

3. Class IC -- Any liquid that has a flash point at or above 73°F but below 100°F.

3.13.2 Maximum Allowable Quantity (MAQ)

The MAQ of flammable and combustible liquids allowed in each control area **SHALL NOT**¹⁷ exceed the amounts specified in Table 2, unless the building already has a Hazardous Occupancy classification.

NOTE: *A control area is defined as a building or portion of a building within which flammable and combustible liquids are allowed to be stored, dispensed, and used or handled in quantities that do not exceed the MAQ*

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Table 2 – MAQ of Flammable and Combustible Liquids per Control Area

	Liquid Class(es)	Quantity		Notes
		gal	L	
Flammable Liquids	IA	30	115	1, 2
	IB and IC	120	460	1, 2
	IA, IB, IC combined	120	460	1, 2, 3
Combustible Liquids	II	120	460	1, 2
	IIIA	330	1,265	1, 2
	IIIB	13, 2000	50, 600	1, 4

Notes:

1. Quantities are permitted to be increased 100 percent where stored in approved flammable liquids storage cabinets or in safety cans in accordance with the fire code. Where Note 2 also applies, the increase for both notes is permitted to be applied accumulatively.
2. Quantities are permitted to be increased 100 percent in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*. Where Note 1 also applies, the increase for both notes is permitted to be applied accumulatively.
3. Containing not more than the maximum allowable quantity per control area of Class IA, Class IB, or Class IC flammable liquids, individually.
4. Quantities are not limited in a building equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

The MAQ of liquids allowed in a control area **SHALL**¹⁷ be allowed to be increased in accordance with NFPA 1, *Fire Code*, and NFPA 30, *Flammable and Combustible Liquids Code*, with the approval of the cognizant FPE.

3.13.3 Flammable Liquids Storage Cabinets

Flammable liquid storage cabinets **SHALL**¹⁷ be listed and approved for storage of flammable and combustible liquids.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Flammable liquid storage cabinets **SHALL**¹⁷ have the vent openings sealed with properly fitting metal bungs, or when the cabinets are required to be vented they **SHALL**¹⁷ be vented to a safe location outdoors.

Flammable liquid storage cabinets **SHALL NOT**¹⁷ be placed in the means of egress (i.e., corridors, aisles, exit doors) and **SHALL NOT**¹⁷ be stored in exit enclosures (i.e., stairwells).

The volume of Class I, Class II, and Class IIIA liquids stored in an individual storage cabinet **SHALL NOT**¹⁷ exceed 120 gallons.

The total volume of Class I, Class II, and Class IIIA liquids in a group of storage cabinets **SHALL NOT**¹⁷ exceed the maximum allowable quantity limits established in Subsection 3.13.2 of this STD.

3.13.4 Dispensing, Handling, Transfer and Use of Liquids

Quantities of Class I and Class II liquids being transferred, dispensed or used outside of flammable liquid storage areas **SHOULD NOT**¹⁷ exceed 5 gallons in any area without the approval of the cognizant FPE.

Quantities of Class III liquids being transferred, dispensed or used outside of flammable liquid storage areas **SHOULD NOT**¹⁷ exceed 55 gallons in any area without the approval of the cognizant FPE.

Flammable and combustible liquids **SHALL**¹⁷ be stored in approved safety containers or be kept in their original packaging.

Spill control **SHALL**¹⁷ be provided when liquid transfer or dispensing is performed. Spills and leakage **SHALL**¹⁷ be cleaned up immediately.

When transferring liquids between conductive containers, the containers **SHALL**¹⁷ be grounded to ensure a difference of potential or static discharge does not develop.

Liquid storage areas where dispensing is conducted **SHALL**¹⁷ be provided with proper ventilation.

Spray operations involving flammable or combustible liquids **SHALL**¹⁷ be reviewed and approved by the cognizant FPE.

3.14 Glovebox Fire Protection

The following requirements apply to glovebox design and operations, including decontamination and dismantling. The requirements are established to protect against glovebox fires.

All new glovebox installations **SHALL**¹ be in conformance with DOE-STD-1066-99.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

Unless identified as removed from service in accordance with DOE-STD-1066-99, all existing glovebox fire protection systems (including fire doors, fire detection, fire suppression, etc.) **SHALL** be tested and maintained operable.

A container of appropriate extinguishing agent **SHALL** be available in gloveboxes containing pyrophoric metals that present an unusual, unpredictable, or true fire hazard. Fire properties of such materials **SHALL** be determined by the cognizant Management and the cognizant FPE.

Flammable and combustible liquids used in gloveboxes **SHALL**¹⁷ be stored and dispensed in accordance with Subsection 3.13 of this STD.

Combustibles required for daily operations (regarding glovebox gloves, use of metal gloveport covers if available, and management of gloves in accordance with the facility specific FHA) may be in a glovebox if proper controls and procedures are in place (i.e., control of ignition sources and combustibles).

Halogen (Quartz-Halogen) lights **SHALL NOT**⁵ be used for illumination of gloveboxes unless sufficient distance is provided between the glovebox and the light source to prevent ignition hazards.

In order for fire protection systems in gloveboxes to be deactivated the following conditions **SHALL** be met:

- The removal of glovebox fire suppression systems complies with the facility specific FHA
- All combustibles are removed from the glovebox (this is not meant to include glovebox construction materials or items used for demolition and deactivation)
- Electrical power and flammable/combustible utilities are isolated, air gapped, and tagged "Out of Service" or "Deactivated." This does not include temporary power for D&D activities
- The glovebox complies with the facility-specific combustible control program

3.15 Heat Producing Appliances

This Section defines the requirements for use of heat producing appliances, including fuel fired heaters and portable devices.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

3.15.1 Portable Electrically Heated Devices

Electrically heated devices are a common source of ignition in major fires, usually as a result of misuse when left unattended. Employees **SHALL**⁵ limit use of electrically heated appliances and devices to that which is necessary for performance of work, and extreme caution and care **SHALL**⁵ be exercised in the use of such equipment. Allow use of certain cooking appliances with the requirement that they be attended at all times when in use.

3.15.2 Portable Space Heaters

Use of portable space or area heaters are discouraged due to high cost of operation, interference with facility provided heating and cooling systems, and risk of fire. Portable space heaters are allowed for use, providing the following provisions are met:

- The heater **SHALL**⁵ be electric.

NOTE: *All electric heaters over 1500 watts **SHALL**⁹ require a Fire Marshal permit.*

- The Building Manager or area Supervisor **SHOULD**⁵ approve the use of the space heater, following consideration for the facility heating and cooling system operation and available electrical supply for the heater.
- The heater **SHALL**¹² be listed by an NRTL.
- The heater shall⁵ be equipped to de-energize electrical power to the unit when tilted or turned over.
- The user **SHALL**⁵ ensure that easily ignitable combustible materials, such as paper or cardboard, are maintained at least 3 feet away from all sides of the heater, or as recommended by the manufacturer, whichever is greater.
- The user **SHALL**⁵ turn off the heater whenever the heater is not in use or when the area is unoccupied.
- The user **SHALL**⁵ periodically inspect the heater and electrical cord to ensure the unit is in good working order.
- The user **SHALL**¹² locate the heater so it cannot be easily overturned.

3.15.3 Portable Cooking Appliances

Portable cooking appliances that produce grease laden vapors, such as griddles or fryers, **SHALL NOT**⁵ be used interior to any facility for which CHPRC has responsibility without prior written approval by the HFM.

Popcorn poppers may be used within CHPRC facilities, providing they are dry-air type appliances. Popcorn poppers that require use of oils, butter, or grease **SHALL NOT**⁵ be used interior to any facility for which CHPRC has responsibility.

Hot plates or food warmers may be used, providing they are used in an area free of easily ignited combustibles and are attended at all times while in use. Hot plates or food warmers **SHOULD**⁵ be equipped with an indicator light showing power is on. Cooking foods that produce grease laden vapors **SHALL NOT**⁵ be allowed on hot plates or warmers.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

Coffee pots may be used within facilities for which CHPRC has responsibility, providing they are used in an area free of easily ignited combustibles and electrical supplies are suitable for the electrical consumption requirements stated on the appliance. Coffee pots **SHOULD** be equipped with an indicator light showing power is on, and are preferred to have shut off timers, and start timers that are based on a 24-hour clock and require manual intervention to initiate each time.

Toaster ovens, toasters, or other type portable ovens may be used, providing they are used in an area free of easily ignited combustibles, and are attended at all times while in use. Clearance from combustible materials **SHALL** be maintained to a minimum distance defined by the manufacturer.

Barbeques may be used provided the barbeques are inspected, maintained, and located properly for use in accordance with the requirements in Hanford Fire Marshal Advisory Bulletin AB06-001. Prior to each use on site, the unit and components **SHOULD**¹⁸ be inspected for physical and operational readiness. See Appendix E for accompanying checklists.

In addition to the items on the checklists, the following additional safety precautions **SHOULD**¹⁸ be considered:

LP Gas Safety Precautions

- To avoid accidents while transporting LP gas containers, transport the container in a secure, upright position. Never keep a filled container in a car trunk that is not well ventilated, as heat will cause the gas pressure to increase, which may open the relief valve and allow gas to escape the vehicle. LP gas is heavier than air and is easily ignited.
- Use caution when storing LP gas containers. Always keep containers upright. Never store a spare gas container under or near the grill or indoors. Never store or use flammable liquids, like gasoline, near the grill.
- Use extreme caution and always follow the manufacturer's instructions when connection or disconnecting.

Charcoal Safety Precautions

- Never burn charcoal or wood inside of a building or confined space.
- Do not store grills indoors with freshly used coals.
- Properly dispose of coals as they can retain heat for several days.

If charcoal lighter fluid is used, it must be used prior to lighting. Do not add lighter fluid after the charcoal is lit. Remove from vicinity of grill after use.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****3.15.4 Lighting**

Use of portable desk or free standing lights that utilize halogen bulbs (quartz halogen) **SHALL NOT**⁵ be allowed inside any building for which CHPRC has responsibility.

NOTE: *Portable halogen bulb element work lighting used by employees for temporary lighting in performance of work SHALL*⁵ *be allowed, providing fixtures are designed to prevent direct contact with combustible materials, and elements are limited to 300 Watts.*

3.15.5 Smoking

All cigarette receptacles **SHALL**¹² be of noncombustible construction.

Smoking **SHALL**¹² be prohibited within 35 feet of any flammable gas or flammable/combustible liquid containers or storage areas.

Smoking **SHALL**¹⁰ be permitted only in designated areas at construction and demolition sites.

3.15.6 Personal Hygiene Appliances

Use of personal appliances that produce heat, such as curling irons, hair dryers, and hair roller heaters, may be used within buildings for which CHPRC has responsibility, providing they are used in a manner consistent with their application, and are limited to use in locker rooms, dressing rooms, or lavatories.

Butane powered curling irons **SHALL NOT**⁵ be used at CHPRC facilities.

3.15.7 Portable Open Flame Producing Appliances

Use of any portable device that produces an open flame **SHALL**¹⁹ comply with Section 3.16 of this STD.

Use of candles, oil burning lamps, catalytic or solid pellet heaters, or other open flame devices for the purpose of decoration, aroma, light, or personal heat **SHALL NOT**⁵ be allowed.

3.15.8 Portable Fuel-Fired Heaters

Portable fuel-fired heaters include any portable heater using fossil fuels. Use of portable heaters is typically limited to facility construction, modification, or demolition, or to supplement facility equipment outages.

Heaters **SHALL**¹² be listed for their intended application by an NRTL.

Heaters **SHALL**¹⁰ be used in a manner consistent with the manufacturer's requirements for, as a minimum:

- Clearance from combustibles and furnishings
- Chimney clearance from combustible construction, if equipped
- Ventilation of combustion gases

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Fresh combustion air supply

Heaters **SHALL**¹² have a Hanford Fire Marshal Permit.

Heaters **SHALL**^{16,26} be located outside and the heat ducted indoors, unless otherwise approved by the HFM.

Heaters located indoors **SHALL**^{16, 26} be continuously monitored and maintained by trained personnel while in operation, unless prior approval is granted from the HFM, and the deviation, including conditional requirements when applicable, are specified in writing on the Hanford Fire Marshal Permit.

Heaters **SHALL**¹⁰ be in good working condition and **SHALL**¹⁰ be periodically inspected.

Heaters **SHALL NOT**¹² be modified in a manner that is inconsistent with its listing or alters the manufacturer's intended use.

Heaters **SHALL**¹² be secured to prevent tip-over or travel, including the fuel source.

Storage of flammable or combustible liquids **SHALL**¹⁷ be consistent with Section 3.13.

3.15.9 Generators

Generators **SHALL**⁵ be turned off prior to refueling unless the generator is equipped with a day tank.

3.16 Hot Work

A Job Hazards Analysis (JHA) **SHALL**²⁰ be completed for hot work activities, when applicable, in accordance with PRC-PRO-WKM-079, *Job Hazard Analysis*

The Job Supervisor **SHALL**²⁰ schedule the cognizant FPE review and approval at least 24 hours in advance for new projects.

NOTE: *When changes occur in the field which could impact the validity of the JHA, the JHA SHALL be reviewed (if necessary) and updated as required to reflect the field changes.*

Those performing hot work **SHALL**¹⁹ wear flame retardant (FR) Personal Protective Equipment (PPE) to at least the level determined through the JHA process to protect the worker from the effects of heat sparks and flame, unless approval to deviate is given on a case by case basis by the FPE (e.g., FR coveralls, leathers are acceptable in non-radiological areas, or FR/leather full front apron as a minimum for "low hazard" hot work).

The FR PPE requirement **SHALL NOT**¹⁹ be waived in a designated area if a designated fire watch is not provided.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

All hot work in areas governed by an RWP **SHALL**¹⁹ require the use of fire retardant PPE. If the RWP requires a double set of anti-contamination coveralls, the outer set of coveralls **SHALL**¹⁹ be flame retardant.

NOTE: *Red FR coveralls (including hoods and boots) for use in radiological areas and brown FR coveralls for use in non-radiological areas are available through the Hanford Central Warehouse.*

Hot work equipment (torches, regulators, pressure-reducing valves, and manifolds, etc.) **SHALL**¹⁹ be listed or approved by an NRTL for the intended use.

Oxygen-fuel gas systems (e.g., oxygen/acetylene welding) **SHALL**¹⁹ be equipped with listed and/or approved backflow valves, flash arrestors, and pressure-relief devices.

When new welding curtains, blankets, pads or equivalent are obtained they **SHALL**¹⁹ be listed or approved. Existing non listed/approved may be used.

Hot work areas requiring scaffolding for access **SHALL**⁵ be constructed of metal planks or **SHALL**⁵ be approved by the cognizant FPE.

Hot work **SHALL**⁵ be performed in accordance with PRC-PRO-FP-40421.

3.16.1 Fire Watch Requirements

A fire watch **SHALL**¹⁹ be required for all hot work outside of designated hot work areas and when required by the cognizant FPE inside designated areas.

Fire watches **SHALL NOT**¹⁹ be assigned other duties.

The fire watch **SHALL**¹⁹ have successfully completed Fire Watch Training (Course #044400), and be within the re-certification training date. Fire watch training not received on site **SHALL NOT**⁵ be accepted. The fire watch **SHALL**¹⁹ clearly understand the following when performing fire watch duties:

- The area to be fire watched
- Potential fire hazards (to personnel and property)
- Appropriate emergency procedures and actions
- Methods for sounding alarm (s)
- Procedure for manually activating fire suppression systems (if applicable)
- That he/she has the authority to stop the hot work operations if unsafe conditions develop

The fire-watch **SHALL**¹⁹ be provided with a fully charged and operable fire extinguisher at the worksite throughout the entire job. Ensure a separate extinguisher is brought to the worksite. Do not take a mounted extinguisher in the facility from its storage rack, except in case of fire.

A fire watch **SHALL**¹⁹ be maintained for at least ½ hour after completion of hot work operations in order to detect and extinguish smoldering fires.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

For torch-applied roofing operations, a fire watch **SHALL**¹⁹ be posted for at least 2 hours following completion of the operation.

3.16.2 Hot Work Performed in Designated Area

A Fire Marshal Permit **SHALL**¹² be required to authorize an area as a designated hot work area. The Fire Marshal Permit **SHALL**¹² be posted at the designated area. The permit **SHALL**¹⁹ address the following as a minimum:

- Criteria to which the area **SHALL**¹⁹ be maintained
- PPE requirements for fire related hazards

NOTE: *Refer to AJHA for all PPE requirements*

- Fire watch requirements per Subsection 3.16.1 of this STD
- Special circumstances pertaining to PPE/fire watch requirements. (Example: Establishing a fire watch in lieu of PPE requirements or vice versa for specific hot work operations).
- Criteria that would require a new permit, (i.e., facility modifications, etc.)

NOTE: *A dedicated fire watch is not required in a designated hot work area unless otherwise specified by the cognizant FPE.*

Designated areas **SHALL**¹⁹ be evaluated by the cognizant DFM with consideration for:

- A specific area designed or approved for hot work
- Fire resistive or of noncombustible construction
- Essentially free of combustible and flammable contents
- Suitably segregated from adjacent areas

The cognizant DFM **SHALL**¹⁹ designate all controls in designated areas

- NOTE:**
- *A dedicated fire watch is not required in a designated hot work area unless otherwise specified by the cognizant FPE.*
 - *For the purposes of this procedure, a designated area is defined as a permanent location designed and approved for hot work operations to be performed regularly and suitably segregated from adjacent areas. The Fire Marshal Permit demonstrates that the area has been reviewed by a DFM to ensure it qualifies for a designated hot work area and establishes any applicable controls. The Job Supervisor and cognizant facility Manager are responsible to ensure the area is maintained in accordance with the requirements in this document and the Fire Marshal Permit.*

The area **SHALL**¹⁹ be provided with a fully charged and serviced portable fire extinguisher (minimum 2A-10BC rating) that serves only the designated hot work area.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

The area **SHALL**¹⁹ have adequate ventilation (consult Industrial Hygiene, if necessary). Inside buildings, the designated area **SHALL**¹⁹ be provided with visual protection, i.e., surrounded by a booth or screen.

Designated hot work area permits **SHALL**¹² be reviewed annually and approved by the cognizant DFM.

3.16.3 Hot Work Performance Outside of Designated Areas

Hot work that is performed at locations other than in a designated hot work area **SHALL**¹⁹ require an approved Site Form A-6006-115 before each job with the exception of the following types of hot work:

- Sanding using grinders with sanding discs
- Peanut grinding
- Dremel® tool grinding
- Pedestal grinders
- Pedestal sanders
- Rotary files
- Reciprocating saws
- Circular saws
- Nibblers
- German saws
- Electric soldering

NOTE: *The Hot Work permit will identify the fire related PPE requirements. Refer to AJHA for all PPE requirements.*

Cognizant FPE approval **SHALL**¹⁹ be required on all hot work permits.

The following high hazard hot work **SHALL**⁹ require notification of the HFM (FAX 373-5846 copy of the permit):

- SMAW-Shielded Metal Arc Welding-Stick Welding
- GMAW-Gas Metal Arc Welding - MIG Welding (Metal Inert Gas) wire feed welding, squirt gun welding
- FCAW-Flux Cored Arc Welding-Wire feed welding with a flux core in the wire

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- CAC-A - Air Carbon Arc Cutting
- CAC-Carbon Arc Cutting (no air)
- PAC-Plasma Arc Cutting
- OFC-Oxy-Fuel Cutting (Cutting torch)
- Heavy Grinding-using Bayflex grinder, side grinder, 6" to 8" grinding wheel (disc)
- Light Grinding-using 4" and smaller grinding wheel
- Cut-off Saw

A fire-watch **SHALL**¹⁹ be established before starting the hot work.

The work area **SHALL**¹⁹ be inspected to ensure compliance with the following:

- The job relocated to avoid exposure if possible
- Combustibles moved at least 35 feet away from the work or protected by noncombustible/fire retardant covers, shields, or blankets or, if appropriate, the combustible materials may be wetted
- Shut down ducts that might carry sparks to distant combustibles

NOTE: *Combustible- A material that, in the form in which it is used and under the conditions anticipated, will ignite and burn.*

- All openings or cracks in walls, floors, systems, and equipment within 35 feet of the work **SHALL**¹⁹ be covered or plugged to prevent sparks from reaching adjacent areas.
- Hot work to be performed near walls, partitions, ceilings or roofs of combustible construction **SHALL**¹⁹ be provided with fire-retardant shields or guards to prevent ignition
- If hot work is to be performed on a wall, partition, ceiling or roof, precautions **SHALL**¹⁹ be taken to prevent ignition of combustibles on the opposite side by relocating combustibles. If it is impractical to relocate combustibles, a fire watch on the opposite side from the work **SHALL**¹⁹ be provided.
- Every elevated hot work operation **SHALL**⁵ be evaluated on a case-by-case basis by the cognizant FPE to determine a reasonable safe distance from hot work to combustible occupancies or construction. For elevated hot work, combustible materials **SHOULD**²¹ be either relocated a minimum of 50 feet from the hot work area; or properly protected with fire retardant welding blankets; or the hot work operation isolated with welding screens. Suspend fire-resistive welding blankets under hot work conducted near the ceiling. Place noncombustible screens around hot work at the floor to trap sparks. The physical conditions involved may dictate relocation of combustibles beyond 50 feet.
- Welding **SHALL NOT**¹⁹ be performed on metal partitions, walls, ceilings, or roofs with combustible coverings or with combustible sandwich-type panel construction.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- When hot work is performed on pipes or other metal objects that are, or have been, in contact with combustible materials or flammable materials such as flammable liquids the configuration **SHALL**¹⁹ be evaluated by the cognizant FPE to ensure that heat conduction through the metal does not present the threat of ignition
- If installed, automatic fire suppression systems **SHALL**¹⁹ be operable unless concurrence is obtained from the cognizant FPE.

