CPCCo
Central Plateau
Cleanup Company

One Focus · One Mission · One Hanford

Standards, Level 1 - Company Wide

CPCC-STD-FP-40404

Fire Protection Program

Revision 1, Change 0

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Program: Fire Protection Engineering
Topic: Fire Protection

Technical Authority: Baker, Rachel K
Alternate Technical Authority: Monroe, Floyd D
Functional Manager: Kopf, Joshua D

Use Type: Administrative

USQ Facility	USQ Review	Screener
Solid Waste Operations Complex	*SWOC-24-004*	Carman, Hans
Canister Storage Building/Interim Storage Area	*CSB-24-006*	Garrett, Robert
Waste Encapsulation Storage Facility	*WESF-24-009*	Garrett, Robert
Transportation	**Exclusion Reason:** *N/A per B-20*	
Capsule Storage Area	*CSA-24-008*	Garrett, Robert
105 KW Facility	GCX-7 (Minor Change)	Oberg, Brian
324 Building	*324-24-008*	Garrett, Robert
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JHA: Administrative
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Change Summary

Description of Change

This revision reflects editorial changes reflecting the CPCCo organizational structure and re-organization of existing informational material for clarity.

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1.0 INTRODUCTION

The Hanford Nuclear Facility is a government-owned, contractor-operated site, administered under the auspices and oversight of the U.S. Department of Energy (DOE) and operated by various contractors. The Central Plateau Cleanup Company (CPCCo) is the prime contractor for the safe, environmental cleanup of the Central Plateau at the Hanford Site and includes responsibility for:

- Waste retrieval and burial
- Non-tank farm waste disposal activities
- Fuels management
- Groundwater monitoring and vadose zone remediation
- Facility and waste site characterization, surveillance, and maintenance, regulatory document preparation, and remediation
- Closure, surveillance, and demolition of facilities, reactors, and canyons along the Columbia River

CPCCo's *Fire Protection Program Policy* (CPCC-POL-FP-40402) asserts the commitment by CPCCo to establish and maintain a fire protection program (FPP) consistent with federal regulations, DOE Orders, DOE Standards, DOE supplemental directives, and related codes and standards. Title 10, *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 10 CFR 851, Appendix A (10/27/2015 Edition) and states:

> "*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 fire protection standard, CPCC-STD-FP-40404 (hereafter referred to as "this standard") identifies fire protection implementing procedures applicable to all CPCCo facilities and activities at the Hanford Site.

1.1 Fire Protection Program Criteria

A well-protected DOE government-owned, contractor-operated facility is characterized by a level of protection sufficient to fulfill the requirements for the best protected class of industrial risks (Highly Protected Risk/Improved Risk). This program is characterized by the inclusion of a continuing, sincere interest on the part of management and employees in minimizing losses from fire and related perils and the inclusion of preventive features necessary to ensure the satisfaction of objectives related to safety.

Basic requirements include:

- A reliable water supply of adequate capacity for fire suppression
- A fully staffed, trained, and equipped emergency response force
- A means to summon the emergency response force in the event of a fire
- A means to notify and evacuate building occupants of a fire; automatic fire extinguishing systems in all areas subject to serious property damage, program interruption, or loss of safety class systems

This level of protection also includes:

- Administrative procedures encompassing controls for hazardous substances/processes
- Inspection and testing of fire protection features
- Other programmatic fire safety activities