NOTE: *Special precautions need to be taken to avoid accidental operation of the system. Consult with the cognizant FPE for appropriate special precautions to avoid inadvertent actuation of fire protection systems.*

- If installed, the HFD **SHALL**¹⁹ bypass or protect smoke/heat detectors that may be affected by the work, before the hot work begins (and restored to service as soon as possible after the job)

NOTE: *Depending on the operation, detectors may need to be covered or removed.*

- Before initiating hot work in spaces classified as confined spaces as defined in PRC-RD-SH-11258, *Confined Space*, the cognizant FPE **SHALL**^{22, 23} evaluate the hazard based on NFPA 326, *Standard for Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair*.
- Prior to hot work on small tanks, containers or piping, the FPE **SHALL**²² evaluate the hazard based on NFPA 326.

3.17 Fire Department Access

Facilities **SHALL**¹² provide and maintain fire department vehicle access. The access roads **SHALL**¹² have an unobstructed driving surface width of at least 20 feet during all weather conditions, and be able to withstand the live loads of fire department apparatus. In addition, all access routes **SHALL NOT**¹² have any over-head obstacles lower than 14 foot 6 inches in height for clearance of fire department apparatus.

The required width of a fire department access road **SHALL NOT**¹² be obstructed in any manner, including by the parking of vehicles.

Dead end fire department access roads in excess of 150 feet **SHALL**¹² be provided with approved provisions for turning around fire department apparatus.

A fire department access road **SHALL**¹² extend to within 50 feet of at least one exterior door that can be opened from the outside and that provides access to the interior of the building.

The fire department access road **SHALL**¹² be extended to within 150 feet of all portions of the exterior walls of the first story of any building.

The angle of approach and departure for any means of fire department access road **SHALL NOT**¹² exceed 1 foot drop in 20 feet or the design limitations of the fire apparatus of the fire department.

Any closure of a fire department access road **SHALL**¹² require a Hanford Fire Marshal permit.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

3.18 Off-Road Vehicle Travel

Any vehicle travel “off-road” **SHALL**²⁴ follow the requirements of this Section.

NOTE: *Off-road is defined as any natural-terrain surface or any road surface including dirt, gravel or pavement that is not being maintained in a way that prevents the underside of the vehicle from coming in contact with natural vegetation.*

The current fire danger rating may be obtained from the FMO, project or facility FPEs or is posted on the intranet home page (www.rl.gov).

Project management **SHALL**²⁴ be responsible for notifying and obtaining concurrence from the HFD's on duty Battalion Chief (373-3856) before any activity involving off-road vehicle travel when the fire danger is HIGH or above.

In all cases of off-road travel the following equipment **SHALL**²⁴ be provided in each vehicle:

- Hand shovel
- Fire extinguisher with a minimum 2A:10BC rating
- Communication (radio or cell phone)

Personnel **SHALL**²⁴ immediately report any fires to HFD (373-0911 for cell phones).

Any vehicle going off-road **SHALL**²⁴ be in good working order with a properly functioning exhaust system and be periodically inspected to ensure there is no vegetation caught under the vehicle.

Off-Road vehicle activities **SHALL**²⁴ not be allowed if:

- The Hanford area is under a “Red Flag Warning” condition
- If wind speeds are expected to exceed 15 MPH and the Fire Danger Level is HIGH or above
- The relative humidity is 15% or less when the Fire Danger Level is HIGH or above
- The SITE is in the Extreme Fire Danger Level

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

The following extra precautions **SHALL**²⁴ be taken during the respective Fire Danger Levels:

Fire Danger Level	Low	Moderate	High *1	Very High *1	Extreme
Specific precautions and requirements	No restrictions but standard Off-Road Equipment (see requirements noted below) must be carried.	Standard Off-Road Equipment plus: - No parking or idling over or on standing vegetation	All precautions for MODERATE plus: - HFD Battalion Chief notification (373-3856) of specific location of activities - Vehicle exhaust system modification (no exhaust components below the vehicle body) or pre-treatment of potentially ignitable vegetation	All precautions for HIGH plus: - Access allowed only between the hours of 10 pm and 10 am - Additional water fire extinguisher - A continuous fire watch of the travelled area performed for at least 30 minutes after the end of travel	CLOSED

*1 – During HIGH or VERY HIGH fire danger conditions when authorized by the on-duty Battalion Chief (373-3856), diesel vehicles manufactured in 2006 or before may be allowed off-road without the pre-treatment of potential fuels such as natural vegetation. Each case shall be evaluated and other considerations and precautions taken as directed. Most diesel powered vehicles produced in 007 and later are equipped with catalytic converters and pose the same fire danger as gasoline powered vehicles.

NOTE: *The pretreatment of potential fuels involves the removal of the vegetation along the path of travel such that vegetation cannot come in contact with the undercarriage of the vehicle and/or having a water truck wet down the area immediately before travel into and out of the area.*

Through coordination with the cognizant FPE and concurrence of the HFD Battalion Chief, a Fire Marshal Permit may be issued on a case-by-case basis for specific variances to the off-road requirements listed above.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

3.19 Exterior Nuclear/Radiological Waste Storage

Exterior storage of nuclear and/or radiological waste **SHALL** be addressed and controlled by a facility specific FHA for Hazard Category 3 or higher activities.

3.20 Ventilation

For building ventilation, exhaust, blower and duct systems where flammable/combustible vapors, residues, lint and/or fibers may accumulate a documented inspection with cleaning, calibration and replacement of components **SHALL**²⁸ be required annually. The following **SHALL**²⁸ be ensured:

- Grill plates are clean
- Replace filter media
- Remove any buildup of foreign material from the duct interior

NOTE: • *The extent of inspection and maintenance necessary depends on many factors, including the environment being ventilated, material exhausted, equipment type and operating pattern. All components exposed to the airflow SHOULD be included in the inspections. Combustible dust buildup is a hazard. Similarly, exhaust systems for areas where combustible liquids are used (such as lubricants and solvents) can become coated with a highly combustible finish over time and be a hazard.*

- *Does not apply to radiological contaminated ducts*

3.21 Portable Fire Extinguishers

This subsection describes the requirements for the distribution, installation, inspection, maintenance, and use of portable fire extinguishers.

3.21.1 Extinguisher Procurement

Portable fire extinguishers utilized at the Hanford Site **SHALL** be limited to the following types:

- Pressurized water-type, including Aqueous Film-Forming Foam (AFFF)
- Stored pressure type dry chemical
- Existing cartridge operated dry chemical or dry powder

NOTE: *Cartridge operated dry chemical or dry powder extinguishers SHALL be replaced with stored pressure dry chemical fire extinguishers at their next 12 year maintenance date.*

- Stored pressure, low pressure gaseous agents (clean agents)
- Self-expelling, high pressure gaseous agent (carbon dioxide)
- Wet chemical

Extinguishers **SHALL** be approved by the FPE prior to being procured.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****3.21.2 Extinguisher Distribution**

Portable fire extinguishers **SHALL**²⁵ be distributed throughout facilities for which CHPRC has responsibility based on the types of hazards expected within the area, and spacing requirements defined by the NFPA 10, *Standard on Portable Fire Extinguishers*. The extinguishers **SHALL** be reviewed and approved by the cognizant FPE to ensure proper spacing and proper application of the extinguisher type for the expected hazard.

Fire Systems Maintenance (FSM) tracks locations and periodic service requirements for Hanford Site portable fire extinguishers and **SHALL**^{26, 32} be notified of any fire extinguisher addition, removal, or relocation.

Portable fire extinguishers **SHALL NOT**²⁵ be removed from the assigned location for any purpose other than fire extinguishment. Fire extinguisher requirements for temporary hazards such as hot work **SHALL**²⁵ be provided through additional fire extinguishers when necessary to ensure facility fire extinguishers remain in the assigned locations. Fire extinguishers removed for periodic service **SHALL**²⁵ be replaced with a like, serviceable extinguisher.

3.21.3 Extinguisher Installation

Indoor portable fire extinguishers **SHALL**²⁵ be installed in accordance with the following:

- Secured to a stationary vertical surface using the listed hanger assembly supplied with the extinguisher OR placed in non-locking cabinets or wall recesses designed to house portable fire extinguishers
- Conspicuously located where they are readily accessible and immediately available in the event of a fire, preferably along normal paths of travel such as exits
- Mounted such that operating instructions appear on the front or outward side of the extinguisher
- Installed such that the bottom of the extinguisher is greater than 4 inches above the floor
- Installed such that the top of the extinguisher is less than 5 feet above the floor for extinguishers with a gross weight of less than 40 lbs., OR less than 3-1/2 feet above the floor for extinguishers with a gross weight greater than 40 lbs.
- If water-type extinguisher, protected from temperatures < 40°F and >120°F

Vehicle extinguishers **SHALL**²⁵ be securely mounted in a harness bracket to prevent dislodgment from any direction.

3.21.4 Extinguisher Inspection, Testing, and Maintenance

Monthly, an extinguisher inspection **SHALL**²⁵ be performed and documented in accordance with this STD.

Deficiencies **SHALL**²⁵ be corrected or the extinguisher **SHALL**²⁵ be replaced.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****3.21.5 Fire Extinguisher Operability**

Unless specifically defined in safety basis documentation the following **SHALL** define conditions of inoperable and deficient portable fire extinguishers.

Portable fire extinguishers **SHALL** be considered to be IMPAIRED when any of the following conditions exist:

- The fire extinguisher is missing from its marked location
- The fire extinguisher is inaccessible to the operator (as defined by 36" clear access in front of the extinguisher)
- The fire extinguisher gross weight is less than the gross weight stamped on the cylinder or shell (or water-type extinguishers with level indicators that indicate lower than the required water level)
- The pressure gauge indicates a pressure lower than the identified minimum operating range
- A cartridge-type extinguisher with a pressurizing gas cartridge gross weight less than the required gross weight stamped on the cartridge
- A cartridge-type extinguisher with less than the required level of dry-chemical or dry-powder agent, or that has evidence of moisture, contamination, or evidence packing or caking
- The fire extinguisher hose assembly has evidence of obstructions, damage, or degradation that would prevent the operator from discharging the agent to the intended target with the appropriate discharge pattern
- The fire extinguisher activation mechanism (valve or puncture pin) has evidence of damage or wear that could prevent operation
- An AFFF fire extinguisher that has chemical content that exceeds the 3-year service date
- A stored pressure dry chemical extinguisher that has not been internal inspected within 6 years of the last internal inspection or manufacture date
- A stored-pressure dry chemical extinguisher that indicates evidence of internal packing or caking during the annual maintenance
- A non-rechargeable dry chemical extinguisher that has exceeded its service date shown on the label, or 12 years, whichever is less

Portable fire extinguishers **SHALL** be considered to be DEFICIENT when any of the following conditions exist:

- A fire extinguisher that has not been inspected in the last month
- A fire extinguisher that has not had annual maintenance performed within the previous year
- A stored pressure gaseous agent extinguisher that has not been internally inspected within the last 6 years
- A fire extinguisher that has not been hydrostatically tested within the required frequency date

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

- A fire extinguisher with inappropriate or missing labels, markings, or tags
- A fire extinguisher with inappropriate wall markings
- A fire extinguisher with broken tamper seals or missing lock pins

3.21.6 Annual Maintenance

Within the month due, annual maintenance **SHALL**²⁵ be performed and documented by the HFD through a separate contract between DOE-RL and the MSA prime contractor and is implemented through a Memorandum of Agreement (MOA) and Service Delivery Document (SDD) between CHPRC and MSA.

3.21.7 Periodic Maintenance

Periodic fire extinguisher maintenance **SHALL**²⁵ be completed within or before the month due, or when a fire extinguisher is found to be IMPAIRED or DEFICIENT.

Equivalent protection **SHALL**²⁵ be provided at any time a fire extinguisher is removed from its location for maintenance.

Recharging, servicing, and hydrostatic testing extinguishers **SHALL**²⁵ be performed by qualified personnel using an appropriate onsite or offsite facility, testing equipment and methodologies in accordance with NFPA 10.

Frequency of Periodic Maintenance **SHALL**²⁵ be as illustrated for each extinguisher type in Table 3, "Extinguisher Maintenance Frequencies."

Table 3 – Extinguisher Maintenance Frequencies

EXTINGUISHER TYPE	SERVICE FREQUENCY	SERVICE REQUIREMENTS
Water-Type with AFFF	3-years	Replace extinguishing agent
Water-Type (all)	5-years	Hydrostatically test
Stored pressure dry-chemical	6-years 12-years	Internal cylinder inspection Hydrostatically test
Cartridge operated dry-chemical or dry-powder	12-years	Replace with a stored pressure dry chemical extinguisher.
Non-rechargeable dry-chemical	12-years*	Discharge and destroy *or sooner if stamped by manufacturer
Stored pressure, low pressure gaseous agent (clean agents)	6-years 12-years	Internal cylinder inspection Hydrostatically test
Self-expelling, high pressure gaseous agent (carbon dioxide)	5-years	Hydrostatically test

Hydrostatic testing **SHALL**²⁵ be recorded on the extinguisher shell.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- High pressure cylinders **SHALL**²⁵ be stamped with the re-tester's identification number, month, and year of test in accordance with Department of Transportation (DOT) requirements.
- Low pressure cylinders **SHALL**²⁵ have a label affixed to the rear or back of the cylinder or shell indicating the test pressure, month, year, performer, and performing agency.

Internal inspection of pressurized extinguisher cylinder or shells **SHALL**²⁵ be identified with a verification of service ring placed on the neck of the cylinder or shell, with perforations showing the month and year of inspection.

4.0 FIRE PROTECTION IN ACTIVE FACILITIES

The following Section defines the fire protection requirements for active facilities at CHPRC.

4.1 Life Safety

This Section defines the CHPRC FPP requirements for life safety in all buildings with a defined occupancy per NFPA 101, to demonstrate compliance to Contractor Requirements for DOE Orders 420.1B, *Facility Safety*, and 440.1A, *Worker Protection Management*, for DOE Federal and Contractor Employees.

Buildings undergoing Deactivation, Decontamination, Decommissioning, and Demolition (D4) or construction are covered in Section 5.0 of this STD.

The requirements described in this Section are not inclusive of the complete set of requirements that govern life safety at CHPRC; rather, they describe the specific requirements encountered through normal Site activities. A complete set of requirements include multiple national Codes is defined in Section 1.6 of this STD.

The following subsections describe the general requirements for means of egress and exit discharge for Site facilities. Topics defined in these subsections represent common areas of non-compliance, and are not intended to represent all requirements established by NFPA 101.

4.1.1 Travel Distance/Common Path/Dead Ends

Exit travel distances, common paths of travel and dead end corridors **SHALL**¹¹ be in accordance with the distances outlined in the specific occupancy chapters located in NFPA 101.

4.1.2 Exit Arrangement/Capacity/Number/Means of Egress

Means of egress **SHALL NOT**¹¹ be obstructed (not blocked or barricaded) in any manner. Temporary obstructions may be allowable when reviewed, approved and documented by the cognizant FPE in a Fire Marshal Permit. If an egress must be blocked, then see Subsection 4.1.8.

At least two separate means of egress **SHALL**¹¹ be provided, except where a single means of egress is allowed in NFPA 101.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

The capacity of means of egress and exit discharge is based on the occupant load of the facility, as defined in NFPA 101, or may be based on actual expected occupancy load given approval by the AHJ.

The minimum required width of the means of egress **SHALL**¹¹ be based upon the occupant load served. In buildings with multiple occupancy classifications that share a means of egress, widths **SHALL**¹¹ be based upon the most restrictive classification.

Minimum widths for the means of egress components (e.g., doors, stairs, corridors etc.) **SHALL**¹¹ be in accordance with the applicable occupancy chapters of NFPA 101.

Minimum width for means of egress **SHALL**¹¹ be continuous to the exterior of the building, including stairways and points of exit discharge.

Exits **SHALL**¹¹ be located remotely from one another in accordance with NFPA 101.

4.1.3 Doors

Doors in the means of egress **SHALL**¹¹ comply with the following:

- Doors **SHALL**¹¹ be the side-hinged type.
- Doors **SHALL**¹¹ be operable with one action. Dead bolts, or similar hardware, which requires a second action **SHALL NOT**¹¹ be installed.
- Doors **SHALL**¹¹ swing in the direction of exit travel when occupant load is 50 or more persons, serves a high hazard occupancy, or is an external (discharge) exit door.
- Doors **SHALL NOT**¹¹ be locked in a manner that prevents opening the door in the direction of exit travel.

4.1.4 Stairs

The height and depth of each stair tread **SHALL**¹¹ be uniform in accordance with NFPA 101.

Stairs and areas underneath stairwells **SHALL NOT**¹¹ be used for storage.

Handrails **SHALL**¹¹ be provided on all stairs in accordance with NFPA 101.

All inside stairs serving as an exit or exit component **SHALL**¹¹ be protected in accordance with NFPA 101.

4.1.5 Protection of Egress

Exit enclosures **SHALL**¹¹ be free of any items whose presence could obstruct or render the exit hazardous.

Exterior exit discharge and means of egress **SHALL**¹¹ be maintained clear of accumulation of snow or ice that would prevent safe passage or full swing of exterior doorways.

Exterior exit components such as handrails, stairs, ramps, and lighting **SHALL**¹¹ be maintained.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****4.1.6 Exit Markings**

Every exit **SHALL**¹¹ be marked by a sign in accordance with and as required by NFPA 101. Where provided, exit signs **SHALL**¹¹ be visible and legible from a distance of 100 feet under all room lighting conditions.

Exit signs **SHALL**¹¹ be marked by the word EXIT in plainly legible letters at least 6 inches high and at least 3/4 inch stroke width. If a directional exit sign is needed, then the same requirements apply.

From any point, access to exits **SHALL**¹¹ be marked by readily visible exit signs in every instance where the exit or way to reach the exit is not readily apparent to the occupants.

Exit sign placement **SHALL**¹¹ be such that no point in exit access corridors is more than 100 feet from the nearest sign.

All exit signs **SHALL**¹¹ be located and of such size, distinctive color and design that it is readily visible and **SHALL**¹¹ provide contrast with decorations, interior finish or other signs.

Externally illuminated exit or direction-to-exit signs **SHALL**¹¹ be illuminated by not less than 5 foot-candles at the sign surface.

Exit signs with internal electrical lighting sources **SHALL**¹¹ be inspected monthly to ensure all lamps are functional.

Tritium gas-powered exit signs **SHALL**¹¹ be inspected to ensure the tritium gas tubes are not damaged, the signs are in place, and the signs are not obstructed annually. Signs **SHALL**¹¹ be replaced before their expiration dates as noted on the individual signs.

Exit signs with standby batteries **SHALL**¹¹ be operationally tested, for a minimum of 1.5 hours, annually.

Photoluminescent signs **SHALL**¹¹ be continually illuminated while the building is occupied to a level in accordance with their listing.

Luminescent or reflective materials **SHALL NOT**¹¹ be used as a substitute for the required illumination for exit signs.

4.1.7 Emergency Lighting

Emergency lighting **SHALL**¹¹ be provided for the means of egress in the following buildings (occupancies **SHALL**¹¹ be determined by the cognizant FPE):

- Industrial occupancies EXCEPT special-purpose industrial occupancies without routine human habitation
- Storage occupancies
- Assembly occupancies

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

Existing business occupancies under the following conditions:

1. The building is three or more stories in height
2. The occupancy is subject to 100 or more occupants above or below the level of exit discharge
3. The occupancy is subject to 1000 or more total occupants

New business occupancies under the following conditions:

1. The building is three or more stories in height
2. The occupancy is subject to 50 or more occupants above or below the level of exit discharge
3. The occupancy is subject to 300 or more total occupants

Building emergency lights **SHALL**¹¹ be operationally tested monthly for a minimum of 30 seconds in accordance with NFPA 101. Annually, emergency lights **SHALL**¹¹ be operationally tested for a minimum of 1.5 hours in accordance with NFPA 101.