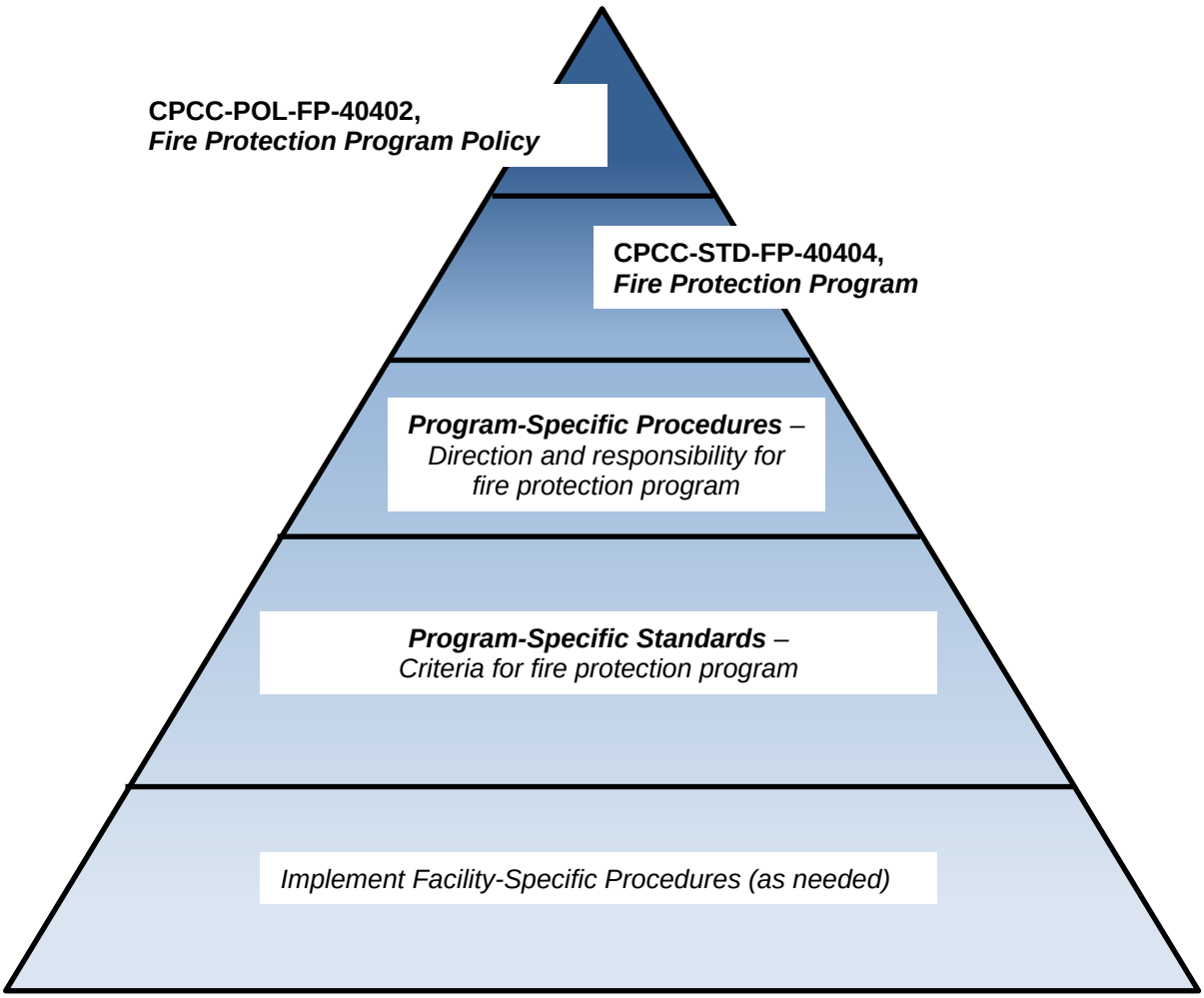
The objective of the FPP is to:

1. Provide fire protection defense-in-place to a level that results in:
    a. No fatalities to the public or personnel
    b. A combined loss (including direct property loss, debris removal and cleanup expense, attendant smoke and water damage) less than the DOE Maximum Possible Fire Loss (MPFL) threshold and a combination of administrative controls and/or physical protection features is in place to reduce the Maximum Credible Fire Loss (MCFL)
2. Minimize the potential for the occurrence of a fire and related perils.
3. Ensure fire does not cause an unacceptable onsite or offsite release of hazardous material that will threaten the worker or public health and safety or the environment.
4. Establish the requirements that will provide an acceptable degree of life safety to plant and contractor personnel and the public from fire.
5. Ensure vital programs will not suffer unacceptable delays as a result of fire and related perils.

1.2 Implementation Procedures and Requirements

Figure 1 depicts the hierarchy of the CPCCo's FPP. CPCC-POL-FP-40402 outlines CPCCo's commitment to implement the FPP though program- and facility-specific procedures and standards. This standard provides the specific requirements CPCCo adheres to and a crosswalk to those program-specific procedures and standards that define CPCCo processes and the responsibilities for meeting those requirements. Facility-specific procedures are provided as necessary when additional actions need to be taken at a particular facility in meeting the requirements.

Figure 1. Hierarchy of CPCCo Fire Protection Program



This standard as well as the implementing procedures (PRO) describe actions necessary to meet DOE objectives for fire safety as required by the Central Plateau Cleanup Contract – 89303320DEM000030.