NOTE: *When emergency generators, as defined by the National Electric Code, are used to satisfy the emergency light requirements, the generators/systems SHALL be tested per NFPA 110, Standard for Emergency and Standby Power Systems.*

4.1.8 Temporary Blocking of Egress or Exits

Occasionally a component of egress or exit discharge may need to be blocked to facilitate performance of maintenance or other work activities within the area or to prevent access by personnel when the area becomes a hazard. Temporary blocking of egress or exits **SHALL**⁵ be reviewed and approved by the cognizant FPE and a Fire Marshal Permit **SHALL**⁵ be prepared.

When blocking egress or exits, an alternative means of egress or exit **SHALL**⁵ be identified and clearly marked.

Blocked egress or exits **SHALL**⁵ be marked as blocked using temporary barricade systems, such as yellow chain or tape. Inadvertent passage through a blocked egress or exit that poses significant risk to the occupant, such as removed stairways, may be physically barricaded in a manner that would prevent access.

For complex alternative egress routes, or densely occupied facilities, public address system announcements **SHOULD**⁵ be made, or written instructions made available to all affected workers, to inform the occupants of the alternative egress or exit.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****4.2 Fire Protection Systems**

This Section defines the FPP requirements for fire protection systems at the CHPRC.

The requirements described in this Section are not inclusive of the complete set of requirements that govern care and maintenance of fire protection systems at CHPRC, but rather describes the specific requirements that apply to Hanford Site type systems. A complete set of requirements including multiple national Codes is defined in Section 1.6 of this STD.

4.2.1 Fire Protection System IT&M

The Building Manager **SHALL**^{26,32} be responsible for ensuring that all IT&M activities are completed for fire protection systems within buildings for which they have responsibility.

Specific fire protection components and systems requiring IT&M by CHPRC are included in the applicable subsections below

HFD is responsible for all remaining IT&M through a separate contract between DOE-RL and the MSA prime contractor and is implemented through a Memorandum of Agreement (MOA) and Service Delivery Document (SDD) between CHPRC and MSA.

Fire protection system maintenance requirements for the Hanford Site are delineated in MSC-RD-7899.

Although support in achieving these requirements is provided by the HFD, the final responsibility of ensuring full compliance is with the facility management.

Impairments and deficiencies **SHALL**^{26,32} be handled in accordance with Subsection 4.2.1.1 of this STD.

Hanford Site fire system IT&M frequencies **SHALL1** comply with the NFPA requirements as modified by DOE-RL approved exemptions and equivalencies. IT&M frequencies may be extended by a 25% grace period, on a case-by-case basis, in DOE-RL facilities, to accommodate facility conflicts when coordinated between and agreed to by the facility manager and the HFM. The "grace period" concept will not apply to specific surveillance requirements contained in a Limiting Condition for Operation (LCO) except as specified in the LCO. For entry into the "grace period," the following is required:

- a. Facility management **SHALL1** notify the Hanford Fire Marshal (HFM) prior to entry into the "grace period."
- b. The facility manager in consultation with the cognizant FPE **SHALL1** develop the appropriate compensatory measures and implement these measures when entry into the "grace period" is commenced.
- c. Written justification for entry into the "grace period", the compensatory measures implemented, and the anticipated completion date **SHALL1** be provided to the HFM within 10 days of entering the "grace period."
- d. The justification for the extension and the implemented compensatory measures **SHALL1** be issued to the responsible Vice-President.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

IT&M frequency extensions that are necessary beyond the 25% grace period **SHALL**¹ also require approval of the local DOE-RL AHJ before facility operations are allowed to continue beyond the grace period.

All inspection, testing and maintenance conducted on fire protection systems **SHALL**^{41, 42} be performed by trained personnel in accordance with NFPA 25 and 72.

IT&M **SHALL**⁵ be performed in accordance with PRC-PRO-FP-40425.

4.2.1.1 Fire Protection System Impairments and Deficiencies

The requirements of this STD pertaining to Fire Protection System Impairments, System Restrictions, and Deficiencies **SHALL**^{26, 32} apply to all active fire protection systems including fire suppression systems, fire alarm systems and fire barriers.

System Restrictions and Emergency Impairments **SHALL**^{26, 32} be tracked on a fire protection deficiency tracking system maintained by the HFD. The cognizant FPE will assist the HFD with the priority designation, and **SHALL**^{26, 32} approve corrective action plans and closeout of each item.

Impairments and Deficiencies **SHALL**⁵ be performed in accordance with PRC-PRO-FP-40426.

4.2.1.2 Identification

Regularly scheduled fire protection system testing/preventive maintenance activities **SHALL NOT**^{26,32} constitute a discrepancy if the activity is conducted using approved procedures.

An emergency impairment **SHALL**^{26,32} be defined as any unplanned condition that causes all or part of a fire protection system to be inoperable (unable to perform its intended function).

NOTE: *A single device out of service in an area having many devices of the same kind would not necessarily constitute an emergency impairment. For example, a single smoke detector out of service in an open bay area covered by other functional smoke detectors may not be an emergency impairment. This classification decision shall be made by agreement of the facility FPE and the HFD.*

A system restriction **SHALL**^{26, 32} be defined as a condition that restricts or otherwise impairs any fire protection system but does not preclude it from operating and/or transmitting a fire alarm.

A planned impairment **SHALL**^{26, 32} be defined as a planned outage that cause all or part of a fire protection system to become inoperable, normally for modification and/or correction of deficiencies.

A deficiency **SHALL**^{26, 32} be defined as a system design condition that does not prevent a fire protection system from operating as designed (not an impairment) but is characterized by a problem such as a code noncompliance, potential for failure, misapplication, inadequate coverage, or similar condition.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

Treat fire protection systems impaired as a result of either an unexpected or planned outage of a utility system as either a system restriction or emergency impairment, as appropriate. If more than one structure is affected by the outage, implement compensatory measures for each affected structure.

4.2.1.3 Emergency Impairments

An emergency impairments **SHALL**^{26, 32} be repaired in 24 hours or less, and the duration of the impairment minimized.

If the system is not restored within 24 hours, facility management **SHALL**^{26, 32} submit a corrective action plan to the HFD and the cognizant FPE within an additional 24 hours. Compensatory measures **SHALL**^{26, 32} be used to reduce the potential consequences of a fire. Failure to submit a plan will be reported to management as a delinquency on HFD impairment reports.

If the system cannot be restored within 5 days, facility management **SHALL**^{26, 32} submit a status report regarding the corrective action plan to the HFD and the cognizant FPE for concurrence on a weekly basis.

As soon as an emergency impairment is recognized, facility management **SHALL**^{26, 32} implement the applicable compensatory measures noted below and obtain concurrence from the cognizant FPE. When compensatory measures involve or affect the HFD, their concurrence **SHALL**^{26, 32} be obtained.

NOTE: *Compensatory-measure procedures pre-approved by the HFM meet the intent of this requirement.*

- A fire surveillance **SHALL**^{26, 32} be established throughout areas affected by emergency impairments in accordance with Subsection 4.2.1.7 of this STD.

NOTE: *A fire surveillance does not provide protection equivalent to a fire protection system. Fire surveillance durations must be minimized.*

- The need to terminate hazardous production or maintenance operations protected by the fire system **SHALL**^{26, 32} be evaluated.
- Arrangements **SHALL**^{26, 32} be made for HFD standby or alternate water supplies as needed.
- As much of the fire protection system as possible **SHALL**^{26, 32} be maintained in service.

NOTE: *Often sprinkler systems can be kept in service using temporary hose connections to hydrants or nearby sprinkler systems.*

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****4.2.1.4 Systems Restrictions**

System restrictions **SHALL**^{26, 32} be repaired within 15 business days.

As soon as it is determined that FSM cannot repair a system restriction within 15 business days, facility management **SHALL**^{26, 32} submit a corrective action plan within 48 hours to the HFD and the cognizant FPE. Failure to submit a plan will be reported to management as a delinquency on the HFD impairment reports.

Fire alarm panels locked in TROUBLE due to a malfunctioning supervisory/trouble condition **SHALL**^{26, 32} be subject to a surveillance program as defined in Subsection 4.2.1.7 of this STD. Surveillance frequency **SHALL**^{26, 32} be determined by the cognizant FPE using a graded approach, but **SHALL NOT**^{26, 32} be less than once per shift.

4.2.1.5 Planned Impairments

The HFD **SHALL**^{26, 32} be notified at least 24 hours in advance of planned impairments.

Only one planned impairment **SHOULD**^{26, 32} be scheduled at a time in a given facility. It is understood that at times conditions may not support this, and it may be necessary to have more than one impairment at a time.

Compensatory measures **SHALL**^{26, 32} be in place to mitigate the potential consequences of a fire and minimize the length of the impairment.

4.2.1.6 Deficiencies

All deficiencies **SHALL** be entered into the CRRS in accordance with PRC-PRO-QA-052, *Issues Management*.

4.2.1.7 Fire Surveillance

A fire surveillance is an interim compensatory measure that may be implemented when a fire protection system is impaired, restricted, or deficient as provided in STD. Compensatory measures are intended to reduce fire risk during a short period of time until the impaired, restricted or deficient condition can be corrected or otherwise dispositioned. The implementation of compensatory measures is not an equivalent means of fire protection to that of an operable fire protection system.

When fire surveillance is required as determined by facility management and the cognizant FPE, the facility manager **SHALL**^{26, 32} ensure the following requirements are implemented.

- a. Notify occupants of the building when a fire protection system is out of service and the proper actions to take in an emergency.
- b. Instruct each fire surveillance person on the following:
 - o The areas to be surveyed
 - o Frequency of tours required

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- The specifics of the fire protection impairment
 - Appropriate emergency procedures and actions
 - Methods for sounding the alarm(s)
 - Procedure for manually activating fire suppression systems (if applicable)
 - Methods for recording tours
- c. Implement the surveillance as follows:
- Continuously, if required by facility process standards/controls
 - Hourly, when a fire protection systems is out of service
 - Other frequency as determined by the FPE (e.g., once per shift, every 4 hours, etc.)
- NOTE:** *Occupied areas do not required fire surveillance. Criteria .c.(1) & c.(2), above may be modified by the cognizant FPE using a graded approach.*
- d. Document the surveillance on *Hanford Site Fire Surveillance Log* (Site Form A-6001-431) or equivalent.

4.2.2 Fire Barriers

This subsection describes the basic construction, identification, maintenance, inspection, testing, and operability requirements for fire barriers, including opening and penetration protection.

Fire barriers are utilized, in part, to limit the spread of a fire, provide confinement functions for nuclear materials, and to provide a protected means of egress for building occupants. Fire barriers may be credited in a facility safety analysis, therefore additional requirements and criteria may apply. When safety basis document requirements and criteria conflict with the requirements of this subsection, the most conservative **SHALL**⁵ apply.

Fire barriers, including penetrations protection and openings, **SHALL**¹¹ be maintained consistent with their rating or listing.

4.2.2.1 Openings and Penetrations

Openings and penetrations in fire barriers **SHALL**¹¹ be protected with a fire assembly of appropriate Fire Protection Rating (FPR) consistent with the fire rating of the barrier.

Penetrations **SHALL**¹¹ be sealed with an approved (e.g., UL Listed, FM Approved, etc.) firestop assembly.

Openings and Penetrations **SHALL NOT**⁵ be modified without the approval of the cognizant FPE.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

4.2.2.2 Fire Doors

Fire doors **SHALL**¹¹ be listed.

Fire doors **SHALL NOT**⁵ be modified in any way without approval from of the cognizant FPE.

Fire doors **SHALL NOT**³³ be blocked, chocked, or otherwise held open unless compensatory measures are in place and approved by the cognizant FPE.

Door hardware installed on a fire door leaf **SHALL**¹¹ be listed in a manner consistent with the listing and rating of the door.

Informational signs **SHALL**³³ be permitted to be installed on the surfaces of fire doors provided the total area of all attached signs **DOES NOT**³³ exceed 5% of the area of the door and signs **SHALL**³³ be attached to fire doors by use of an adhesive.

4.2.2.3 Fire and Smoke Dampers

All fire and smoke dampers **SHALL**³⁴ close automatically.

Dampers **SHALL NOT**³⁴ be blocked open or otherwise prevented from automatically closing.

4.2.2.4 Fire Barrier Identification

All new fire barrier construction **SHALL**³⁵ be permanently identified with signs or stenciling. Such identification **SHALL**³⁵:

- Be located in accessible floor, floor-ceiling or attic spaces
- Be repeated at intervals not exceeding 30 feet measured horizontally
- Include lettering not less than 0.5 inches in height, incorporating the suggested wording "FIRE AND/OR SMOKE BARRIER – PROTECT ALL OPENINGS" or similar wording

All fire doors **SHALL**¹¹ be identified by an approval label.

Fire barriers that have been removed from service **SHALL**⁵ have the identification removed, covered, or painted to eliminate the designation.

Fire barriers **SHALL**¹² be identified in the applicable FHA and drawings.

4.2.2.5 Fire Barrier IT&M

CHPRC is responsible for the periodic inspection of fire barrier systems as described in the subsections below.

- Fire walls **SHALL**^{26, 32} be inspected biennially.
- Fire doors **SHALL**³³ be inspected and tested annually in accordance with NFPA 80, *Standard for Fire Doors and Other Opening Protectives*.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Fire dampers **SHALL**³⁴ be tested one year after installation and every four years thereafter in accordance with the requirements of NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, and NFPA 90B, *Standard for the Installation of Warm Air Heating and Air-Conditioning Systems*.

4.2.2.6 Fire Barrier Operability

Unless specifically defined in safety basis documentation, the following subsections **SHALL5** define conditions of inoperable and deficient fire barriers.

NOTE: *Allowances for a specific application documented in an exception approved by the AHJ or formal exemption approved by DOE.*

4.2.2.7 Barrier Walls

Barrier walls **SHALL5** be considered to be IMPAIRED due to the presence of any unprotected opening or penetration in a barrier wall.

4.2.2.8 Personnel Fire Doors

Personnel fire doors **SHALL5** be considered to be IMPAIRED given any of the following conditions:

- The door swing is obstructed
- The door is incapable of fully closing and latching automatically
- Fusible links, where installed (including door mounted fire dampers), are missing and or painted
- The door has pass-through penetrations or openings
- Glazing is other than glass.
- Glazing is cracked or damaged
- Door mounted fire dampers do not fully close when operated automatically

Personnel fire doors **SHALL5** be considered to be DEFICIENT given any of the following conditions:

- Door meets the frame with no gaps, but does not close completely
- The door coordinator, where installed, does not function properly but does not result in gaps between doors and frame or gaps exceeding ½ inch between doors
- All hardware is not intact or does not operate properly, but does not preclude closing and latching of the door
- Door and frame hinge plates are in poor condition, but do not preclude closing and latching of the door

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Door frame is breached, modified, or separated from wall by less than ½ inch, but maintains structural stability within the wall
- Listing labels are missing or painted over
- Door is not numbered properly

4.2.2.9 Rolling Steel or Sliding Fire Doors

Rolling steel or sliding fire doors **SHALL** be considered to be IMPAIRED given any of the following conditions:

- The area below the door or shutter is obstructed
- The door or shutter is incapable of fully closing automatically (i.e., without manual intervention other than operation of the release mechanism)
- Fusible links, where installed, are missing or painted
- The door or shutter has pass-through penetrations or openings
- Glazing, if present, is cracked or damaged
- Rails, if present, are bent in a manner that would preclude operation of the door

Rolling steel or sliding fire doors **SHALL** be considered to be DEFICIENT if the door is incapable of self-closing when in the open position, but the door is in a closed position and controlled in that position via an administrative or engineered control

4.2.2.10 Fire Windows

Fire windows **SHALL** be considered to be IMPAIRED given any of the following conditions:

- There are gaps between window components
- Glazing is missing
- Window components are loose within their holder or within the wall
- Non-fixed windows are incapable of closing or latching automatically
- Fire window frame membrane penetrations (i.e., penetrations on one face of the frame) are present

4.2.2.11 Fire Dampers

Fire dampers **SHALL** be considered to be IMPAIRED given any of the following conditions:

- Dampers are incapable of fully closing under normal ventilation system airflow
- Latches, if provided, do not latch automatically upon operation of the damper

4.2.2.12 Compensatory Measures

Unless specifically defined in safety basis documentation, compensatory measures for impaired or deficient fire barriers **SHOULD** include any of the following:

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Implementation of a fire surveillance
- Placement of a 10-foot restriction of any combustible materials on both sides of the barrier

NOTE: *The restriction is defined as a 10-foot radius from all portions of the violation of the barrier or the inoperable opening protection device.*

- A temporary barrier equivalent in fire rating to the barrier that is impaired or deficient

4.2.2.13 Fire Barrier Repair Methods

Fire barriers, including penetrations protection and openings, **SHALL**¹¹ be maintained consistent with their rating or listing. Fire-resistive construction **SHALL**¹¹ be repaired, restored, or replaced when damaged, altered, breached, penetrated, removed, or improperly installed. The fire-resistive assemblies **SHALL**¹¹ be returned, as much as possible, to the original (as tested) condition while using methods appropriate to the extent of the damage. Methods of repair **SHOULD**⁵ be reviewed by the cognizant FPE prior to use.

4.2.3 Water Based Fire Protection Systems

While many types of water-based fire protection systems exist, not all are installed at Hanford Site facilities. Water-based fire protection systems installed at Hanford Site facilities for which CHPRC has responsibility include:

- Automatic sprinkler systems
- Water spray systems (including filter plenum deluge fire protection systems)
- Hose station systems
- Fire hydrants
- Fire pumps
- Fire service mains
- Fire protection water supply tanks

4.2.3.1 Water Based Fire Protection System IT&M

CHPRC is responsible for the periodic inspection of water based fire protection systems as described below.

Gauges **SHALL**²⁶ be checked monthly to verify indicated pressure is in the normal range.

Deluge, preaction, and dry systems valve enclosure heating equipment **SHALL**^{26, 32} be inspected daily (when not provided with a low temperature alarm) or monthly (when a low temperature alarm is provided) during cold weather to ensure at least 40°F (5°C) can be maintained.

Control valves **SHALL**^{26, 32} be inspected weekly (valves without locks or tamper switches) or monthly (valves with locks or tamper switches) to verify they are in the designated normal position.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

Water tanks **SHALL**^{26, 32} be inspected and tested according to the following:

- Daily. When the temperature of the environment that surrounds the tank is 40°F or below, the tank level, water temperature and the heating system **SHALL**^{26, 32} be inspected to ensure it is operational and adequate to meet the conditions necessary to preclude freezing.
- Monthly. The water level and air pressure (in pressure tanks) **SHALL**^{26, 32} be inspected and cold temperature alarms **SHALL**^{26, 32} be tested.
- Quarterly. The support structure and general surroundings **SHALL**^{26, 32} be inspected.
- Semi-annually. The water level alarm and relief valves on pressure tanks **SHALL**^{26, 32} be tested.
- Annually:
 - The exterior and expansion joint **SHALL**^{26, 32} be inspected
 - Heating systems and high water temperature limit switches **SHALL**^{26, 32} be tested
 - Cathodic protection **SHALL**^{26, 32} be maintained
 - Drain valves **SHALL**^{26, 32} be cycled
 - Vents **SHALL**^{26, 32} be cleaned
- Every three years. The interior of steel tanks without cathodic protection **SHALL**^{26, 32} be inspected.
- Every five years. The interior of tanks with cathodic protection **SHALL**^{26, 32} be inspected.

Fire Pumps **SHALL**^{26, 32} be inspected and tested according to the following:

- Weekly:
 - The automatic start on pressure drop **SHALL**^{26, 32} be tested
 - Diesel pumps **SHALL**^{26, 32} be run for 30 minutes and electric pumps run for 10 minutes
 - Verify the proper operation of circulation relief valves and pressure relief valves
 - The pertinent visual observations specified in Paragraph 8.2.2 of NFPA 25 - 2008 **SHALL**^{26, 32} be performed during the weekly test.
- Annually. A performance test of the pump in accordance with Paragraph 8.3.3 of NFPA 25-2008 **SHALL**^{26, 32} be performed with the additional items:
 - Check controller timer
 - Check for proper indication of the controller lights
 - Check all valves to make sure they are in the correct position
 - Verify pump speed and discharge pressure at each flow

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

- Check water flow and alarm switches
- Test relief valve setting
- Calibrate gauges
- Operate speed trip
- The results of any testing SHALL⁴² require an evaluation by a qualified individual.
- A preventive maintenance program SHALL^{26, 32} be established in accordance with the driver and pump manufacturers recommendation.

4.2.3.2 Water-Based Fire Protection System Operability

Unless specifically defined in safety basis documentation, the following criteria define conditions of inoperable and deficient water-based fire protection systems.

4.2.3.3 Automatic Sprinkler Systems and Water Spray Systems

Automatic sprinkler systems and water spray systems SHALL⁵ be considered to be IMPAIRED when any of the following conditions exist:

- The water supply to the system has been found to be either:
 - Discontinued (i.e., valve(s) shut, obstructed water line, etc.)
 - Reduced below acceptable limits, as determined by the cognizant FPE (i.e., static pressure too low, residual pressure from main drain test too low, etc.)
- System piping is obstructed and does not allow water flow within the system
 - For automatic sprinkler systems, this is determined via the inspector's test connection
 - For water spray systems, this is determined through full-flow testing of the system
- Sprinklers or nozzles are improperly oriented
- Sprinkler or nozzle spray patterns are obstructed or coverage area is incorrect

NOTE: *In most cases, multiple sprinklers or nozzles will need to be obstructed or have incorrect coverage area to establish an inoperable condition. The cognizant FPE should be consulted to make a final determination.*

- Damage has been found to system sprinklers or nozzles and/or piping and supports that affect system performance, as determined by the cognizant FPE

NOTE: *This issue includes items such as excessively leaking pipes and valves, painted or coated sprinklers and missing supports that could lead to broken piping upon system activation.*

- Openings in suspended ceilings (tile or hard-surface) that exceed 8 ft² per 100 ft² in large open areas and are located away from sprinklers or nozzles

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

NOTE: *Intended for implementation in large, open rooms. A determination for ceiling openings in rooms of limited area or number of sprinklers should be referred to the cognizant FPE.*

- Freeze protection is inadequate, as determined by the cognizant FPE
- Alarm devices associated with the system do not automatically report to fire alarm control panel (FACP)
- Any associated fire detection system(s) required for sprinkler or water spray activation are impaired
- Automatic sprinkler systems and water spray systems **SHALL** be considered to be RESTRICTED (i.e., a SYSTEM RESTRICTION) when any of the following conditions exist:
 - Manual activation means for deluge systems being inactive or impaired, if the automatic means of actuation is not impaired, restricted, or deficient
 - Supervisory alarms (e.g., low air pressure on dry systems) are not transmitted as required
 - Valves in the normally open position are stuck in the open position or will not close completely when tested
- Automatic sprinkler systems and water spray systems **SHALL** be considered to be DEFICIENT when any of the following conditions exist:
 - Minor leaks in sprinklers or nozzles, piping, or valves

NOTE: *Leaks in sprinklers or nozzles require timely corrective action or replacement.*

- Gauges or other monitoring devices being out of calibration
 - Although the system is still considered to be functional, an out-of-calibration gauge may impact a facility's safety basis.
- Single sprinklers having damage or obstruction or being misoriented in rooms having multiple sprinklers, as determined by the cognizant FPE

4.2.3.4 Standpipe and Hose Systems

Standpipe systems **SHALL** be considered to be IMPAIRED when any of the following conditions exist:

- Hose connection(s) is inaccessible for use
- Hose connection outlet(s) is obstructed with foreign matter
- Hose connection threads are damaged and cannot support connection of hose
- Fire department connection is inaccessible for use
- Fire department connection is obstructed with foreign matter
- Fire department connection threads are damaged and cannot support connection of hose
- Damage has been found to system piping and supports that affect system performance, as determined by the cognizant FPE

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

NOTE: *This issue includes items such as excessively leaking pipes and valves and missing supports that could lead to broken piping upon system activation.*

- Freeze protection is inadequate, as determined by the cognizant FPE

Standpipe systems **SHALL** be considered to be RESTRICTED (i.e., a SYSTEM RESTRICTION) when any of the following conditions exist:

- Valves in the normally open position are stuck in the open position or will not close completely when tested
- Any alarms associated with the system do not operate correctly

Standpipe systems **SHALL** be considered to be DEFICIENT when any of the following conditions exist:

- Caps for either the hose connection or the fire department connection are missing
- Any gauges or other monitoring devices are out of calibration

4.2.3.5 Fire Hydrants

Fire hydrants **SHALL** be considered to be IMPAIRED when any of the following conditions exist:

- Water supply is inadequate to supply 1000 gpm or more at 20 psi
- Hose connections are inaccessible for use
- Hose connections are obstructed with foreign matter
- Hose connection threads are damaged and cannot support connection of hose
- Hydrant operating nut is damaged such that a standard hydrant wrench cannot be used to operate the hydrant
- Hydrant will not drain adequately to prevent freezing
- Hydrant foot valve will not open or close completely

NOTE:

- *If the foot valve is not fully open the effectiveness of the hydrant is reduced and the hydrant could be damaged while in use due to flow from the drain at the base on the hydrant stem.*
- *If the foot valve is not fully closed water is allowed to continuously flow inside the hydrant, leading to a pressurized condition at the hydrant caps and exposing users to unacceptable hazards.*

Fire hydrants **SHALL** be considered to be RESTRICTED (i.e., a SYSTEM RESTRICTION) when the control valve(s) for the hydrant is stuck in the open position or will not close completely when tested.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

Fire hydrants **SHALL** be considered to be DEFICIENT when caps or chains for the hose connections are missing.

4.2.3.6 Fire Service Main Systems

Fire service main systems **SHALL** be considered to be IMPAIRED when any of the following conditions exist:

- Significant pressure loss conditions (i.e., obstructions, partial valve closures, etc.) reduce fire protection system supplies below acceptable levels
- Blockages or obstructions, including complete blockage (e.g., shut valves), reduce fire protection system supplies below acceptable levels
- Excessive leakage, flow, or use reduces system pressures below acceptable levels, as determined by the cognizant FPE
- Combination of piping arrangement and weather conditions present freeze protection concerns, as determined by the cognizant FPE

Fire service main systems experiencing the same conditions as noted above, but to a lesser extent as determined by the cognizant FPE, **SHALL** be considered to be DEFICIENT.

4.2.3.7 Fire Pump Systems

Fire systems **SHALL** be considered to be IMPAIRED when any of the following conditions exist:

- Fire pumps designed to primarily start automatically fail to do so under test conditions
- Fire pumps designed to primarily start manually fail to do so when requested to do so from the primary operating location
- Fire pump fails to run for 30 minutes for diesel engine driven units or 10 minutes for electric motor driven units
- The fire pump demonstrates an unacceptable flow/pressure curve to support Hanford Site operations, as determined by the cognizant FPE
- Freeze protection is inadequate, as determined by cognizant FPE
- Fuel levels for diesel engine driven pumps or required generators for electric motor driven pumps are below 4 hours of supply

Fire pump systems **SHALL** be considered to be RESTRICTED (i.e., a SYSTEM RESTRICTION) when any of the following conditions exist:

- The manual start feature does not operate properly on fire pumps designed to start automatically and do not have the automatic start feature impaired
- Valves in the normally open position are stuck in the open position or will not close completely when tested
- Any local alarms associated with the system do not activate, if remote alarms report to their designated location (e.g., Water Utilities or HFD Dispatch) as required

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Fuel levels for diesel engine driven pumps or required generators for electric motor driven pumps are above 4 hours of supply but below 8 hours

Fire pump systems **SHALL**⁵ be considered to be DEFICIENT when any gauges or other monitoring devices are out of calibration.

4.2.3.8 Fire Water Tank Systems

Fire water tank systems **SHALL**⁵ be considered to be IMPAIRED when any of the following conditions exist:

- Water quantity stored is below that established for the tank, as determined by the cognizant FPE
- The tank demonstrates visible leaks that will affect the ability of the tank to maintain required water quantity, as determined by the cognizant FPE
- For pressure tanks, the pressure level is inadequate to support fire protection system design
- Freeze protection is inadequate, as determined by the cognizant FPE

Fire water tank systems experiencing the same conditions as noted above, but to a lesser extent as determined by the cognizant FPE, **SHALL**⁵ be considered to be DEFICIENT.

4.2.3.9 Freeze Protection

The facility management responsible for the maintenance of each facility provided with fire protection systems/components **SHALL**³⁶ ensure a documented winterization program is in place for their facilities (see PRC-PRO-MN-472, *Cold Weather Protection*).

Facility management **SHALL**⁵ document any cold weather protection related deficiencies that may be identified and promptly initiate corrective action to resolve the condition.

Each facility installed with fire protection systems **SHALL**³⁶ be inspected by October 31 each year to ensure all areas are winterized.

4.2.4 FIRE ALARM SYSTEMS

While many types of fire alarm systems exist, not all are installed at Hanford Site facilities. Fire alarm systems installed at Hanford Site facilities for which CHPRC has responsibility include:

- Smoke detection (including air sampling type and duct type)
- Heat detection (including glovebox overheat and filter plenum pilot lines)
- Manual devices (including manual pull stations)
- Fire suppression or extinguishing system devices (including those for water-based suppression systems and special extinguishing systems)
- Notification appliances (including bells, strobes, horns, horn/strobes, chimes, and others)
- Hanford Site fire alarm transmission systems (Radio Fire Alarm Reporter)

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

All fire alarm systems and components **SHALL**^{26, 32} be inspected, tested, and maintained by the HFD in accordance with the frequencies provided in MSC-RD-7899.

4.2.4.1 Fire Alarm System Operability

Unless specifically defined in safety basis documentation, the following criteria define conditions of inoperable and deficient fire alarm systems.

4.2.4.2 Fire Alarm Systems (Excluding Hanford Site Fire Alarm Transmission Systems)

Fire alarm systems **SHALL**⁵ be considered to be IMPAIRED when any of the following conditions exist:

- The system has been on battery power for a time period that exceeds the capacity of its batteries (typically 24 hours) and AC power has not yet been restored.
- The system fails to transmit alarm signals (fire, trouble, supervisory) to the monitoring station (i.e., HFD Dispatch or alternate monitoring station).
- The system has trouble or supervisory alarms that interfere with fire alarm transmission to the monitoring station (i.e., HFD Dispatch or alternate monitoring station).
- Individual or multiple devices do not operate as required and result in unacceptable detection or notification, as determined by cognizant FPE.

NOTE: *This issue includes obstructions in orifices or tubing in air sampling type and duct type smoke detection.*

Fire alarm systems **SHALL**⁵ be considered to be RESTRICTED (i.e., a SYSTEM RESTRICTION) when any of the following conditions exist:

- The system will undergo a planned power outage for a time period that does not exceed the capacity of its batteries (typically 24 hours).
- Supervisory or Trouble signals are present on the system that do not affect the ability of the system to transmit alarm signals.
- Testing devices (such as heater straps on glovebox heat detectors) do not function properly.
- Non-required initiating devices are not functioning properly but other initiating equipment is available (i.e., manual pull stations on gaseous fire protection systems normally activated by automatic detection, etc.).

NOTE: *Facilities with redundant required detection systems (e.g., smoke detection and manual pull stations) may also follow this condition, as determined by the cognizant FPE.*

4.2.4.3 Radio Fire Alarm Reporter (RFAR) Systems

RFAR Systems **SHALL**⁵ be declared to be IMPAIRED when any of the following conditions exist:

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- System fails to transmit fire alarm signals from all connected fire alarm panels or fire detection and alarm devices to the monitoring station (i.e., HFD Dispatch or alternate monitoring station)
- Electrical power for equipment used for the transmission of signals (i.e., panels, computers, repeaters, amplifiers, telephone switches, etc.) is disconnected or cannot provide continuous power for at least the designed capacity of the battery system (typically 24 hours)

4.2.5 Dry Chemical Fire Extinguishing Systems**4.2.5.1 Monthly System Inspections**

CHPRC is responsible for the periodic inspection of dry chemical fire extinguishing systems as described below.

Monthly, an inspection of the dry chemical fire extinguishing system **SHALL**³⁷ be performed and documented.

4.2.5.2 Periodic Service

Periodic maintenance of dry chemical extinguishing **SHALL**^{26, 32} be in accordance with MSC-RD-7899.

Every 6 years dry chemical pressurized cylinders **SHALL**³⁷ be inspected.

Every 12 years dry chemical cylinders **SHALL**³⁷ be hydrostatically tested.

Compensatory measures **SHALL**^{26, 32} be provided at any time system components are removed from their location for service.

4.2.5.3 Dry Chemical Fire Extinguishing System Operability

Unless specifically defined in safety basis documentation, the following criteria define conditions of inoperable and deficient dry chemical fire extinguishing systems.

Dry chemical fire extinguishing systems **SHALL**⁵ be considered to be IMPAIRED when any of the following conditions exist:

- The system has been moved from its installed location or the hazard for which the system was installed (e.g., cooking equipment) has been moved and is no longer protected
- Piping or nozzles indicate evidence of obstruction
- The manual release mechanism, if provided, is inaccessible to the operator (as defined by 36-inch clear access in front of the mechanism)
- Heat detectors associated with the system are not present or are damaged in a way that preclude operation
- The actuating mechanism (cable, dry pilot system, electrical release, etc.) is damaged or obstructed in a manner that precludes operation

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- A chemical agent container that indicates evidence of inadequate chemical quantity
- A chemical agent container that indicates evidence of internal packing, caking, or solidification of agent during the semiannual or 6-year maintenance
- A chemical container or expellant gas container that indicates evidence of inadequate pressure
- A stored pressure chemical container that has not been opened and the chemical inspected within 6 years of the last internal inspection or manufacture date

Dry chemical fire extinguishing systems **SHALL** be considered to be RESTRICTED (i.e., a SYSTEM RESTRICTION) when any of the following conditions exist:

- A system that has not been inspected within 30 days of the last inspection
- An agent container that has not been hydrostatically tested within the required frequency date

Dry chemical fire extinguishing systems **SHALL** be considered to be DEFICIENT when any of the following conditions exist:

- A system with evidence of damage, corrosion or wear that does not directly affect operation
- A system with damaged or missing tamper indicators or seals
- A system with missing nozzle blowoff caps
- A system with damaged nozzle blowoff caps that do not restrict discharge of agent
- Maintenance tag or certificate is damaged or missing

5.0 FIRE PROTECTION IN D4 FACILITIES AND FACILITIES UNDER CONSTRUCTION

The following section defines the requirements for facilities undergoing Deactivation, Decontamination, Decommissioning and Demolition (D4) and Construction.

This Section is a consolidation of applicable basic requirements for D&D/Construction operations common to the Hanford Site, and is not intended to fully replicate the requirements of the source documents. The primary requirements are contained in NFPA 241, *Safeguarding, Construction, Alteration, and Demolition Operations*. Additional requirements may be applicable to specific situations.

5.1 Life Safety

The general principles of NFPA 101, **SHALL**¹⁰ be taken into consideration when determining the adequacy of life safety features in buildings undergoing construction or demolition. The requirements **SHALL**¹⁰ be established on a case-by-case basis as work is being performed in the facilities.

A life safety analysis **SHALL** be performed to determine the adequacy of the life safety features of any building prior to undergoing D4 or construction. The analysis **SHALL** be performed in accordance with PRC-PRO-FP-40420, *Fire Protection Analysis*. The analysis and work area **SHALL** be reviewed weekly or more often as defined by the FPE.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

The general principles of NFPA 101 that **SHALL**¹¹ be considered when determining the adequacy of life safety features are:

- Ensuring that the design of the facility is such that reliance for life safety does not depend solely on any single safeguard
- Providing two means of egress
- Ensuring that egress routes are clear and unobstructed
- Ensuring the route to every exit is clearly identifiable or conspicuously indicated
- Adequate lighting is provided (including emergency lighting)
- Providing adequate notification of a fire
- Notification to the affected workers of the egress features

If any principle of NFPA 101 cannot be met it **SHALL**⁵ be explained and any compensatory measures **SHALL**⁵ be detailed in the life safety analysis.

The analysis of life safety features in buildings undergoing construction or D4 **SHALL**⁵ be documented through an interoffice memorandum or other similar medium and **SHALL**⁵ include peer review by a CHPRC FPE.

5.1.1 Construction

Fire protection **SHALL**¹ be provided on all construction sites as required by NFPA 241 and NFPA 1141, *Fire Protection Infrastructure for Land Development in Suburban and Rural Areas*.

The Construction Manager **SHALL**¹⁰ ensure that a Fire Marshal Permit is obtained prior to beginning construction, which includes excavation and site preparation work, and that an HFD *Construction/Demolition Fire Safety Inspection Checklist* (Site Form A-6002-692) is completed prior to the start of work.

A water supply for fire protection **SHALL**¹⁰ be made available as soon as combustible material accumulates.

Where underground water mains and hydrants are to be provided, they **SHALL**¹⁰ be installed, completed, and in service prior to commencing work on any structure.

Protection **SHALL**¹⁰ be provided to separate an occupied portion of the structure from a portion of the structure undergoing alteration, construction or demolition operations when such operations are considered as having a higher level of hazard than the occupied portion of the building. Walls **SHALL**¹⁰ have at least a 1-hour fire resistance rating.

Where sprinklers are required for safety to life, the building **SHALL NOT**¹⁰ be occupied until the sprinkler installation has been entirely completed and tested so that the protection is not susceptible to frequent impairment caused by testing and correction.

Accumulations of unnecessary combustible forms or form lumber **SHALL**¹⁰ be prohibited.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

Combustible forms or form lumber **SHALL**¹⁰ be removed from the structure as soon as stripping is complete.

Smoking **SHALL**¹⁰ be permitted only in designated areas.

Temporary storage of equipment to be installed, combustible construction materials or combustible packing materials **SHALL NOT**¹⁰ be permitted in unprotected structures under construction unless authorized by the AHJ.

Storage **SHALL NOT**¹⁰ be permitted in protected structures until protection is in service.

Temporary lighting fixtures that operate at temperatures capable of igniting ordinary combustibles (such as quartz halogen) **SHALL**¹⁰ be located and fastened securely where there is no possibility of their coming in contact with combustibles.

5.1.2 Demolition

Flammable and combustible liquids **SHALL**¹⁰ be drained from tanks and machinery reservoirs in a safe manner and removed from the building prior to demolition.

Smoking **SHALL**¹⁰ be prohibited throughout demolition areas.

If demolition includes the use of explosives see Subsection 5.1.5 of this STD.

Prior to demolition gas supplies **SHALL**¹⁰ be turned off, and capped at a point outside the building and gas lines inside the building **SHALL**¹⁰ be purged after capping.

Where a building is equipped with fire protection systems the deactivation of the systems **SHALL**^{26, 16} be in accordance with Subsection 5.1.3 of this STD.

Temporary lighting fixtures that operate at temperatures capable of igniting ordinary combustibles (such as quartz halogen) **SHALL**¹⁰ be located and fastened securely where there is no possibility of their coming in contact with combustibles.

5.1.3 Deactivation of Fire Systems

A Fire Marshal Permit **SHALL**¹² be obtained from the HFMO prior to the deactivation of any fire protection feature.

The need for fire protection features in facilities undergoing D4 activities is governed by the fire risks to the public, workers, fire fighters and the potential release of hazardous and radiological materials to the environment. Property protection and program continuity are not normally factors to consider unless the facility possesses a definable value and/or mission as determined by the AHJ or if a fire would significantly increase the cost of cleanup.

For facilities having an FHA, the FHA **SHALL**^{26, 16} be revised as appropriate to address the proposed fire protection feature deactivation. The revision **SHALL**^{26, 16} be performed in

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

accordance with the requirements of PRC-PRO-FP-40420, *Fire Protection Analysis*. Items to consider **SHALL**^{26, 16} include but are not limited to the following:

- MPFL determination
- Exposure assessment
- Water Supply Assessment
- Life Safety Review
- Firefighter Safety Review

For facilities that do not have an FHA, a Deactivation Analysis **SHALL**^{26, 16} be completed by the responsible FPE with assistance from the requesting organization in accordance with Hanford Fire Department internal procedures 4.10, (latest revision), *Deactivation of Facilities Fire Protection Procedure*. The Deactivation Analysis **SHALL**^{26, 16} be composed of the following elements:

- Introduction
- Summary/Conclusions
- Facility Description/Construction
- MCFL and MPFL Evaluation
- Radiological/Hazardous Material Release Assessment
- Manual Fire Suppression Water Assessment (See Appendix F)
- Exposure Analysis per NFPA 80A (See Appendix F)
- Personnel Occupancy/Life Safety Features
- Firefighter Safety Assessment
- Conclusions/Recommendations

The facility or project organization requesting the deactivation of a fire protection feature **SHALL**^{26, 16} be responsible for performing and providing the following along with the permit request as applicable:

- Evaluate the acceptability of fire protection feature deactivation per nuclear safety requirements
- Perform an Unreviewed Safety Question (USQ) review in accordance with an established process, if required
- Obtain a PAAA review to evaluate potential liabilities with fire protection feature deactivation
- Evaluate, potential company-level financial and political risks of fire protection feature deactivation, should hazardous and/or radioactive materials be present. (Reference PRC-MP-PC-40167 *Risk Management Plan* for optional risk evaluation guidance). Evaluation shall include the following elements:
 - Environmental evaluation of potential releases
 - Hazardous material release and cleanup evaluation
 - Radiological material release and cleanup evaluation
 - Groundwater evaluation for fire suppression runoff
- Provide a letter to the HFD confirming that potential financial and political risks are acceptable

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

- An approved schedule for demolition

5.1.4 Deactivation Decision Requirements

Fire protection feature deactivation **SHALL NOT**^{26, 16} be permitted if determined to not be acceptable per nuclear safety requirements (i.e., USQ evaluation).