Accordingly, the FPP in CPCCo facilities on the Hanford Site is implemented in accordance with the following DOE directives, contractor agreements, and procedures, and applies to all CPCCo contractor and subcontractor personnel, facilities, systems, equipment, and activities on the Hanford Site.

- 10 CFR 851, Appendix A, item 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 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) is met. This includes meeting applicable building codes and National Fire Protection Association codes and standards."

- **DOE O 420.1C, Change 3, *Facility Safety***, governs general FPP requirements for all DOE facilities and assets and states: "Codes and Standards. Fire protection and emergency response programs must meet, or exceed, the applicable building code and National Fire Protection Association (NFPA) codes and standards."
- **DOE O 420.1C, Change 3, Facility Safety, Implementation Direction,** modifies DOE O 420.1C for the Hanford site and states: "This direction expands upon the requirements stated in the Order and reflects how Hanford implements these requirements in day-to-day operations".
- **DOE-STD-1066-2016, *Fire Protection***, states: "Now serves as the single document for criteria and guidance for fire protection programs supporting implementation of DOE O 420.1C, *Facility Safety*."
- Since there are multiple U.S. Department of Energy prime contractors at Hanford and since the Hanford Fire Department (HFD) and Hanford Fire Marshal (HFM) are organizations of the Hanford Mission Integration Solutions, LLC (HMIS) contractor, an Administrative Interface Agreement (AIA) (HNF-51041, *Administrative Interface Agreement for Fire Protection Flow-Down of Roles, Responsibilities, Authorities and Enforcement between CH2MHill Plateau Remediation Company, Washington Closure Hanford and Mission Support Alliance, LLC*, Rev. 0) establishes the authority of the HFM and addresses organizational relationships, roles, responsibilities, requirements, and enforcement of fire protection and related activities of and between HMIS and CPCCo. HMIS also has a separate AIA with Washington River Protection Solutions LLC (WRPS), the other prime contractor on site.

This standard, in conjunction with the following CPCCo fire protection (FP) administrative implementing procedures, policies, and standards and HMIS's requirements documents, constitute the CPCCo FPP on the Hanford Site.

- CPCCo Administrative Procedures
  - CPCC-GD-FP-54132, *Fire Prevention Self-Inspections*
  - CPCC-PRO-FP-40420, *Fire Protection Analysis*
  - CPCC-PRO-FP-40421, *Hot Work*
  - CPCC-PRO-FP-40422, *Hanford Fire Marshal Permit Interfaces*
  - CPCC-PRO-FP-40424, *Equivalencies, Exemptions, and Interpretation/Clarification Requests (ICRs)*
  - CPCC-PRO-FP-40425, *Fire Protection System Inspection, Testing and Maintenance*
  - CPCC-PRO-FP-40426, *Fire Protection System Discrepancies*
  - CPCC-PRO-FP-54129, *Portable Fire Extinguishers*
  - CPCC-PRO-FP-54130, *Life Safety Features and Emergency Lighting*
  - CPCC-PRO-FP-54131, *Fueled Equipment and Heat-Producing Appliances*
  - CPCC-PRO-FP-54134, *Fire Protection in D4 Facilities and Facilities Under Construction*
  - 100K-PRO-FP-50757, *Fire Protection Program*
- Policies
  - CPCC-POL-FP-40402, *Fire Protection Program Policy*
- Standards
  - CPCC-STD-FP-40404, *Fire Protection Program*
  - CPCC STD-FP-54128, *Fire Protection System Design*
  - CPCC-STD-FP-54133, *Control of Combustible Materials*
  - CPCC-STD-FP-54135, *Control of Compressed and Flammable Gases*
  - CPCC-STD-FP-54136, *Control of Explosives*
  - CPCC-STD-FP-54137, *Control of Flammable and Combustible Liquids*
- Requirement Documents
  - HMIS-RD-FP-8589, *Hanford Fire Marshal Permits*
  - HMIS-RD-FP-7899, *Fire Protection System Testing/Inspection/Maintenance/Discrepancies*

Figure 2. CPCCo/DOE Fire Protection Program Hierarchy

10 CFR 851 – Energy – Worker Safety and Health Program

(Authorizes 29 CFR 1910, "General Industry", including Subpart L – Fire Protection and 29 CFR 1926, "Construction", including -.24 Fire Protection and Prevention)

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DOE O 420.1C, Change 3, Facility Safety – Chapter 2 Fire Protection and as modified by DOE O 420.1C, Change 3, Implementation Direction

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(Contract Authorization Basis)