Fire protection feature deactivation **SHALL**^{26, 16} proceed with no timetable for facility demolition if the following is concluded or completed:

- Analysis confirms that the MPFL does not exceed DOE criteria for requiring a fire protection feature
- Analysis confirms that NFPA and other pertinent codes and standards criteria support fire protection feature deactivation
- Senior level company management confirms that the financial and political risks associated with a fire in the facility without a fire protection feature and with the presence of radiological and/or hazardous materials are acceptable to CHPRC
- Hanford Fire Chief concurs the risk is acceptable

With Hanford Fire Chief concurrence, fire protection feature deactivation **MAY**^{26, 16} proceed provided facility demolition begins within 30 days following deactivation if the following is concluded:

- Analysis confirms that the MPFL exceeds DOE criteria for requiring a fire protection feature
- Analysis confirms that the MPFL does not exceed DOE criteria for requiring a fire protection feature, but the financial and political risks associated with a fire in the facility with the presence of radiological and/or hazardous materials are not acceptable to CHPRC
- Analysis confirms that NFPA and other pertinent codes and standards criteria require the feature to remain in place

For buildings consisting of one fire area that contain one or more fire protection features (i.e., one fire area being protected by more than one sprinkler riser) demolition of the entire building **SHALL**^{26, 16} commence within 30 days following the deactivation of one or all the fire protection feature(s) unless the FHA or the Deactivation Analysis justifies an alternate demolition commencement time.

For buildings having multiple fire areas and a single fire protection feature or multiple fire protection features, deactivation of the fire protection feature or features **SHALL**^{26, 16} be performed on the basis of fire areas in a manner to ensure that the fire areas of the building not planned for demolition maintain fire protection. Demolition of the fire areas in which fire protection has been deactivated **SHALL**^{26, 16} begin within 30 days following deactivation unless the FHA or the Deactivation Analysis justifies an alternate demolition commencement time.

For buildings or portions of buildings having redundant fire protection systems as defined by CRD O 420.1B Chg. 1 (Supplemented, Rev. 0) and DOE-STD-1066-99 (such as both an automatic sprinkler system and a smoke detection system), a graded approach for deactivation

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

of one of the systems may be applied when the need for redundant protection is no longer required by DOE criteria and with concurrence of the HFM.

The deactivation of special fire protection features installed solely to protect a particular component in a facility or a unique enclosure or area(s) within a facility such as a dip tank, glovebox, standpipe, respectively, etc., may be justified using a graded approach and may proceed with concurrence of the HFM or the Hanford Fire Chief provided the applicable criteria below are met:

- The hazard that required the fire protection has been removed
- The feature is not required by the FHA or deactivation analysis to mitigate MPFL consequences
- Analysis confirms that NFPA and other pertinent codes and standards support fire protection feature deactivation

In addition to the above specific requirements for fire system deactivation, the following **SHALL**^{26, 16} be required for all proposed fire protection feature deactivations:

- Implement administrative controls as prescribed by the FHA or Deactivation Analysis
- Complete a HFD Response Assessment to evaluate safety to HFD personnel and establish proposed tactics in responding to a fire following deactivation
- Revise the Pre-Incident Plan
- Obtain a Fire Marshal Permit

5.1.5 Explosives

The use, transportation and storage of explosives on the Hanford Site **SHALL**¹ comply with the applicable requirements of the following documents:

DOE M 440.1-1A, Att. 2, *DOE Explosives Safety Manual*, Sections 16.0, "Transportation," and 17.0, "Storage"

- NFPA 495, *Explosive Materials Code*
- NFPA 490, *Code for the Storage of Ammonium Nitrate*
- NFPA 498, *Standard for Safe Havens and Interchange Lots for Vehicles Transporting Explosives*

Subcontractors who transport, store, or use explosives on the Hanford Site **SHALL**¹³ be appropriately licensed or permitted in accordance with 18 United States Code, Chapter 40.

Personnel transporting, handling or detonating explosives on the Hanford Site **SHALL**²⁹ obtain a prohibited/controlled article pass approved by the Director, U.S. Department of Energy, Richland Operations Office, Security and Emergency Services. Prohibited article passes are issued in accordance with MSC-PRO-417, *Controlling Prohibited and Controlled Articles*.

NOTE: *Charges for propellant actuated devices/tools are not subject to this requirement.*

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

A formal written request to the HFM by the applicable contractor for the use, detonation, and storage of explosives on the Hanford Site **SHALL**^{26, 38} be submitted at least 30 days prior to the actual need date. The request must provide the following:

- Description and justification for proposed use, including specific location(s) where explosives will be used
- Type and quantity of explosives and detonators to be used; include Material Safety Data Sheet (MSDS) for each type
- Maximum quantity of explosives and detonators to be onsite at any one time
- Maximum quantity of explosives to be detonated at any one time
- Period of time for which approval is requested
- Listing of safety codes and standards to be followed
- Documentation that each person responsible for explosives activities is a Washington State licensed blaster
- Description of storage facilities to be used if explosives/detonators are to be stored on site(magazines must comply with standards for explosives storage with separation/compatibility requirements)
- Description of method to be used to keep unauthorized personnel from entering any area where explosives are being handled, detonated, or stored and a description of the method to be used to warn personnel in the blast area of any impending detonation
- Type of conveyance to be used for transport of explosives
- Procedure for removal of unused explosives and detonators
- Name of each person who requires a prohibited/controlled article pass
- Name of each person who is to be authorized access to explosives magazines (only licensed blasters may have direct access to explosive magazines)
- Procedure for notification to nearby facility/utility landlords immediately prior to detonation
- Procedure for control of radio frequency hazards
- Assurance that a current inventory of the contents of each storage magazine will be kept, including each entry and withdrawal

Final approval or denial of the request **SHALL**²⁶ be by the HFM.

If explosives will be stored or used in the vicinity of nuclear facilities, facility management **SHALL**^{26, 38} ensure all reviews, including USQ, are completed prior to proceeding.

5.2 Safeguarding Underground Operations

At each aboveground entrance, there **SHALL**¹⁰ be a check-in/check-out system, supervised by a qualified individual at all times, which provides an accurate record of each person who is underground.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

The location of the check-in/check-out station **SHALL**¹⁰ be within 300 inches of the entrance and **SHALL**¹⁰ be easily identifiable.

Completed or unused sections of the underground facility **SHALL**¹⁰ be barricaded, properly marked, and made off limits.

All personnel **SHALL**¹⁰ be trained in emergency and evacuation procedures and informed of the hazards before entering. Disaster and evacuation drills **SHALL**¹⁰ be conducted for each shift at the start of underground operations and every 6 months thereafter.

Suitable fire extinguishers **SHALL**¹⁰ be installed so that travel distance does not exceed 300 feet to the nearest fire extinguisher.

Two means of communications with the surface **SHALL**¹⁰ be available at all times from all areas of the underground facility.

Audible and visible alarm and emergency lighting for safe evacuation **SHALL**¹⁰ be provided.

NOTE: *Consult FPE for acceptable methods of compliance for meeting this requirement.*

The quantity of combustible materials to be used underground **SHALL**¹⁰ be kept to a minimum. Advance planning **SHALL**¹⁰ provide for the use of materials having the most favorable combination of high ignition points, low rates of combustion, and low emissions of smoke and harmful gases.

Class 1 flammable liquids **SHALL NOT**¹⁰ be taken, stored or used underground or within 100 feet of an entry.

Class 2 and Class 3 liquids **SHALL**¹⁰ be transported and stored in approved closed containers, safety cans or tanks that do not allow the contents to spill. Quantities **SHALL**¹⁰ be limited to those necessary for one work shift.

Oil, grease and diesel fuel stored underground **SHALL**¹⁰ be kept in tightly sealed containers in fire-resistant areas located at least 100 feet from shafts and inclines. Storage areas **SHALL**¹⁰ be positioned or diked so that the contents of ruptured or overturned containers cannot flow from the storage area.

No combustible structure **SHALL**¹⁰ be erected and no combustible materials **SHALL**¹⁰ be stored within 100 feet of an access shaft, shaft hoist, or other entry.

Metal containers with self-closing lids **SHALL**¹⁰ be provided and used to store combustible waste and debris and **SHALL**¹⁰ be removed and taken to the surface daily.

The ventilation system **SHALL**¹⁰ be sufficient for the number of personnel underground. Air sampling logs **SHALL**¹⁰ be maintained and air tests **SHALL**¹⁰ be conducted before or after each shift.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

5.3 Facility Transition

Facilities transitioning from unoccupied to occupied status shall be re-evaluated per DOE G 420.1-3, Chapter 8 of NFPA 801, and Chapters 8, 10, and 11 of NFPA 241, including applicable provisions of the other chapters of these standards in a graded approach to address life safety, fire hazards, and the potential release of hazardous and radiological materials to the environment during occupied activities such as D&D. Facilities transitioning from occupied to unoccupied shall also be evaluated for appropriate life safety provisions to address infrequent entries and associated activities.

6.0 FIRE ANALYSIS

The following Section defines the requirements for the various types of fire protection related analysis performed at CHPRC.

6.1 Facility Fire Hazard Analysis

An FHA **SHALL**1 be completed for significant new facilities (new facilities that have a combined building and content replacement value of \$25,000,000 or more, a new moderate hazard non-nuclear facility, or new high hazard non-nuclear facility), existing and new nuclear facilities, and other facilities as defined by DOE O 420.1B.

NOTE: *The definition of high and moderate are as follows:*

- *High—hazards with a potential for onsite and offsite impacts to large numbers of persons or for major impacts to the environment*
- *Moderate—hazards which present considerable potential for onsite impacts to people or the environment, but at most only minor offsite impacts*

Fire hazard analyses **SHALL**1 be performed under the direction of a qualified FPE.

Each individual facility required to have an FHA **SHALL**1 have its own FHA document. Facility modifications that require an FHA will not have a stand-alone FHA document but must be reflected in the facility FHA document.

For new facility design, a preliminary FHA **SHALL**1 be completed during Title I (conceptual design) and revised during Title II (definitive design) of the project design process.

The preliminary FHA completed during the design process **SHALL**1 address to the maximum extent possible the elements required by the final FHA.

The scope of an FHA **SHALL**1 include facilities that directly support the parent facility, such as filter plenum buildings, generators, tanks etc. The scope **SHALL**1 also include proximal facilities which pose exposure risks to the target facility, regardless of the support role, unless specifically included in a separate FHA or an FHA for another major facility. Regardless, the exposure fire potential of the proximal facility **SHALL**1 be considered for the target building within the FHA.

The FHA **SHALL**1 include an assessment of the risk from fire and related hazards (wild-land fire, direct flame impingement, hot gases, smoke mitigation, firefighting water damage, fire exposure to structural members, etc.) in relationship to existing or proposed fire safety features

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

to ensure that the facility can be safely controlled and stabilized during and after a fire. In accordance with the "graded approach" concept, the level of detail necessary in the FHA is directly related to the complexity of the facility and the potential risk to the public, worker, and the environment.

The focus of the FHA **SHALL** be the individual fire areas that comprise the facility unless analytical deterministic modeling methods can demonstrate a lesser or greater fire potential. A fire area is defined as a location bounded by fire rated construction having a minimum fire resistance rating commensurate with the analyzed fire duration and intensity but not less than 2 hours.

Fire models developed by the National Institute of Standards and Technology (NIST) or fire models acceptable by the DOE AHJ that utilize deterministic fire behavioral methods may be used in the development of the fire hazard analysis provided that the model has undergone a formal software quality assurance program in accordance with DOE requirements.

The FHA **SHALL NOT** preclude the assumption of a fire occurring when an energy source and a combustible source are present. Average combustible loading as a means to characterize the fire severity **SHALL NOT** be considered an acceptable technique.

For nuclear facilities, the Maximum Possible Fire Loss (MPFL) fire scenario including assumptions for combustible loading and ignition sources, **SHALL** be consistent in both the FHA and facility nuclear safety documentation where the FHA author and the safety analyst jointly identify fire-related hazards and evaluate the postulated fire scenario(s). In addition, a more conservative approach can be used in the Documented Safety Analysis (DSA) alone to provide a more bounding analysis. The final FHA **SHALL** be referenced by the facility DSA, including the final or interim safety analysis.

The final and preliminary FHA **SHALL** contain, but not be limited to, the following elements:

- Description of operations
- Description of construction
- Protection of essential safety class and safety significant equipment
- Fire protection features
- Description of fire hazards
- Life safety considerations
- Critical process equipment
- High value property
- Damage potential: Maximum Credible Fire Loss (MCFL) and Maximum Possible Fire Loss (MPFL) (See DOE M 231.1-1A (latest version))
- Fire Department response
- Recovery potential
- Potential for a toxic, biological and/or radiation incident due to a fire

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Emergency planning
- Security considerations related to fire protection
- Natural hazards (earthquake, flood, wind) impact on fire safety
- Exposure fire potential, including the potential for fire spread between fire areas
- Reference the fire department needs assessment baseline document
- Deficiencies or "recommendations" that are required to be corrected to meet fire protection objectives
- Risk of fire and related hazards (direct flame impingement, hot gases, smoke mitigation, firefighting water damage, etc.) – See DOE G 420.1-3 (latest edition)

The FHA **SHALL**1 include an inventory of all safety class systems and all credible fire related failure modes of the SSCs **SHALL**1 be considered.

The FHA **SHALL**²⁷ consider fire propagation and the potential for fire induced radiological dispersal through the facility air distribution system. Consideration **SHALL**²⁷ include normal operating modes as well as alternate modes, such as system failure, that may result from the fire.

If the FHA will be used to replace the Fire Protection Program Assessment (FPPA), then the following additional areas **SHALL**1,²⁷ be addressed in the FHA:

- Water Runoff
- Fire Barrier Integrity
- Fire Safety Training
- Inspection/Testing/Maintenance Reports
- Adequacy of the Facility Self Appraisals
- Administrative Controls
- Status of Previous Findings

The FHA **SHALL**1 arrive at a conclusion that either the facility meets the fire protection objectives or does not meet the objectives with implementation actions that are required in order for the facility to meet the objectives. The FHA **SHALL**1 be documented and show the thought process and assumptions required arriving at the conclusion.

New or revised FHAs **SHALL**1 be submitted to the HFMO for review and concurrence prior to being submitted to DOE-RL.

The results of an FHA may determine that implementation of recommendations or corrective actions to address deficiencies are required in order for the facility to demonstrate that the fire protection objectives of DOE O 420.1, CRD O 420.1B, Supplemented, latest revision, and life safety are met. Following completion, and approval of the FHA, CHPRC **SHALL**1 develop an FHA implementation plan. The FHA implementation plan **SHALL**1 describe each recommendation or deficiency requiring action, and include implementation strategies, funding,

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

and schedules for each item recommended or determined to be deficient by the FHA. The recommendations and corrective actions in the implementation plan **SHALL**1 be developed by a FPE and reviewed by the HFMO. The FHA implementation plan **SHALL**1 be submitted to the DOE-RL Contracting Officer Representative for information only.

FHA conclusions **SHALL**1 be incorporated into the DSA and integrated into design basis and beyond design basis accident conditions.

The current facility FHA **SHALL**1 be provided concurrently with the DSA as part of the set of key supporting documents when the DSA is submitted for RL approval.

Credit taken for fire department response in an FHA and nuclear safety documentation **SHALL**1 be concurred by the HFD and be documented in the pre-incident plan.

A program to identify, prioritize, and monitor the status of fire protection-related appraisal findings and recommendations (corrective action management) **SHALL**1 be applied until final resolution is achieved. When final resolution will be significantly delayed, appropriate interim compensatory measures **SHALL**1 be implemented to minimize the fire risk.

All FHAs **SHALL**1 be reviewed every three (3) years and revised as follows:

- When changes to the annual DSA updates impact the contents of the FHA
- When a modification to an associated facility poses a significant new fire safety risk
- When the three (3) year review identifies the need for changes

The reviews of FHAs **SHALL**5 be entered into the Integrated Evaluation Plan (IEP) system for planning purposes.

A peer review by a qualified FPE **SHALL**⁵ be required for all FHAs and shall be performed and documented on a *CHPRC Review Checklist* (Site Form A-6004-797).

FHAs **SHALL**5 be performed in accordance with PRC-PRO-FP-40420.

6.2 Fire Protection Assessments

FPAAs **SHALL**1 be performed in accordance with the following:

- a. Assessments **SHALL**1 be made annually for facilities valued (combined building and content replacement cost) in excess of \$100 million or in non-nuclear facilities considered to be a high hazard facility
- b. Assessments **SHALL**1 be made at least every three (3) years for the following facilities:
 - 1) Facilities having a value of \$3 million to \$100 million
 - 2) Non-nuclear facilities considered to be moderate hazard facilities
 - 3) Category 2 or 3 nuclear facilities

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

- c. Assessments **SHALL**¹ be made at least every 5 years for facilities valued between \$1 million and \$3 million
- d. Facilities having a property value less than \$1 million **SHALL NOT**¹ require a facility FPA that contains the required nature and scope elements of DOE G 420.1-3 (latest revision) unless significant impacts from programmatic interruption, hazardous materials, or radioactive materials are involved. If such assessments are required, they **SHALL**¹ be performed at least every three (3) years.

Facility FPAs **SHALL**¹ be performed under the direction of a qualified FPE.

Facility fire protection assessments **SHALL**¹ include the elements as contained in DOE G 420.1-3 unless specific criteria permit otherwise.

NOTE: *The assessments may be performed using the Facility Fire Protection Assessment -Long Format (Site Form A-6003-347) or -Short Format (Site Form A-6003-348).*

Maximum Possible Fire Loss (MPFL) values described in the assessments **SHALL**¹ utilize the property valuation and loss estimation guidelines found in DOE M 231.1-1A (latest revision).

The FPA **SHALL**²⁷ identify the compensatory measures that must be implemented (if any) until recommendations are corrected/resolved.

All findings **SHALL**⁵ be entered into the CRRS system in accordance with PRC-PRO-QA-052.

FPAs **SHALL**⁵ be entered into the IEP system for planning purposes.

An electronic copy of each completed assessment **SHALL**^{26, 39} be sent to the HFMO. In addition, the two most current assessments for each facility **SHALL**^{26, 39} be retained in the facility file by the responsible project or facility and be available upon request.

FPAs **SHALL**⁵ be performed in accordance with PRC-PRO-FP-40420.

6.3 Exemptions and Equivalencies

If compliance cannot be achieved with the required DOE Orders or mandatory fire protection codes and standards, or a requirement is subject to approval of the AHJ, an exemption request or equivalency request **SHALL**¹ be submitted to the DOE-RL. The project or facility **SHALL**¹ prepare and submit their request to the HFMO for review and concurrence prior to submitting the completed request to DOE-RL.

Documented requests for relief **SHOULD**²⁷ be developed by a qualified FPE.

Request for exemptions/equivalencies **SHALL**³⁰ include the following information:

- Hanford Site or facility for which an exemption/equivalency is being requested
- Reference to the requirements for which exemption/equivalency is sought

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Identification and justification of the acceptance of any additional risks that will be incurred if the exemption/equivalency is granted
- Benefits to be realized by providing the exemption/equivalency
- Whether the exemption/equivalency being requested is temporary or permanent and for temporary, indication of when compliance will be achieved
- Identification of other pertinent data or information used as a basis for obtaining an exemption/equivalency

Requests for exemptions/equivalencies to environment, safety and health requirements

SHALL³⁰ also address:

- A description of any special circumstances that warrant the granting of an exemption/equivalency, including whether:
 1. Application of the requirement in the particular circumstances would conflict with another requirement
 2. Application of the requirement in the particular circumstances would not achieve, or is not necessary to achieve its underlying purpose
 3. Application of the requirement in the particular circumstances would not be justified by any safety and health benefit
 4. The exemption/equivalency would result in a health and safety benefit that compensates for any detriment that would result from granting the exemption
 5. Other material circumstances that exist were not considered when the requirement was adopted for which it is in the public interest to grant an exemption/equivalency
- Steps to be taken to provide adequate protection of health, safety and the environment, and a statement that adequate protection will be provided
- A description of any alternative or mitigating actions that have or will be taken to ensure adequate safety and health and protection of the public, the workers and the environment for the period the exemption will be effective

A change in use or occupancy or significant modification **SHALL**²⁷ require the re-evaluation and approval of all documented requests for relief to assure that these are valid under the new use or occupancy.

All approved exemptions/equivalencies **SHOULD**²⁷ be provided or referenced within the FHA document along with all supporting information.

Equivalencies and exemptions **SHALL**⁵ be performed in accordance with PRC-PRO-FP-40424.

Exemptions and equivalencies **SHOULD**²⁷ be reviewed at a frequency determined acceptable by the facility or project that owns them to ensure the conditions that were required to gain approval remain valid and are being maintained.

NOTE: *Current approved exemptions and equivalencies can be found on the CHPRC intranet under "Contracts and Facilities Services, Prime Contracts, Attachment J.2"*

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

Requirements Sources and Implementing Documents, Exemptions Deviations or Variations from DOE Requirements.”

6.4 Fire Protection Program Assessments

The principal objective of a Fire Protection Program Assessment (FPPA) **SHALL**²⁷ include identification of significant fire program deficiencies that would prevent the achievement of DOE's fire safety policy objectives.

FPPAs **SHALL**² be made every three (3) years.

FPPAs **SHOULD**²⁷ be performed under the supervision of a qualified FPE.

The FPPA **SHALL**²⁷ include assessment of the following as a minimum:

- Comprehensiveness of the Program
- Procedures for engineering design and review
- Procedures for inspection, testing and maintenance of installed fire protection systems and features
- Fire protection engineering staff (number, qualifications, training)
- Emergency services organizations including Baseline Needs Assessments (BNAs)
- Management support
- Exemptions and documented equivalencies
- Conformance with applicable Orders, codes and standards
- Adequacy of facility appraisal reports

The contractor **SHALL**¹ provide FPE support to RL in performing Tri-Annual Fire Protection Assessments of other site contractors.

FPPAs **SHALL**⁵ be performed in accordance with PRC-PRO-FP-40420.

6.5 Interpretations/Clarification Requests

The HFMO **SHALL**¹ provide routine interpretations of fire protection and building codes or standards with input from the cognizant FPE.

Routine Interpretations **SHALL NOT**²⁶ be used as a mechanism for granting a departure from a mandated code, DOE requirement, or standard. Furthermore, an interpretation **SHALL NOT**²⁶ be used when the approval of a fire safety exemption or equivalency is mandated by DOE requirements or the DOE AHJ.

NOTE: *Approved ICRs are located on the Hanford Fire Protection Forum shared drive.*

ICRs **SHALL**⁵ be performed in accordance with PRC-PRO-FP-40424.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****6.6 Pre-Incident Plans**

CHPRC **SHALL**¹ provide facility assistance to the HFD in the development of pre-incident plans.

6.7 Ignitable and Reactive Waste Inspections

Ignitable and Reactive Waste site inspections **SHALL**³¹ be performed annually as required by WAC-173-303-395 for applicable Treatment, Storage, and/or Disposal (TSD) units and 90-day accumulation areas.. The inspection **SHALL**³¹ be documented on the Hanford Fire Department *Ignitable/Reactive Waste Fire Inspection* (Site Form A-6005-334).

Inspections for TSD units are required for areas which the Part A Permit Application allows for the management of ignitable and reactive waste at the storage area.

Inspections for 90-day accumulation areas are required for all “active” areas.

WAC inspections **SHALL**⁵ be performed in accordance with PRC-PRO-FP-40420.

6.8 Annual Fire Protection Program Summary

By December 31 of every year, provide input as required to the HFD for reporting of CHPRC's recurring fire protection program costs in accordance with the requirements of DOE M 231.1A, *Environment, Safety and Health Reporting Manual*. CHPRC's input **SHALL** consist of Fire Protection Engineering costs. If directed by the HFD, provide this input directly to DOE-RL.

6.9 Miscellaneous Analysis

Fire protection engineering analyses may be performed on any specific risk when requested or when deemed necessary. Miscellaneous analyses may address multiple topics such as:

- Use of a specific combustible or toxic material
- Use of unique interior or exterior finishes
- Application of hazardous or combustible finishes
- Effectiveness of a specific fire protection system application
- Risks associated with unique equipment or machinery
- Code intent analysis or technical positions

The format for miscellaneous analysis **SHOULD**⁵ include, as a minimum:

- Purpose or Objective
- Governing or required documents
- Description of the system or item in study
- Analysis
- Conclusions

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

- Recommendations

Miscellaneous analysis **SHALL**⁵ be documented as a Calculation, defined in PRC-STD-EN-40259, *Engineering Calculations*.

A peer review by a qualified FPE **SHALL**⁵ be required for all fire protection engineering analyses and shall be performed and documented on Site Form A-6004-797.

Miscellaneous analyses **SHALL**⁵ be performed in accordance with PRC-PRO-FP-40420.

7.0 DOCUMENTS DERIVED FROM THIS STANDARD

Other fire protection related documents prepared by CHPRC **SHALL**⁵ be consistent with the requirements of this STD. In cases where the STD provides sufficiently detailed information and direction, procedures and instructions may incorporate such information by reference to this STD.

CHPRC Fire Protection procedures are controlled and distributed under the Hanford Site Document Control Program.

CHPRC FHAs and derivatives of FHAs, FSAs, Self-Assessments, and Calculations are controlled and distributed through Hanford Site Design Document Control (SDDC).

8.0 MAINTENANCE OF THIS STANDARD

The CHPRC Fire Protection Program Manager **SHALL**⁵ be responsible for the maintenance of this STD. The STD **SHALL**⁵ be reviewed for required significant upgrade at a minimum of every three (3) years, and **SHALL**⁵ be reviewed and reissued for minor updates on an annual basis. Changes to CHPRC FPP criteria and this STD **SHALL**⁵ be made in accordance with established Site infrastructure process.

9.0 FORMS

CHPRC Review Checklist, A-6004-797

Nonemergency Hydrant Tie-in Permit, A-6003-681

Hanford Site Fire Surveillance Log, A-6001-431

Ignitable/Reactive Waste Fire Inspection, A-6005-334

Construction/Demolition Fire Safety Inspection Checklist, A-6002-692

Facility Fire Protection Assessment - Long Format, A-6003-347

Facility Fire Protection Assessment – Short Format, A-6003-348

CHPRC Hot Work Permit, A-6006-115

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****10.0 RECORD IDENTIFICATION**

All records are required to be managed in accordance with PRC-PRO-IRM-10588, *Records Management Processes*. OCRWM records are also managed in accordance with PRC-PRO-QA-19579, *OCRWM Records Management*.

Records Capture Table

Name of Record	Submittal Responsibility	Retention Responsibility	OCRWM Retention Schedule (If OCRWM Related)
Fire Hazard Analysis	Requesting Facility/Project	Requesting Facility/Project	NA
Fire Hazard Analysis Implementation Plan	Requesting Facility/Project	Requesting Facility/Project	NA
Fire Protection Assessment	Fire Protection Engineer	Facility/Project	NA
Fire Protection Program Assessment	Fire Protection Engineer	Contractor	NA
Interpretation/Clarification Request	Requesting Facility/Project	Hanford Fire Marshal's Office	NA
Equivalency/Exemption	Requesting Facility/Project	DOE	NA
Life Safety Analysis	Fire Protection Engineer	Requesting Facility/Project	NA
Miscellaneous Analysis	Fire Protection Engineer	Requesting Facility/Project	NA
WAC Inspection	Requesting Facility/Project	Requesting Facility/Project	NA
Deactivation Analysis	Fire Protection Engineer	Requesting Facility/Project	NA

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

11.0 SOURCES**11.1 Requirements**

1. CRD O 420.1B, Chg. 1, Supplemented Rev 0, *Facility Safety*
2. CRD O 420.1B, *Facility Safety*
3. DOE-STD-1066-99, *Fire Protection Design Criteria*
4. DOE-STD-1088-95, *Fire Protection for Re-locatable Structures*
5. *CHPRC Program Requirement*
6. PRC-PRO-EN-8336, *Design Verification*
7. *DOE Fire Protection Handbook-Hanford Chapter*
8. PRC-PRO-WKM-12115, *Work Management*
9. *Hanford Fire Marshal Requirement*
10. NFPA 241, *Standard for Safeguarding Construction, Alteration and Demolition Operations*
11. NFPA 101, *Life Safety Code*
12. NFPA 1, *Fire Code*
13. 18 United States Code, Chapter 40
14. NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*
15. NFPA 13, *Standard for the Installation of Sprinkler Systems*
16. NFPA 30, *Flammable and Combustible Liquids Code*
17. *Hanford Fire Marshal Advisory Bulletin AB06-001*
18. NFPA 51B, *Standard for Fire Prevention during Welding, Cutting and Other Hotwork*
19. PRC-PRO-WKM-079, *Job Hazard Analysis*
20. FM Data Sheet 10-3, *Hot Work Management*
21. NFPA 326, *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning or Repair*
22. PRC-RD-SH-11258, *Confined Space*
23. *Fire Marshal Advisory Bulletin AB07-001, Rev. 5*
24. NFPA 10, *Standard for Portable Fire Extinguishers*
25. *Fire Marshal Charter, 10-SED-0010*
26. DOE G 420.1-3, *Implementation Guide for Fire Protection and Emergency Services Programs*
27. NFPA 90B, *Standard for the Installation of Air-Condition and Ventilating Systems*
28. MSC-PRO-417, *Controlling Prohibited and Controlled Articles*
29. DOE M 251.1-1B, *Departmental Directives Program Manual*

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12**

30. WAC-173-303-395, *Dangerous Waste Regulations, "Other general requirements"*
31. NFPA 80, *Standard for Fire Doors and Other Opening Protectives*
32. NFPA 90A, *Standard for the Installation of Warm Air Heating and Air Conditioning Systems International Building Code*
33. PRC-PRO-MN-472, *Cold Weather Protection*
34. NFPA 17, *Standard for Dry Chemical Extinguishing Systems*
35. NFPA 72, *National Fire Alarm and Signaling Code*
36. NFPA 25, *Standard for the Inspection, Testing and Maintenance of Water Based Fire Protection Systems*
37. NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*
38. NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance and Operations*
39. NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*
40. DOE M 231.1-1A (property loss evaluation), *Directive System Management*

11.2 References

- 10 CFR 830, *Nuclear Safety Management National Fire Protection Association Codes and Standards*
- 10 CFR 851, *Worker Safety and Health Program*
- 29 CFR 1910, *Occupational Safety and Health Standards*
- 29 CFR 1926, *Safety and Health Regulations for Construction*
- CRD M 231.1A, *Environment, Safety, and Health Reporting Manual*
- CRD O 420.1B, Chg. 1 (Supplemented Rev. 0), *Facility Safety*
- DOE M 231.1A, *Directive System Management*
- DOE O 420.1B, *Facility Safety*
- DOE O 440.1A, *Worker Protection Management*
- DOE-STD-1189, *Integration of Safety into the Design Process*
- HNF-36174, *DOE Fire Protection Handbook – Hanford Chapter*
- MSC-POL-36200, *Fire Protection Program Policy*
- MSC-PRO-2827, *Facility & Mobile Office Number Management*
- MSC-PRO-38421, *Fire Hazard Analysis Development and Implementation Process*
- MSC-RD-10606, *Fire Protection Program Requirements*
- MSC-RD-7899, *Fire Protection System Testing/Inspection/Maintenance/Deficiencies*
- MSC-RD-9118, *Fire Protection Design/Operations Criteria*
- MSC-RD-9717, *Fire Prevention for Construction/Occupancy/Demolition Activities*
- MSC-RD-9900, *Hot Work Performance Requirements*
- MSC-RD-11227, *Use of Explosives on the Hanford Site*
- MSC-PRO-34037, *Performance of Fire Protection Assessments*
- MSC-RD-8589, *Hanford Fire Marshal Permits*
- PRC-PRO-IRM-10588, *Records Management Processes*
- PRC-PRO-QA-052, *Issues Management*
- PRC-PRO-QA-19579, *OCRWM Records Management*

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

PRC-RD-SH-11258, *Confined Space*
PRC-STD-EN-40259, *Engineering Calculations*
PRC-POL-FP-40402, *Fire Protection Program Policy*
PRC-PRO-FP-40420, *Fire Protection Analysis*
PRC-PRO-FP-40421, *Hot Work*
PRC-PRO-FP-40422, *Fire Marshal Interface*
PRC-PRO-FP-40424, *Equivalencies/Exemptions/Interpretation/Clarification Requests (ICRs)*
PRC-PRO-FP-40425, *Fire Protection System Inspection, Testing, and Maintenance*
PRC-PRO-FP-40426, *Fire Protection System Impairments and Deficiencies*
MSC-RD-10361, *Controlling Cross Connections*

12.0 APPENDIXES

Appendix A - Applicable NFPA Codes and Factory Mutual Data Sheets
Appendix B - Permit Requirements
Appendix C - Glossary
Appendix D - Acronyms
Appendix E - BBQ Checklist

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix A - Applicable NFPA Codes and Factory Mutual Data Sheets

NFPA 1	Fire Code
NFPA 2	Hydrogen Technologies Code
NFPA 3	Recommended Practice on Commissioning and Integrated Testing of Fire Protection and Life Safety Systems
NFPA 10	Standard for Portable Fire Extinguishers
NFPA 11	Standard for Low-, Medium-, and High-Expansion Foam
NFPA 11A	Standard for Medium- and High-Expansion Foam Systems
NFPA 11C	Standard for Mobile Foam Apparatus
NFPA 12	Standard on Carbon Dioxide Extinguishing Systems
NFPA 12A	Standard on Halon 1301 Fire Extinguishing Systems
NFPA 13	Standard for the Installation of Sprinkler Systems
NFPA 14	Standard for the Installation of Standpipes and Hose Systems
NFPA 15	Standard for Water Spray Fixed Systems for Fire Protection
NFPA 16	Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems
NFPA 17	Standard for Dry Chemical Extinguishing Systems
NFPA 17A	Standard for Wet Chemical Extinguishing Systems
NFPA 18	Standard on Wetting Agents
NFPA 18A	Standard on Water Additives for Fire Control and Vapor Mitigation
NFPA 20	Standard for the Installation of Stationary Pumps for Fire Protection
NFPA 22	Standard for Water Tanks for Private Fire Protection
NFPA 24	Standard for the Installation of Private Fire Service Mains and Their Appurtenances
NFPA 25	Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems
NFPA 30	Flammable and Combustible Liquids Code
NFPA 30A	Code for Motor Fuel Dispensing Facilities and Repair Garages
NFPA 30B	Code for the Manufacture and Storage of Aerosol Products
NFPA 31	Standard for the Installation of Oil-Burning Equipment

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

NFPA 33	Standard for Spray Application Using Flammable or Combustible Materials
NFPA 34	Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids
NFPA 37	Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines
NFPA 42	Code for the Storage of Pyroxylin Plastic
NFPA 45	Standard on Fire Protection for Laboratories Using Chemicals
NFPA 46	Recommended Safe Practice for Storage of Forest Products
NFPA 50	Standard for Bulk Oxygen Systems at Consumer Sites
NFPA 50A	Standard for Gaseous Hydrogen Systems at Consumer Sites
NFPA 50B	Standard for Liquefied Hydrogen Systems at Consumer Sites
NFPA 51	Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes
NFPA 51B	Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 52	Vehicular Gaseous Fuel Systems Code
NFPA 53	Recommended Practice on Materials, Equipment, and Systems Used in Oxygen-Enriched Atmospheres
NFPA 54	National Fuel Gas Code
NFPA 55	Compressed Gases and Cryogenic Fluids Code
NFPA 56	Standard for the Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems
NFPA 57	Liquefied Natural Gas (LNG) Vehicular Fuel Systems Code
NFPA 58	Liquefied Petroleum Gas Code
NFPA 59	Utility LP-Gas Plant Code
NFPA 59A	Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG)
NFPA 67	Guideline on Explosion Protection for Gaseous Mixtures in Pipe Systems
NFPA 68	Standard on Explosion Protection by Deflagration Venting
NFPA 69	Standard on Explosion Prevention Systems

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

NFPA 70	National Electrical Code®
NFPA 70A	National Electrical Code® Requirements for One- and Two-Family Dwellings
NFPA 70B	Recommended Practice for Electrical Equipment Maintenance
NFPA 70E	Standard for Electrical Safety in the Workplace®
NFPA 72	National Fire Alarm and Signaling Code
NFPA 75	Standard for the Protection of Information Technology Equipment
NFPA 76	Standard for the Fire Protection of Telecommunications Facilities
NFPA 77	Recommended Practice on Static Electricity
NFPA 79	Electrical Standard for Industrial Machinery
NFPA 80	Standard for Fire Doors and Other Opening Protectives
NFPA 80A	Recommended Practice for Protection of Buildings from Exterior Fire Exposures
NFPA 85	Boiler and Combustion Systems Hazards Code
NFPA 86	Standard for Ovens and Furnaces
NFPA 86C	Standard for Industrial Furnaces Using a Special Processing Atmosphere
NFPA 86D	Standard for Industrial Furnaces Using Vacuum as an Atmosphere
NFPA 87	Recommended Practice for Fluid Heaters
NFPA 88B	Standard for Repair Garages
NFPA 90A	Standard for the Installation of Air-Conditioning and Ventilating Systems
NFPA 90B	Standard for the Installation of Warm Air Heating and Air-Conditioning Systems
NFPA 91	Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids
NFPA 92	Standard for Smoke Management Systems
NFPA 92A	Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences
NFPA 96	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

NFPA 97	Standard Glossary of Terms Relating to Chimneys, Vents, and Heat-Producing Appliances
NFPA 101	Life Safety Code®
NFPA 101A	Guide on Alternative Approaches to Life Safety
NFPA 101B	Code for Means of Egress for Buildings and Structures
NFPA 102	Standard for Grandstands, Folding and Telescopic Seating, Tents, and Membrane Structures
NFPA 105	Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives
NFPA 110	Standard for Emergency and Standby Power Systems
NFPA 111	Standard on Stored Electrical Energy Emergency and Standby Power Systems
NFPA 115	Standard for Laser Fire Protection
NFPA 170	Standard for Fire Safety and Emergency Symbols
NFPA 203	Guide on Roof Coverings and Roof Deck Constructions
NFPA 204	Standard for Smoke and Heat Venting
NFPA 211	Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances
NFPA 214	Standard on Water-Cooling Towers
NFPA 220	Standard on Types of Building Construction
NFPA 221	Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls
NFPA 225	Model Manufactured Home Installation Standard
NFPA 230	Standard for the Fire Protection of Storage
NFPA 231	Standard for General Storage
NFPA 231C	Standard for Rack Storage of Materials
NFPA 231D	Standard for Storage of Rubber Tires
NFPA 231F	Standard for the Storage of Roll Paper
NFPA 232	Standard for the Protection of Records
NFPA 232A	Guide for Fire Protection for Archives and Records Centers

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

NFPA 241	Standard for Safeguarding Construction, Alteration, and Demolition Operations
NFPA 251	Standard Methods of Tests of Fire Resistance of Building Construction and Materials
NFPA 252	Standard Methods of Fire Tests of Door Assemblies
NFPA 253	Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
NFPA 255	Standard Method of Test of Surface Burning Characteristics of Building Materials
NFPA 256	Standard Methods of Fire Tests of Roof Coverings
NFPA 257	Standard on Fire Test for Window and Glass Block Assemblies
NFPA 258	Recommended Practice for Determining Smoke Generation of Solid Materials
NFPA 259	Standard Test Method for Potential Heat of Building Materials
NFPA 262	Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces
NFPA 265	Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls
NFPA 266	Standard Method of Test for Fire Characteristics of Upholstered Furniture Exposed to Flaming Ignition Source
NFPA 267	Standard Method of Test for Fire Characteristics of Mattresses and Bedding Assemblies Exposed to Flaming Ignition Source
NFPA 268	Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source
NFPA 269	Standard Test Method for Developing Toxic Potency Data for Use in Fire Hazard Modeling
NFPA 270	Standard Test Method for Measurement of Smoke Obscuration Using a Conical Radiant Source in a Single Closed Chamber
NFPA 271	Standard Method of Test for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter
NFPA 272	Standard Method of Test for Heat and Visible Smoke Release Rates for Upholstered Furniture Components or Composites and Mattresses Using an Oxygen Consumption Calorimeter

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

NFPA 274	Standard Test Method to Evaluate Fire Performance Characteristics of Pipe Insulation
NFPA 275	Standard Method of Fire Tests for the Evaluation of Thermal Barriers Used Over Foam Plastic Insulation
NFPA 276	Standard Method of Fire Tests for Determining the Heat Release Rate of Roofing Assemblies with Combustible Above-Deck Roofing Components
NFPA 285	Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components
NFPA 286	Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
NFPA 287	Standard Test Methods for Measurement of Flammability of Materials in Cleanrooms Using a Fire Propagation Apparatus (FPA)
NFPA 288	Standard Methods of Fire Tests of Floor Fire Door Assemblies Installed Horizontally in Fire Resistance-Rated Floor Systems
NFPA 289	Standard Method of Fire Test for Individual Fuel Packages
NFPA 290	Standard for Fire Testing of Passive Protection Materials for Use on LP-Gas Containers
NFPA 291	Recommended Practice for Fire Flow Testing and Marking of Hydrants
NFPA 295	Standard for Wildfire Control
NFPA 297	Guide on Principles and Practices for Communications Systems
NFPA 298	Standard on Foam Chemicals for Wild-land Fire Control
NFPA 299	Standard for Protection of Life and Property from Wildfire
NFPA 326	Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair
NFPA 328	Recommended Practice for the Control of Flammable and Combustible Liquids and Gases in Manholes, Sewers, and Similar Underground Structures
NFPA 329	Recommended Practice for Handling Releases of Flammable and Combustible Liquids and Gases
NFPA 385	Standard for Tank Vehicles for Flammable and Combustible Liquids
NFPA 386	Standard for Portable Shipping Tanks for Flammable and Combustible Liquids