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DOE-STD-1066-2016, *Fire Protection*

(Adopts International Building Code as Building Code of Record for New Construction, NFPA 1 *Fire Code* as Fire Code of Record, Washington Administrative Code 173-303 *Dangerous Hazardous Waste Regulations* (and applicable sections of International Fire Code) for "Ignitable and Reactive Hazardous Waste Storage", NFPA 101 *Life Safety Code,* and "most recent edition of applicable NFPA Codes and Standards". All "should" references shall be considered by the cognizant FPE as applicable to the specific project or facility involved.. Contractor Fire Protection Program must be submitted to DOE for approval, Sets FPE Staffing Qualifications, Water Supply requirements for fire protection, Fire Hazards Analysis criteria, Facility Fire Protection Assessment criteria Fire System Inspection-Testing-Maintenance policy. Establishes Hanford Fire Protection Forum, Hanford Fire department, and extension of authority to Hanford Fire Marshal)

(Establishes General Fire Protection requirements, Fire Protection Program Administration elements, Fire Protection Design Criteria, Operations Criteria, and Criteria for development of Facility Fire Protection Evaluations)

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HNF-51041 AIA for Fire Protection Flow-Down Roles, Responsibilities, and Enforcement (extends Authority Having Jurisdiction responsibilities from DOE-RL to Hanford Fire Marshal, Company Deputy Fire Marshals, and to Qualified Fire Protection Engineers, as sole interpretive authority for fire protection and prevention Codes and Standards)

↓ ↓

HNF-36174, Hanford Fire Protection Requirements (Establishes Hanford Site-Specific Fire alarm, Water Supply, and Fire Suppression System design requirements)	**HNF-52336 Authority, Responsibilities, and Duties of the Hanford Fire Marshal** (Hanford Fire Marshal Charter – Establishes duties of Company Deputy Fire Marshals)

Figure 2. (Cont.) CPCCo/DOE Fire Protection Program Hierarchy

WAC 173-303-395 *Other General Requirements* – Precautions for Ignitable, Reactive, or Incompatible Wastes (Provides acceptable criteria to meet fire prevention requirements for Washington Department of Ecology regulated hazardous waste storage)	**HMIS-RD-FP-7899 Fire Protection System Testing/Inspection/Maintenance/Discrepancies** (Endorsed document by Company - Establishes compliance matrix for active and passive fire protection system inspection, testing, and maintenance; including responsibilities of Fire Marshal's Office, Company Facilities Management, and Hanford Fire Systems Maintenance)
	HMIS-RD-FP-8589 Hanford Fire Marshal Permits (Endorsed document by Company - Establishes compliance matrix for Hanford Site Fire Marshal Permits)

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(Company Fire Protection Program)

CPCC-POL-FP-40402 Fire Protection Policy

CPCC-STD-FP-40404 Fire Protection Standard

Fire Protection Procedures		
CPCC-PRO-FP-40420 Fire Protection Analyses (including FHAs, FFPAs, Life Safety Analyses, D4 Analysis, and Fire Protection System Analysis)	**CPCC-PRO-FP-40424 Equivalencies, Exemptions, and Interpretation/Clarification Requests**	**CPCC-PRO-FP-54129 Portable Fire Extinguishers**
CPCC-PRO-FP-40421 Hot Work (including Designated and Field Work Area Permits)	**CPCCC-PRO-FP-40425 Fire Protection System Inspection, Testing, and Maintenance** (including implementation of HMIS-RD-FP-7899)	**CPCC-PRO-FP-54130 Life Safety Features and Emergency Lighting**
CPCC-PRO-FP-40422 Hanford Fire Marshal Permit Interfaces (including implementation of HMIS-RD-FP-8589)	**CPCC-PRO-FP-40426 Fire Protection System Discrepancies** (including implementation of HMIS-RD-FP-7899)	**CPCC-PRO-FP-54131 Fuel-Fired Equipment and Heat Producing Appliances**
CPCC-PRO-FP-54134 Fire Protection in D4 Facilities and Facilities Under Construction		

Figure 2. (Cont.) CPCCo/DOE Fire Protection Program Hierarchy

Fire Protection Standards and Guides		
CPCC-STD-FP-54128 Fire Protection System Design	CPCC-STD-FP-54135 Control of Compressed and Flammable Gases	CPCC-STD-FP-54137 Control of Flammable and Combustible Liquids
CPCC-STD-FP-54133 Control of Combustible Materials	CPCC-STD-FP-54136 Control of Explosives	CPCC-GD-FP-54132 Fire Prevention Inspections

1.2.1 Applicability

This standard applies to all CPCCo activities as well as all CPCCo subcontractor activities at the Hanford Site. The requirements associated with the FPP criteria are applicable to CPCCo 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.