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

NFPA 395	Standard for the Storage of Flammable and Combustible Liquids at Farms and Isolated Sites
NFPA 400	Hazardous Materials Code
NFPA 430	Code for the Storage of Liquid and Solid Oxidizers
NFPA 432	Code for the Storage of Organic Peroxide Formulations
NFPA 434	Code for the Storage of Pesticides
NFPA 471	Recommended Practice for Responding to Hazardous Materials Incidents
NFPA 472	Standard for Competence of Responders to Hazardous Materials/Weapons of Mass Destruction Incidents
NFPA 480	Standard for the Storage, Handling, and Processing of Magnesium Solids and Powders
NFPA 481	Standard for the Production, Processing, Handling, and Storage of Titanium
NFPA 482	Standard for the Production, Processing, Handling, and Storage of Zirconium
NFPA 484	Standard for Combustible Metals
NFPA 485	Standard for the Storage, Handling, Processing, and Use of Lithium Metal
NFPA 490	Code for the Storage of Ammonium Nitrate
NFPA 495	Explosive Materials Code
NFPA 496	Standard for Purged and Pressurized Enclosures for Electrical Equipment
NFPA 497	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
NFPA 498	Standard for Safe Havens and Interchange Lots for Vehicles Transporting Explosives
NFPA 499	Recommended Practice for the Classification of Combustible Dusts and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
NFPA 501	Standard on Manufactured Housing
NFPA 501A	Standard for Fire Safety Criteria for Manufactured Home Installations, Sites, and Communities

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

NFPA 505	Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations
NFPA 513	Standard for Motor Freight Terminals
NFPA 520	Standard on Subterranean Spaces
NFPA 550	Guide to the Fire Safety Concepts Tree
NFPA 551	Guide for the Evaluation of Fire Risk Assessments
NFPA 555	Guide on Methods for Evaluating Potential for Room Flashover
NFPA 556	Guide on Methods for Evaluating Fire Hazard to Occupants of Passenger Road Vehicles
NFPA 557	Standard for Determination of Fire Load for Use in Structural Fire Protection Design
NFPA 560	Standard for the Storage, Handling, and Use of Ethylene Oxide for Sterilization and Fumigation
NFPA 601	Standard for Security Services in Fire Loss Prevention
NFPA 650	Standard for Pneumatic Conveying Systems for Handling Combustible Particulate Solids
NFPA 654	Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids
NFPA 655	Standard for Prevention of Sulfur Fires and Explosions
NFPA 664	Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities
NFPA 701	Standard Methods of Fire Tests for Flame Propagation of Textiles and Films
NFPA 703	Standard for Fire-Retardant Treated Wood and Fire-Retardant Coatings for Building Materials
NFPA 704	Standard System for the Identification of the Hazards of Materials for Emergency Response
NFPA 705	Recommended Practice for a Field Flame Test for Textiles and Films
NFPA 720	Standard for the Installation of Carbon Monoxide(CO) Detection and Warning Equipment
NFPA 750	Standard on Water Mist Fire Protection Systems
NFPA 780	Standard for the Installation of Lightning Protection Systems

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

NFPA 790	Standard for Competency of Third Party Field Evaluation Bodies
NFPA 791	Recommended Practice and Procedures for Unlabeled Electrical Equipment Evaluation
NFPA 801	Standard for Fire Protection for Facilities Handling Radioactive Materials
NFPA 820	Standard for Fire Protection in Wastewater Treatment and Collection Facilities
NFPA 850	Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations
NFPA 853	Standard for the Installation of Stationary Fuel Cell Power Systems
NFPA 900	Building Energy Code
NFPA 909	Code for the Protection of Cultural Resource Properties - Museums, Libraries, and Places of Worship
NFPA 914	Code for Fire Protection of Historic Structures
NFPA 921	Guide for Fire and Explosion Investigations
NFPA 950	Standard for Data Development and Exchange for the Fire Service
NFPA 1035	Standard for Professional Qualifications for Public Fire and Life Safety Educator
NFPA 1037	Standard for Professional Qualifications for Fire Marshal
NFPA 1128DS	Draft Standard for Standard Method of Fire Test for Flame Breaks
NFPA 1141	Standard for Fire Protection Infrastructure for Land Development in Suburban and Rural Areas
NFPA 1142	Standard on Water Supplies for Suburban and Rural Fire Fighting
NFPA 1143	Standard for Wild-land Fire Management
NFPA 1144	Standard for Reducing Structure Ignition Hazards from Wild-land Fire
NFPA 1150	Standard on Foam Chemicals for Fires in Class A Fuels
NFPA 1192	Standard on Recreational Vehicles
NFPA 1221	Standard for the Installation, Maintenance, and Use of Emergency Services Communications Systems
NFPA 1231	Standard on Water Supplies for Suburban and Rural Fire Fighting
NFPA 1403	Standard on Live Fire Training Evolutions

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

NFPA 1600	Standard on Disaster/Emergency Management and Business Continuity Programs
NFPA 1620	Standard for Pre-Incident Planning
NFPA 1961	Standard on Fire Hose
NFPA 1962	Standard for the Inspection, Care, and Use of Fire Hose, Couplings, and Nozzles and the Service Testing of Fire Hose
NFPA 1963	Standard for Fire Hose Connections
NFPA 1964	Standard for Spray Nozzles
NFPA 1965	Standard for Fire Hose Appliances
NFPA 1991	Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies
NFPA 1992	Standard on Liquid Splash-Protective Ensembles and Clothing for Hazardous Materials Emergencies
NFPA 2001	Standard on Clean Agent Fire Extinguishing Systems
NFPA 2010	Standard for Fixed Aerosol Fire-Extinguishing Systems
NFPA 2112	Standard on Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire
NFPA 2113	Standard on Selection, Care, Use, and Maintenance of Flame-Resistant Garments for Protection of Industrial Personnel Against Flash Fire
NFPA 5000	Building Construction and Safety Code®
NFPA 8501	Standard for Single Burner Boiler Operation
NFPA 8502	Standard for the Prevention of Furnace Explosions/Implosions in Multiple Burner Boilers
NFPA 8503	Standard for Pulverized Fuel Systems
NFPA 8504	Standard on Atmospheric Fluidized-Bed Boiler Operation
NFPA 8505	Standard for Stoker Operation
NFPA 8506	Standard on Heat Recovery Steam Generator Systems

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**Factory Mutual Data Sheets**

17-1	Nondestructive Examination
13-3	Steam Turbines
13-6	Flywheels and Pulleys
13-7	Gears
13-8	Power Presses
13-12	Governor Valve Bypass
13-17	Gas Turbines
13-18	Industrial Clutches and Clutch Couplings
13-24	Fans and Blowers
13-26	Internal Combustion Engines
12-2	External Corrosion of Pressure Vessels and Piping
12-3	Continuous Digesters
12-5	Critical Steam and Water Piping
12-6	Batch Digesters and Related Process Vessels
12-14	Waste Heat Boilers
12-26	Quick Actuating Closures
12-43	Pressure Relief Devices
12-53	Absorption Refrigeration Systems
12-61	Mechanical Refrigeration
12-66	High Pressure Forming Presses
11-1	Electric Power Generation- Steam Cycle
10-0	The Human Factor of Property Conservation
10-3	Hot Work Management
10-4	Contractor Management
10-6	Protection Against Arson and Other Incendiary Fires
9-0	Maintenance and Inspection
9-1	Supervision of Property

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

9-3	Industrial Cost Trends
9-7	Property Conversation
9-18	Prevention of Freeze-Ups
8-1	Commodity Classification
8-3	Rubber Tire Storage
8-9	Storage of Class 1, 2, 3, 4 and Plastic Commodities
8-21	Roll Paper Storage
8-22	Storage of Baled Waste Paper
8-23	Rolled Nonwoven Fabric Storage
8-24	Idle Pallet Storage
8-27	Storage of Wood Chips
8-28	Pulpwood and Outdoor Log Storage
9-19	Wild-land Fire/Bush Fire Exposure
7-0	Causes and Effects of Fires and Explosions
7-2	Waste Solvent Recovery
7-6	Heated Plastic and Plastic-Lined Tanks
7-7	Semiconductors Fabrication Facilities
7-7R	Semiconductors Fabrication Facilities
7-9	Dip Tanks, Flow Coaters, and Roll Coaters
7-10	Wood Processing and Woodworking Facilities
7-11	Belt Conveyors
7-14	Fire & Explosion Protection for Flammable Liquid, Flammable Gas & Liquefied Flammable Gas
7-15	Garages
7-16	Barricades
7-17	Explosion Suppression Systems
7-22	Hydrazine and Derivatives
7-23	Data on General Class of Chemical Processing

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

7-24	Blowing Agents
7-27	Spray Application of Flammable and Combustible Materials
7-28	Energetic Materials
7-29	Flammable Liquid Storage in Portable Containers
7-30N	Solvent Extraction Plants
7-31	Storage of Aerosol Products
7-32	Flammable Liquid Operations
7-33	High-Temperature Molten-Materials
7-35	Air Separation Processes
7-35R	Air Separation Processes
7-37	Cutting Oils
7-39	Industrial Trucks
7-40	Heavy Duty Mobile Equipment
7-42	Guidelines for Evaluating the Effect of Vapor Cloud Explosions Using a TNT Equivalency Method
7-43	Loss Prevention in Chemical Processing Plants
7-44	Spacing of Facilities in Outdoor Chemical Processing Plants
7-45	Instrumentation and Control in Safety Applications
7-46	Chemical Processing Reactors and Reactions
7-47	Physical Operations in Chemical Processing Plants
7-48	Disposal of Waste Materials
7-49	Emergency Venting of Vessels
7-50	Compressed Gases in Cylinders
7-51	Acetylene
7-52	Oxygen
7-54	Natural Gas and Gas Piping
7-55	Liquefied Petroleum Gas
7-56	MAPP Industrial Gas

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

7-58	Chlorine Dioxide
7-59	Inerting and Purging of Equipment
7-61	Facilities Processing Radioactive Materials
7-72	Reformer and Cracking Furnaces
7-73	Dust Collectors and Collection Systems
7-76	Prevention and Mitigation of Combustible Dust Explosions and Fires
7-77	Testing Internal Combustion Engines and Accessories
7-78	Industrial Exhaust Systems
7-79	Fire Protection for Gas Turbine Installations
7-80	Organic Peroxides
7-81	Organic Peroxides- Hazard Classification
7-82N	Storage of Liquid/Solid Oxidizing Materials (NFPA)
7-83	Drainage Systems for Flammable Liquids
7-84	Hydrogen Peroxide
7-85	Metals and Alloys
7-86	Cellulose Nitrate
7-88	Storage Tanks for Flammable Liquids
7-89	Ammonium Nitrate and Mixed Fertilizers Containing Ammonium Nitrate
7-91	Hydrogen
7-92	Ethylene Oxide
7-94	Ammonia Synthesis Units
7-95	Compressors
7-96	Paper Working and Printing Plants
7-97	Metal Cleaning
7-98	Hydraulic Fluids
7-99	Heat Transfer By Organic and Synthetic Fluids
7-100	Dynamic Compressors
7-101	Fire Protection for Steam Turbines and Electric Generators

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

6-0	Elements of Industrial Heating Equipment
6-2	Pulverized Coal Fired Boilers
6-3	Induction and Dielectric Heating Equipment
6-4	Oil and Gas-Fired Single-Burner Boilers
6-5	Oil-or Gas-Fired Multiple Burner Boilers
6-6	Boiler Furnaces Implosions
6-7	Fluidized Bed Combustors
6-8	Combustion Air Heaters
6-9	Industrial Ovens and Dryers
6-10	Process Furnaces
6-11	Fume Incinerators
6-12	Low-Water Protection
6-13	Waste Fuel Fired Boilers
6-14	Waste Heat Boilers
6-17	Rotary Kilns and Dryers
6-18	FM Cock Safety-Control System
6-20	Space Heaters
6-21	Chemical Recovery Boilers
6-22	Fire-tube Boilers
6-23	Water-tube Boilers
6-24	Coal Pulverizers and Pulverizing Systems
6-25	Cast Sectional Boilers- Failures
6-26	Non-Chemical Water Treatment
5-1	Electrical Equipment in Hazardous (Classified) Locations
5-4	Transformers
5-8	Static Electricity
5-10	Protective Grounding for Electric Power Systems and Equipment
5-11	Lightning and Surge Protection for Electrical Systems

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

5-12	Electric AC Generators
5-14	Telecommunications
5-15	Electric Generating Stations
5-16	Arc Furnace Transformer Installations
5-17	Motors & Adjustable Speed Drives
5-18	Protection of Electrical Equipment
5-19	Switchgear and Circuit Breakers
5-20	Electrical Testing
5-21	Electrical Fires
5-23	Emergency and Standby Power Systems
5-24	Miscellaneous Electrical Equipment
5-30	Power Factor Correction and Static Reactive Compensator Systems
5-31	Cables and Bus Bars
5-32	Electronic Data Processing Systems
5-40	Fire Alarm Systems
5-48	Automatic Fire Detection
5-49	Gas and Vapor Detectors and Analysis Systems
4-0	Special Fire Protection Systems
4-1N	Fixed Water Spray Systems for Fire Protection
4-2	Water Mist Systems
4-3N	Medium and High Expansion Foam Systems
4-4N	Standpipe and Hose Systems
4-5	Portable Extinguishers
4-7N	Low Expansion Foam Systems
4-8N	Halon 1301 Extinguishing Systems
4-9	Clean Agent Fire Extinguishing Systems
4-10	Dry Chemical Processing Systems
4-12	Foam-Water Sprinkler Systems

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

3-0	Hydraulics of Fire Protection Systems
3-1	Tanks and Reservoirs for Interconnected Fire Service and Public
3-2	Water Tanks for Fire Protection
3-3	Cross Connections
3-4	Embankment-Support Fabric Tanks
3-6	Lined Earth Reservoirs for Fire Protection
3-7	Fire Protection Pumps
3-9	Underwriter Steam Fire Pumps
3-10	Installation/Maintenance of Fire Service Mains
3-11	Pressure Reducing Valves for Fire Protection Service
3-26	Fire Protection Water Demand for Non-storage Sprinkler Properties
2-0	Installation Guidelines for Automatic Sprinklers
2-1	Prevention and Control of Internal Corrosion in Automatic Sprinkler
2-8	Earthquake Protection for Water-Base Fire Protection Systems
2-10R	Dry Pipe, Deluge, Pre-action Valves and Accessories
2-58	Indicator Post Valves – Turns to Open
2-69	Unlisted Automatic Sprinklers
2-74	Identification of FMRC-Approved Plated Sprinklers
2-81	Fire Protection System Inspection, Testing and Maintenance
2-89	Pipe Function Loss Tables
1-0	Safeguards During Construction, Alteration and Demolition
1-1	Fire-safe Building Construction and Materials
1-2	Earthquakes
1-3	High-Rise Buildings
1-4	Fire Tests
1-5	Removal and Shipping of Roof Deck Samples for Calorimeter Testing
1-6	Cooling Towers
1-8	Antenna Towers and Signs

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets**

1-9	Roof Anchorage
1-10	Interaction of Sprinklers, Smoke and Heat Vents, and Draft Curtains
1-11	Fire Following Earthquakes
1-12	Ceilings and Concealed Spaces
1-13	Chimneys
1-14	Construction Systems
1-17	Reflective Ceiling Insulation
1-20	Protection Against Exterior Fire Exposure
1-21	Fire Resistance of Building Assemblies
1-22	Maximum Foreseeable Loss
1-23	Protection of Openings in Fire Subdivisions
1-24	Protection Against Liquid Damage
1-25	Process Tanks and Silos
1-28	Wind Design
1-28R	Roofing Systems
1-29	Roof Deck Securement and Above-Deck Roofing Components
1-30	Repair of Wind Damaged Roof Systems
1-31	Metal Roof Systems
1-32	Existing PVC Roof Covers
1-33	Safeguarding Torch – Applied Roof Installations
1-34	Hail Damage
1-35	Green Roof Systems
1-40	Flood
1-44	Damage-Limiting Construction
1-45	Air Conditioning and Ventilating Systems
1-49	Perimeter Flashing
1-51	Fire-Retardant Coatings and Paints for Interior Finish Materials
1-52	Field Uplift Tests

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix A - (Cont.) Applicable NFPA Codes and Factory Mutual Data Sheets

1-53	Anechoic Chambers
1-54	Roof Loads for New Construction
1-55	Weak Construction and Design
1-56	Cleanrooms
1-57	Plastics in Construction
1-60	Asphalt-Coated/Protected Metal Buildings
1-61	Fire-Retardant Treated Wood
1-62	Cranes

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix B - Permit Requirements

Operations and Materials	Permit Required
Aerosol Products	To store or handle an aggregate quantity of Level 2 or Level 3 aerosol products in excess of 500 lb. (226.8 kg)
Ammonium Nitrate	For storage
Asbestos Removal	For the removal of asbestos
Automatic Fire Suppression Systems	For installation or modification
Automotive Fuel Servicing	To provide automotive fuel servicing
Battery System	To install or operate stationary lead-acid battery systems having an electrolyte capacity of more than 100 gal (379 L) in sprinkler buildings or 5gal (189 L) in non-sprinkler buildings
Candles, Open Flames, and Portable Cooking	To use in connection with assembly areas, dining areas of restaurants, or drinking establishments
Cellulose Nitrate Film	To store, handle, use, or display
Cellulose Nitrate Plastic	To store or handle more than 25 lb. (11.3 kg)
Cleanrooms	For construction, alteration or operation
Combustible Fibers	For storage or handling of combustible fibers greater than 100 ft ³ (2.8 m ³)
Combustible Material Storage	To store more than 2500 ft ³ (70.8 m ³) gross volume
Commercial Rubbish-Handling Operation	To operate
Compressed Gases	To store, use, or handle compressed gases in excess of the amounts listed in Table 1.12.7(b) When the compressed gases in use or storage exceed the amounts listed in Table 1.12.7(b), a permit is required to install, repair damage to, abandon, remove, place temporarily out of service, close, or substantially modify a compressed gas system For additional permit requirements for compressed gases facility closures, see 63.12
Construction/Demolition	New construction projects, modifications to or relocation of existing facilities/structures and demolition of facilities and structures, or portions thereof
Cryogenics	To produce, store, or handle cryogenics in excess of amounts listed in Table 1.12.7 (c) Exception: Where federal or state regulations apply or for fuel systems of a vehicle
Cutting and Welding Operation	For operations within a jurisdiction

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix B - (Cont.) Permit Requirements

Operations and Materials	Permit Required
Dust-Producing Operations	To operate a grain elevator, flour mill, starch mill, feed mill, or plant pulverizing aluminum, coal, cocoa, magnesium, spices, sugar, or other similar combustible material
Exhibit and Trade Shows	For operation of all exhibits and trade shows held within a jurisdiction
Explosives	Manufacture, sell, dispose, purchase, storage, use, possess, or transport of explosives within the jurisdiction. For additional permit requirements for blasting operations, see 65.9.2
Fire Alarm and Detection Systems and Related Equipment	Installation or modification to fire alarm and detection systems and related equipment.
Fire Hydrants and Water-Control Valves	To use a fire hydrant or operate a water-control valve intended for fire suppression purposes
Fire Pumps and Related Equipment	Installation of or modification to fire pumps, jockey pumps, controllers, and generators*
Flammable and Combustible Liquids	To use or operate, repair, or modify a pipeline for the onsite transportation of flammable or combustible liquids. To store, handle, or use Class I liquids in excess of 5 gal (18.9 L) in a building or in excess of 10 gal (37.9 L) outside of a building <i>Exception to item (2): A permit is not required for the following: (a) The storage or use of Class I liquids in the fuel tank of a motor vehicle, aircraft, motorboat, mobile power plant, or mobile heating plant unless such storage in the opinion of the chief would cause an unsafe condition (b) The storage or use of paints, oils, varnishes, or similar flammable mixtures when such liquids are stored for maintenance, painting, or similar purposes for a period of no more than 30 days</i> To store, handle, or use Class II or Class III-A liquids in excess of 25 gal (94.6 L) in a building or in excess of 60 gal (227.1 L) outside a building <i>Exception to item (3): Fuel oil used in connection with oil-burning equipment</i> To remove Class I or Class II liquids from an underground storage tank used for fueling motor vehicles by any means other than the approved, stationary onsite pumps normally