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 (ITM), emergency response, fire prevention, and design/procurement of fire protection equipment. Each CPCCo Hanford Site employee is responsible for fire safety, identification of fire alarm and fire suppression system deficiencies, and for compliance with requirements, procedures, and policy.

The HMIS Contractor provides the ITM function for fire-alarm and suppression systems emergency response for both property and worker events, and also provides the fire marshal function in the administration and implementation of the Hanford Site-wide FPP. Hanford Fire Marshal (HFM) and Deputy Fire Marshal (DFM) roles and responsibilities are found in HNF-52336, *Authority, Responsibilities, and Duties of the Hanford Fire Marshal.*

1.3.1 President and General Manager, CPCCo

The President, CPCCo, establishes the policy for the FPP and promotes the FPP throughout CPCCo organization including CPCCo subcontractors.

1.3.2 Director and Senior Manager

Directors and senior managers oversee the development, implementation, and maintenance of the FPP, including funding support, active and passive fire protection and life safety features, fire prevention; as well as supporting documentation, tracking and timely resolution to identified deficiencies, associated training and drill/exercise programs, to ensure adequate levels of fire protection preparedness and response are maintained within their designated areas of responsibility.

1.3.3 Manager

Managers at all levels oversee the development, implementation, and maintenance of the FPP, including funding support, active and passive fire protection and life safety features, and fire prevention, as well as supporting documentation, tracking and timely resolution to identified deficiencies, associated training, and drill/exercise programs to ensure adequate levels of fire protection preparedness and response are maintained within their designated areas of responsibility.

1.3.4 Design Authority/System Engineer (DA/SE)

- Provides technical support to HFD Operations to ensure they are knowledgeable of facility design and operations regarding fire protection systems and changes as included in DOE O 420.1C, Chg. 3.
- Develops and maintains competency in basic passive and active fire protection system and feature principles of operation.
- Develops and maintains competency in the passive and active systems within their charge and responsibility, per CPCC-STD-FP-54128.
- Maintains both passive and active fire protection system and feature drawings, calculations, and specifications in an accurate as-built condition, per CPCC-PRO-FP-40425, CPCC-PRO-FP-40426, and CPCC-PRO-FP-54134.
- Reviews and ensures ITM manuals, instructions, procedures, and work packages for both active and passive fire protection systems and features are accurate and complete.
- Maintains, tracks, and trends the results from ITM activities.
- At least annually, provides a fire system health, trending, aging, and obsolescence/ replacement report to the cognizant Fire Protection Engineer (FPE), and Project Manager/ Facility Manager/Building Manager (FM/BM) for vital safety systems.
- Performs such duties of the Project Manager/FM/BM as delegated.
- Coordinates with the cognizant FPE/DFM for fire system discrepancies, compensatory measures, and expediting corrective action.

1.3.5 Planner and Field Work Supervisor (FWS)

Planners and FWS perform their duties pre CPCC-PRO-WKM-12115, *Work Management*, CPCC-PRO-FP-40420, CPCC-PRO-FP-40422, and other governing documents.

1.3.6 Fire Prevention and Life Safety Inspector

Fire prevention and life safety inspection is a functional area responsibility that may be delegated to one or more individuals at the discretion and direction of the responsible manager, rather than a required standalone position. Similarly, the inspection functions may be incorporated into other surveillance or walkdown activities, so long as the required elements are documented, per applicable FPP procedures or standards.

- Develops and maintains competence in the assigned active and/or passive fire protection surveillance tasks assigned by the Project Manager/FM/BM (e.g., including but not limited to fire extinguisher inspection, fire barrier and fire door/damper inspections, emergency lighting and exit signs inspection and testing, and fire system riser, valve, and panel inspection).
- Performs inspection of fire prevention or life safety features as assigned in accordance with established and approved procedures and reporting template, in accordance with CPCC-PRO-FP-54130, CPCC-GD-FP-54132, and CPCC-STD-FP-54133.
- Advises the Project Manager/FM/BM, DA/SE, or cognizant FPE/DFM as applicable, regarding needed changes to procedures or reporting templates to ensure a thorough surveillance.
- Identifies, reports, and documents in a timely manner any discrepancies or deficiencies encountered during the inspection or testing to the Project Manager/FM/BM or DA/SE, as applicable.

1.3.7 Hot Work Permit Authorizing Individual (PAI), Hot Work Worker, Fire Watch, Fire Protection Impairment Coordinator (FPIC), Fire Surveillance, and Fire Alarm Panel Watch

Hot Work Permit Authorizing Individual (PAI), Hot Work Worker, and Fire Watch are functional area responsibilities that may be delegated to one or more individuals at the discretion and direction of the responsible manager, rather than required standalone positions. The duties are to be performed in accordance with CPCC-PRO-FP-40421.

Fire Protection Impairment Coordinator (FPIC), Fire Surveillance, and Fire Alarm Panel Watch are functional area responsibilities that may be delegated to one or more individuals at the discretion and direction of the Responsible Building Manager (RBM), rather than required standalone positions. The duties are to be performed in accordance with CPCC-PRO-FP-40421, CPCC-PRO-FP-40425, and CPCC-PRO-FP-40426.

1.3.8 Fire Protection Program Manager

- Implements the CPCCo FPP in accordance with contractual requirements and this standard.
- Maintains a staff of Qualified Fire Protection Engineer(s) (QFPE) and administrative support personnel.
- Approves and submits requests for DFM qualification of FPE to the Hanford Fire Marshal Office (HFMO) and maintains a staff of DFMs.
- .
- Provides at least one CPCCo representative to serve on the Hanford Fire Protection Forum (HFPF).
- Mentors and provides leadership to the CPCCo 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 the Chief Engineer in making interpretations of fire protection requirements and acts as the FPE SME for providing and explaining fire protection requirements to the CPCCo projects and other stakeholders.

- 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 Sitewide FPPs. This includes participation on the Hanford Fire Marshal Advisory Board.
- Is the CPCCo voting representative for the HFPF.
- Plans, performs, and directs performance of Facility Fire Protection Assessments (FFPA) to promote continuous process improvement.
- Maintains a list of facilities requiring FFPAs.
- Ensures release of fire protection engineering calculations, assessments, and analyses as the responsible manager.
- Works with the assigned facility and project to determine required reading.

The Director or Manager, CPCCo FPP is also responsible for the following topical areas and activities:

- FPP Development, Implementation, and Administration
- Triennial Fire Protection Program (FPP) Assessment
    - Schedules and performs the triennial FPP assessment for CPCCo
    - Assists DOE as requested in conducting FPP assessments of other contractors
    - Documents and tracks triennial FPP assessment corrective actions
    - Provides a copy of any FPP assessments to the HFMO for information

1.3.9 CPCCo Fire Protection Staff

This position provides FPE support, expertise, and direction to CPCCo management, operations, and projects. It includes functioning as an interpretive authority on fire protection-related codes, standards, and contractual requirements at the local CPCCo project level.

The CPCCo FPE staff is responsible for the following topical areas and activities:

- FPP Implementation and Administration
    - Applies FPP requirements to design, deactivation and decommissioning (D&D), operations, and maintenance
    - Ensures project implementation of FPP revisions
    - Reviews and concurs in FPP-related procedures and implementation documents
    - Plans and prepares fire protection documents in accordance with CPCCo fire protection procedures
    - Plans and performs implementation activities for fire protection documents including revision of project compliance matrices and procedures
    - Ensures the appropriate communication of site-wide fire protection information, topical bulletins, and Fire Marshal Advisory Bulletins within the assigned projects and facilities
    - Complies with the FPP