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix B - (Cont.) Permit Requirements

Operations and Materials	Permit Required
	<p>used for dispensing purposes To install, construct, alter, or operate tank vehicles, equipment, tanks, plants, terminals, wells, fuel-dispensing stations, refineries, distilleries, and similar facilities where flammable and combustible liquids are produced, processed, transported, stored, dispensed, or used.</p> <p>To install, alter, clean, repair, line with a protective coating, remove, abandon, place temporarily out of service, or otherwise dispose of a flammable or combustible liquid tank</p> <p>To change the type of contents stored in a flammable or combustible liquid tank to a material other than those for which the tank was designed and constructed.</p>
General Storage	To store materials indoors or outdoors, representing a broad range of combustibles, including plastics, rubber tires, and roll paper
Grandstands, Bleachers, and Folding and Telescopic Seating	For construction, location, erection, or placement of grandstands, bleachers, and folding and telescopic seating
Hazardous Materials	<p>To store, transport on site, dispense, use, or handle hazardous materials in excess of the amounts listed in Table 1.12.7(d)</p> <p>To install, repair, abandon, remove, place temporarily out of service, close, or substantially modify a storage facility or other area regulated by Chapter 60 when the hazardous materials in use or storage exceed the amounts listed in Table 1.12.7(d).</p>
High-Piled Combustible Storage	To use any building or portion thereof as a high-piled storage area exceeding 500ft ² (46.45 m ²)
Hot Work Operations	To conduct hot work
Industrial Ovens and Furnaces	For operation of industrial ovens and furnaces covered by Chapter 51
Laboratories	For construction, alteration, or operation
Liquefied Petroleum Gases	To store, use, handle, or dispense LP-GAS of 125 gal (0.5 m ³) *(water capacity) aggregate capacity or greater 2. To install or modify LP-GAS Systems
Liquid-or Gas-Fueled Vehicles	To display, compete, or demonstrate liquid-or gas-fueled vehicles or equipment in assembly buildings

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix B - (Cont.) Permit Requirements**

Operations and Materials	Permit Required
Lumberyards and Woodworking Plants	For storage of lumber exceeding 100,000 board ft
Membrane Structures, Tents, and Canopies— Permanent	For construction, location, erection , or placement
Membrane Structures, Tents, and Canopies – Temporary	To erect or operate in air-supported temporary membrane structure or tent having an area in excess of 200 ft ² (18.6 m ²) or a canopy in excess of 400 ft ² (37.2 m ²) Exception: Temporary membrane structures, tents, or canopy structures used exclusively for camping
Occupancy	The use and occupancy of a facility, and the re-occupancy or change of use and occupancy of an existing facility including portable structures
Oil-and Gas-Fueled Heating Appliances	To install oil-and gas-fired heating appliances
Open Burning	To conduct open burning For additional permit requirements for open burning, see 10.11.1
Open Fires	For Kindling or maintaining an open fire For additional permit requirements for open fires, see 10.11.4†
Organic Coatings	For operation and maintenance of a facility that manufactures organic coatings
Organic Peroxide Formulations	To store, transport on site, use or handle materials in excess of amounts list in Tables 1.12.7(C) and (d)
Outside Storage of Tires	To store more than 500 tires outside
Oxidizers	To store, transport on site, use, or handle materials in excess of amounts listed in Tables 1.12.7(c) and (d)
Places of Assembly	To operate a place of assembly
Pyroxylin Plastics	For storage, handling, assembly, or manufacture of pyroxylin plastics
Private Fire Hydrants	For installation, modification, or removal from service of any private fire hydrants
Refrigeration Equipment	To install or operate a mechanical refrigeration unit or system regulated by this Code
Repair Garages and Service Stations	For operation of service stations and repair garages
Solvent Extraction	For storage, use, and handling

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix B - (Cont.) Permit Requirements**

Operations and Materials	Permit Required
Spraying or Dipping of Flammable Finish	For installation or modification of any spray room, spray booth, or preparation work station, or to conduct a spraying or dipping operation utilizing flammable or combustible liquids or powder coating
Standpipe Systems	For installations, modification, or removal from service of any standpipe system*
Special Outdoor Events	For Location and operation of special outdoor events
Tar Kettles	To place a tar kettle, a permit must be obtained prior to the placement of a tar kettle
Tire Storage	To use an open area or portion thereof to store tires in excess of 500 tires
Torch-Applied Roofing Operations	For the use of a torch for application roofing materials
Wild-land Fire-Prone Areas	For use of hazardous areas within fire-prone areas
Wood Products	To store wood chips, hogged material, wood by-products, lumber, or plywood in excess of 200 ft ³ (5.7 m ³)

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix B - (Cont.) Permit Requirements

Table 1.12.7(b) Permit Amounts for Compressed Gases

Type of Gas	Amount*	
	ft ³	m ³
Corrosive	200	0.57
Flammable	200	0.57
Highly toxic	Any amount	
Inert and simple asphyxiant	6000	169.9
Oxidizing (including oxygen)	504	14.3
Pyrophoric	Any amount	
Toxic	Any amount	
Unstable (reactive)	Any amount	

Note: See Chapters 41, 42, 60, 63, and 69 for additional requirements and exceptions.

*Cubic feet measured at normal temperature and pressure.

Table 1.12.7(c) Permit Amounts for Cryogenics

Type of Cryogen	Inside Building (gal)	Outside Building (gal)
Corrosive	Over 1	Over 1
Flammable	Over 1	60
Toxic/Highly toxic	Over 1	Over 1
Nonflammable	60	500
Oxidizer (includes oxygen)	10	50

Note: See Chapter 63.

Table 1.12.7(d) Permit Amounts for Hazardous Materials

Type of Material	Amount	
	U.S. Unit	Metric Unit
Cellulose nitrate	25 lb	11.3 kg
Combustible fiber	100 ft ³	2.8 m ³
Combustible liquids	See Table 1.12.7(a)	
Consumer fireworks (1.4G)	10 lb	4.5 kg*
Corrosive gases	See Table 1.12.7(b)	
Corrosive liquids	55 gal	208 L
Corrosive solids	500 lb	227 kg
Cryogenics	See Table 1.12.7(c)	
Display fireworks (1.3G)	Any amount	
Explosives	Any amount	
Flammable gases	See Table 1.12.7(b)	
Flammable liquids	See Table 1.12.7(a)	
Flammable solids	100 lb	45.4 kg
Highly toxic gases	See Table 1.12.7(b)	
Highly toxic liquids	Any amount	
Highly toxic solids	Any amount	
LP-Gas	See Table 1.12.7(b)	
Nitrate film (cellulose)	Any amount	
Organic peroxides:	See Table 1.12.7(a)	

Table 1.12.7(d) Continued

Type of Material	Amount	
	U.S. Unit	Metric Unit
Class I	Any amount	
Class II	Any amount	
Class III	10 lb	4.5 kg
Class IV	20 lb	9 kg
Class V	Not required	
Unclassified detonatable	Any amount	
Oxidizing gases	See Table 1.12.7(b)	
Oxidizing liquids:	See Table 1.12.7(a)	
Class 4	Any amount	
Class 3	1 gal	3.8 L
Class 2	10 gal	38 L
Class 1	55 gal	208 L
Oxidizing solids:	See Table 1.12.7(a)	
Class 4	Any amount	
Class 3	10 lb	4.5 kg
Class 2	100 lb	45 kg
Class 1	500 lb	227 kg
Pyrophoric gases	See Table 1.12.7(b)	
Pyrophoric liquids	Any amount	
Pyrophoric solids	Any amount	
Toxic gases	See Table 1.12.7(b)	
Toxic liquids	10 gal	38 L
Toxic solids	100 lb	45 kg
Unstable (reactive) gases	See Table 1.12.7(b)	
Unstable (reactive) liquids:		
Class 4	Any amount	
Class 3	Any amount	
Class 2	5 gal	19 L
Class 1	10 gal	38 L
Unstable (reactive) solids:		
Class 4	Any amount	
Class 3	Any amount	
Class 2	50 lb	22.7 kg
Class 1	100 lb	45 kg
Water reactive liquids:		
Class 3	Any amount	
Class 2	5 gal	19 L
Class 1	10 gal	38 L
Water reactive solids:		
Class 3	Any amount	
Class 2	50 lb	22.7 kg
Class 1	100 lb	45 kg

Note: See Chapter 60 for additional requirements and exceptions.

*Unless the actual weight of the pyrotechnic composition of the consumer fireworks, 1.4G, is known, 25 percent of the gross weight of the fireworks, including packaging, is permitted to be used to determine the weight of the fireworks for the purpose of this table.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix C - Glossary

Active Facilities. Any building no longer undergoing design and construction and which has not gone “cold and dark” in preparation for demolition.

Code of Record. Fire protection-related codes and standards in effect when facility design commences

Combustible Liquid. A combustible liquid is a liquid having a flash point at or above 100 °F (37.9 °C).

Combustible liquids **SHALL** be subdivided as follows:

- **Class II Combustible Liquids:** Have flash points at or above 100 °F (37.8 °C) and below 140 °F (60 °C).
- **Class IIIA Combustible Liquids:** Have flash points at or above 140 °F (60 °C) and below 200 °F (93.4 °C).
- **Class IIIB Combustible Liquids:** Have flash points at or above 200 °F (93.4 °C).

Combustible Material. Any material, solid, liquid, or gas that can oxidize rapidly, producing heat, and often light. This includes materials such as tissues, paper, rags, wood, oils, and flammable liquids.

Compensatory Measures. A temporary measure instituted to compensate for the lack of a fire protection system to perform its intended function as a result of an Impairment. These measures do not replace the impaired fire protection system but are designed to reduce the risk or effect of fire during the Impairment. It is not the intent of this procedure to preclude the building establishing any Compensatory Measures as dictated by the building documents. All established Compensatory Measures must receive concurrence in writing from the Project Fire Protection Engineer.

Containment Enclosure. A containment structure utilized for the control of radiological hazards and asbestos abatement activities.

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix C - (Cont.) Glossary**

Control Area. A building or portion of a building within which flammable and combustible liquids are allowed to be stored, dispensed and used or handled in quantities that do not exceed the MAQ.

Deficiency. A system design condition that does not prevent a fire protection system from operating as designed (not an impairment) but is characterized by a problem such as a code noncompliance, potential for failure, misapplication, inadequate coverage, or similar condition.

Designated Hotwork Area. A specific area approved by Project Fire Protection Engineering through the issuance of a Hanford Fire Marshal Permit for long-term or permanent welding, cutting, and burning operations (hot work).

Exit. That portion of a means of egress that is separated from all other spaces of the building by construction or equipment as required to provide a protected way of travel to the exit discharge.

Fire Area. An area of a building separated from the remainder of the building by construction having a fire resistance of at least 1 hours and having all communicating openings properly protected by an assembly having a fire resistance of at least 1 hours.

Fire Barrier. A continuous membrane either a wall, ceiling, roof, or floorassembly, including opening and penetration protection elements, which has a structural resistance to fire as prescribed by a recognized testing laboratory.

Fire Damper. A device installed in air distribution ducts, or in air transfer grilles, designed to close automatically upon the detection of heat, to interrupt migratory airflow, and to restrict the passage of flame.

Fire Surveillance. Periodic walk downs of areas affected by an impairment to the installed fire protection systems in order to verify safe configuration and detect any incipient stage fires.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix C - (Cont.) Glossary

Fire Watch. The process of observing field conditions, usually during hot work operations, which are indicators of incipient stage fire development and initiating specified actions to mitigate the situation.

Flammable Gas. A material that is a gas at 68°F (20°C) or less at an absolute pressure of 14.7 psia (101.325 kPa), that is ignitable at an absolute pressure of 14.7 psia (101.325 kPa) when in a mixture of 13 percent or less by volume with air, or that has a flammable range at an absolute pressure of 14.7 psia (101.325 kPa) with air of at least 12 percent, regardless of the lower limit.

Flammable Liquid. A flammable liquid is a liquid having a flash point below 100 °F (37.8 °C) and having a vapor pressure not exceeding 40 pounds per square inch (psi) absolute at 100 °F (37.8 °C); known as a Class I Liquid.

- **Class IA Flammable Liquids:** Have flash points below 73 °F (22.8 °C) and having a boiling point below 100 °F (37.8 °C).
- **Class IB Flammable Liquids:** Have flash points below 73 °F (22.8 °C) and a boiling point at or above 100 °F (37.8 °C).
- **Class IC Flammable Liquids:** Have flash points at or above 73 °F (22.8 °C) and below 100 °F (37.8 °C).

Hazardous Materials. Any solid, liquid, or gaseous material that is toxic, explosive, flammable, corrosive, or otherwise physically or biologically threatening to health. Oil is excluded from this definition. Solid, liquid, or gaseous substances in quantities that either alone, when combined with another substance through a credible mechanism, or when coming in contact with an available energy source, are determined to be capable of posing an unacceptable risk to the environment or the health and safety of the workers or the public. This includes radiological,

Fire Protection Program**Published Date: 12/03/12****Effective Date: 12/03/12****Appendix C - (Cont.) Glossary**

non-radiological and mixed materials that are toxic, explosive, flammable, corrosive, or otherwise physically or biologically health threatening.

High Hazard. Hazards with a potential for onsite and offsite impacts to large numbers of persons or for major impacts to the environment

High-Pressure Cylinder. For the purposes of this technical position, high-pressure cylinders (and cartridges) are those containing nitrogen, compressed air, carbon dioxide, or other gases at a pressure higher than 500 psi at 70 degrees F. (NFPA 10)

Hot Work. Any operation involving open flames or producing heat and/or sparks including brazing, cutting, grinding, soldering, arc or gas welding, plasma welding, or torch-applied roofing. Cutting and grinding classified as Hot Work is limited to operations that produce significant sources of heat or spraying sparks such that they are considered ignition sources to surrounding combustibles.

Idle Pallets. Any pallets that are not currently being used

Emergency Impairment. Any unplanned condition that causes all or part of a fire protection system to be inoperable (unable to perform its intended function).

Interior Finish. Interior wall, floor and ceiling finish means the exposed interior surfaces of buildings including, but not limited to, fixed or movable walls and partitions, columns, and ceilings.

Low-Pressure Cylinder. For the purposes of this technical position, low-pressure cylinders are those containing fire extinguishing agent (medium), nitrogen, compressed air, or other compressed gases at a service pressure of 500 psi or lower at 70 degrees F. (NFPA 10)

Maximum Allowable Quantity. The quantity of hazardous material permitted in a control area.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix C - (Cont.) Glossary

Means of Egress. A continuous and unobstructed route of travel from any point in a building to a public way consisting of three separate and distinct parts: the exit access, the exit, and the exit discharge.

Moderate Hazard. Hazards which present considerable potential for onsite impacts to people or the environment, but at most only minor offsite impacts

Off-Road. Any natural terrain surface or any road surface including dirt, gravel or pavement that is not being maintained in a way that prevents the underside of the vehicle from coming in contact with natural vegetation

Planned Impairment. A planned impairment SHALL be defined as a planned outage that causes all or part of a fire protection system to become inoperable, normally for modification and/or correction of deficiencies.

Re-locatable Structure. Manufactured structures, mobile homes, trailers, semi-trailers, modular type structures, factory assembled structures, cargo containers, hazardous materials or flammable liquid storage containers, air supported/inflated structures, tent/membrane and cloth/rib structures. This term does not apply to trailers and cargo containers that are being used in the transportation mode for conveying materials while onsite, or to prefabricated buildings that are permanently located, such as "Butler" or "Strand Steel" buildings.

System Restriction. A condition that restricts or otherwise impairs any fire protection system but does not preclude it from operating and/or transmitting a fire alarm.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix D - Acronyms

AFFF	Aqueous Film Forming Foam
AGA	American Gas Association
AHJ	Authority Having Jurisdiction
ALARA	As Low As Reasonably Achievable
ANSI	American National Standard Institute
ASTM	American Society for Testing and Materials
CAP	Corrective Action Plan
CFR	Code of Federal Regulations
CGAA	Compressed Gas Association of America
CRRS	Condition Reporting and Resolution System
D4	Deactivation, Decontamination, Decommissioning and Demolition
DFM	Deputy Fire Marshal
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DOT	Department of Transportation
D&D	Decontamination and Decommissioning
FDC	Fire Department Connection
FHA	Fire Hazards Analysis
FM	Factory Mutual
FMAB	Fire Marshal Advisory Bulletin
FPA	Fire Protection Assessment
FPE	Fire Protection Engineer
FPP	Fire Protection Program
FPPA	Fire Protection Program Assessment
FPR	Fire Protection Rating
FSM	Fire Systems Maintenance
FSO	Fire Safety Officer
HFD	Hanford Fire Department
HFM	Hanford Fire Marshal
HFMO	Hanford Fire Marshal's Office
HMIS	Hazardous Material Identification System
IBC	International Building Code
IFC	International Fire Code
IT&M	Inspection Testing and Maintenance
MAQ	Maximum Allowable Quantity
MCFL	Maximum Credible Fire Loss
MPFL	Maximum Possible Fire Loss
MSA	Mission Support Alliance
MSC	Mission Support Contract
NEC	National Electrical Code
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
PAAA	Price Anderson Amendments Act
PFHA	Preliminary Fire Hazards Analysis
RBA	Radiological Buffer Area
RL	Richland Operations Office
RFAR	Radio Fire Alarm Reporter

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix D - (Cont.) Acronyms

RMA	Radiological Material Area
RWP	Radiological Work Permit
SDD	Service Delivery Document
SME	Subject Matter Expert
SMP	Safety Management Program
STD	Standard
UL	Underwriters Laboratory

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix E - BBQ Checklist

Barbecue Safety Checklist

Gas Grills
NOTE: Only gas grills manufactured after October 1, 1995 (affixed with a manufacturer's stamp/label that states the grill was manufactured after October 1, 1995, or other verification that the grill was manufactured after October 1, 1995) will be allowed on the Hanford Site. Gas grills manufactured after this date were provided with additional safety features to eliminate leak hazards.
1. Operator is familiar with and following the manufacturer's instructions that accompany the grill.
2. BBQ has been inspected for physical readiness (i.e., adequately supported, not damaged, proper distance from combustible materials, etc.)
3. Once per month or prior to use, whichever is longer, check the tubes that lead into the burner for insects or food grease. If necessary, clear/clean in accordance with manufacturer's instructions.
4. Once per month or prior to use, whichever is longer, check grill hoses for cracking, brittleness, holes, or leaks.
5. Ensure there are no sharp bends in the hose or tubing.
6. Gas hoses are separated from hot surfaces and dripping hot grease.
7. Catch pan for grease is in place and it is kept clean.
8. When changing the gas cylinder, verify that connectors are in good condition. Replace scratched or damaged connectors as they could cause a gas leak.
9. Prior to installing a replacement gas cylinder, or a cylinder that has been removed from the BBQ between use, examine the cylinder for evidence of exposure to fire, gouges or dents, seriously corroded areas, leaks or other condition indicating possible weaknesses that might render it unfit for service. Any such findings require further evaluation by an approved supplier prior to being filled or used. (See page 1 of Bulletin for additional LP gas safety precautions)
10. Grill is placed on a non-combustible surface and positioned at least 10 feet from any building, under any overhang, or combustible materials.
11. Following use, the BBQ or gas cylinders, if removed, shall not be stored within 5 feet of any building opening or exit door.

Fire Protection Program

Published Date: 12/03/12

Effective Date: 12/03/12

Appendix E - (Cont.) BBQ Checklist**Barbecue Safety Checklist**

Charcoal Grills
1. Operator is familiar the operation of the grill and following the manufacturer's instructions that accompany the grill.
2. Grill has been inspected for physical readiness (i.e. adequately supported, not damaged, etc.)
3. The grill has been placed on a non-combustible surface and is positioned at least 10 feet from the following: <ul style="list-style-type: none"> a. Any building or structure b. A combustible overhang c. Any combustible materials (including charcoal container and lighter fluid, if used, prior to starting barbeque).
4. Ash collection tray is in place for grills having this feature and has been emptied prior to use. (See page 2 of Bulletin for additional Charcoal safety precautions).
5. Use extreme caution under breezy conditions. Keep cover/lid in place to prevent blowing embers.

Barbecue Safety Checklist

Pellet Grills
1. Operator is familiar with the operation of the grill and following the manufacturer's instructions that accompany the grill.
2. Grill has been inspected for physical readiness (i.e. adequately supported, parts in working order, sound integrity, etc.)
3. The grill has been placed on a non-combustible surface and is positioned at least 10 feet from the following: <ul style="list-style-type: none"> a. Any building or structure b. A combustible overhang c. Any combustible materials (including pellet container prior to starting barbeque).
4. Check ash tray and, if necessary, empty prior to operation.