- Code Interpretations
  - Evaluates life safety conditions; prepare life safety analysis as required
  - Provides technical direction on code requirements
  - Prepares Interpretation/Clarification Requests (ICR)
  - Complies or aligns with CPCC-PRO-FP-40424, *Equivalencies, Exemptions, and Interpretation/Clarification Requests (ICRs)*, as necessary
- Exemptions and Equivalencies
  - Supports the preparation of exemption and equivalency requests
  - Complies or aligns with CPCC-PRO-FP-40424, *Equivalencies, Exemptions, and Interpretation/Clarification Requests (ICRs)*
- Fire Hazards Analysis (FHA)
  - Prepares and/or oversees the development, update, and revision of FHAs for CPCCo projects, facilities, and operations as required by CPCC-PRO-FP-40420, *Fire Protection Analysis*
- Facility Fire Protection Assessments (FFPA)
  - Performs required FFPAs as required on a periodic basis in accordance with CPCC-PRO-FP-40420, *Fire Protection Analysis*, as necessary
- Fire Marshal Permits
  - Reviews conditions and/or compensatory measures specified in Fire Marshal Permits as required
  - Prepares and/or approves HFM Permits for designated hot work areas permits under the direction of a DFM or as an authorized DFM
  - Approves Field Hot Work Permits for non-designated hot work areas as QFPEs; these may be within a building or outside
  - Prepares Fire Marshal Occupancy Permits under direction of DFMs
  - Requests a permit be suspended or revoked when information is incorrect or in violation of requirements or conditions of approval
  - Complies or aligns with CPCC-PRO-FP-40422, *Hanford Fire Marshal Permits Interfaces*
- Fire Code Related Enforcement
  - Prepares routine communication and provide enforcement of fire codes, standards, and requirements
  - Ensures routine operations and work packages, as well as emergent work, and incorporate appropriate CPCCo FPP requirements
  - Provides contractor/facility-level enforcement for non-compliant items
  - Supports Job Hazards Analysis (JHA) process as the fire protection SME
  - Institutes a stop work per company policies
  - Complies or aligns with CPCC-PRO-QA-052, *Issues Management*

- Inspection, Testing, and Maintenance (ITM) of Fire Systems
  - Provides monitoring and oversight of ITM
  - Assists management in ensuring that ITM is performed on schedule
  - Tracks system impairments and system restrictions to resolution
  - Assists other engineers and planners with CPCCo FPP requirements in work package preparation
  - Provides fire protection review of documents, procedures, and work packages for conformance with FPP requirements
  - Reviews work packages to ensure timely integration with operations
  - Supports facility fire protection SEs, DAs, and building administrators with the implementation of the ITM program
  - Monitors the ITM 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
  - Ensures compensatory measures are implemented for system restrictions and upon entry into the ITM grace period
  - Complies or aligns with CPCC-PRO-FP-40425, *Fire Protection System Inspection, Testing and Maintenance*
  - Complies or aligns with CPCC-PRO-FP-40426, *Fire Protection System Discrepancies,* as necessary
- Fire System Deactivations
  - Ensures appropriate planning and timing for system shutdown
  - Prepares requests and analyses for the deactivation of fire protection systems
  - Complies or aligns with HMIS-RD-FP-9717, *Fire Protection for Construction/Occupancy/ Demolition Activities*, as necessary
- Design, Installation, and Modification of Fire Systems
  - Provides fire protection design criteria to the designer
  - Reviews design media
  - Supports and/or oversees modification work
  - Ensures revision of as-built documentation
  - Coordinates cognizant DFM oversight of the review and approval process and DFM peer review, including acceptance test procedures, and fire protection system changes for compliance
  - Complies with site engineering requirements
  - Complies or aligns with HNF-36174, *Hanford Fire Protection Requirements*

- Changes to Existing Water Supplies
  - Prior to any changes to existing water supplies, coordinates with HFMO for peer review and approval of water system changes for compliance
- Non-Emergency Tie-ins to Fire Hydrants
  - Supports 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
  - Ensures compatibility and consistency with existing systems
  - Coordinates with DFM for review and approval of components and procedures
  - Complies or aligns with CPCCo Site Engineering requirements
- Fire Protection Support in Conceptual and Detailed Design Processes for New Projects
  - Participates as a member of the design review team for new projects to ensure inclusion of fire and life safety code requirements
  - Participates 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*
  - Coordinates oversight by the DFM of evolving designs for new and significantly modified projects to ensure compliance with fire protection requirements
  - Complies or aligns with CPCCo Site Engineering requirements
- Routine Support
  - Be involved in project planning activities, including conceptual and detailed design to ensure fire protection requirements are integrated early in the project (e.g., DOE-STD-1066-2016)
  - Provides technical support and guidance
  - Performs periodic walkdowns to remain current relative to operations and hazards
  - Participates in pre-job planning, JHA, etc. to represent fire safety
  - Coordinates conflict resolution on fire protection-related issues with HFMO
- Use of Electric (>1500 Watts), Fuel-Fired, and LPG Fired Heaters
  - Reviews and approves portable heater use
- Performance of Ignitable and Reactive Waste Site Inspections per WAC-173-303-395, *Dangerous Waste Regulations*, “Other general requirements”
  - Supports annual inspections in accordance with CPCC-PRO-EP-52900, *Performing Inspections of Storage Areas for Ignitable or Reactive Waste*
- 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
  - Prescribes compensatory measures to mitigate temporary fire hazards or risks
  - Documents compensatory measures to ensure requirements are met and risks/hazards minimized
  - Coordinates recovery plans with the HFMO for concurrence
- Investigation of Fire, Explosions, and Other Hazardous Conditions
  - Conducts preliminary investigations of events and supports HFMO representatives
- Use of Explosives On Site
  - Ensures request for the use, detonation, or storage of explosives is submitted to the HFMO at least 30 days prior to the actual need date
  - Ensure request has an unreviewed safety question (USQ) review as required
  - Follows CPCC-STD-FP-54136, *Control of Explosives*
- Fire Protection Issue Identification, Documentation, Tracking, and Resolution
  - Utilizes the Integrated Contractor Assurance System (iCAS) for identification, corrective action planning, and resolution for fire protection issues from FHAs, FFPAs, or other assessment processes
  - Participates in the closure process of FPP-related issues
- Fire Protection Training and Communication
  - Reviews and approves fire protection training materials and content relative to specific projects (e.g., operator certifications)
  - Be a project-specific conduit for sitewide fire protection and prevention information
- Hanford Fire Department (HFD) Technical Support
  - Provides support and technical information valuable to emergency response crews (e.g., pre-incident plans, roadway closures, non-emergency hydrant use, security fence changes)
  - Ensures appropriate notifications are made to the HFD for system outages, hazardous shipments, etc.
  - Provides 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)
  - Ensures other safety or regulatory functions or requirements do not negatively impact fire protection (e.g., life safety)
  - Reviews facility/project emergency preparedness response plans as the fire protection SME
- Participates as a Member of the HFPF

- Participates in site fire protection forums and meetings including the HFPF, Hanford Fire Marshal Advisory Board, and the Hanford Water Supply for Fire Protection Meeting
    - 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
    - Responds to requests for information from DOE/Defense Nuclear Facilities Safety Board (DNFSB) representatives
    - Accompanies clients, when requested on facility tours, walkdowns, and assessments
    - Interfaces with DOE fire protection and project personnel in resolution of FPP issues

Fire Protection Staff Span of Authority. The CPCCo Fire Protection Staff is an integrated organization that uses technical resources of varying degrees of education, training, and experience to fulfill program responsibilities. The following outlines the span of authority within this group:

Deputy Fire Marshal (DFM). When having met the qualifications requirements set forth by the HFMO as a DFM and qualified as a CPCCo QFPE, the individual is capable of fulfilling all responsibilities articulated above with supervision limited to Director/Manager oversight and peer review. Appointment as a DFM requires passing an oral board administered by the HFMO and meeting the experience requirements for a QFPE. CPCCo's DFMs responsibilities are detailed HNF-51041, *Administrative Interface Agreement for Fire Protection Flow-Down of Roles, Responsibilities, Authorities and Enforcement between CH2MHill Plateau Remediation Company, Washington Closure Hanford and Mission Support Alliance, LLC*.

Fire Protection Engineer (FPE). When meeting the requirements of CPCCo Site Engineer and CPCCo QFPE, the individual may perform all functions listed above, including peer review of reports, calculations, and analyses prepared by other fire protection engineers and technicians. The QFPE may not perform those duties specifically assigned to the DFM (e.g., issuing Hanford Fire Marshal Permits).

In addition to the roles and responsibilities detailed for the CPCCo Fire Protection staff, CPCCo FPEs may also assume, when properly trained and certified, the roles and responsibilities of a DFM in support of the HFM and the overall Hanford Site FPP as it applies to CPCCo.

When meeting the DOE definition of an FPE, the individual may perform all of the functions listed above (excluding those specifically identified for DFM), but may not render code opinions or issue reports, calculations, and analyses without peer review by a QFPE.

For the purposes of CPCCo FP procedures, references to an FPE mean a QFPE, unless the work is reviewed and approved by a QFPE. Limited authority may also be granted to an FPE (other than QFPE) on a task-specific basis by the Director/Manager of Fire Protection Engineering.

Associate Fire Protection Engineer (AFPE). When meeting the requirements of CPCCo Site Engineer and SFPE qualifications as an Associate Member, the individual may perform selected duties as listed above, under the direct supervision and review of a QFPE. Limited authority may also be granted to an AFPE on a task-specific basis by the Director/Manager of Fire Protection Engineering.

Fire Safety Officer (FSO). An FSO may perform fire protection surveillances and prepare reports as assigned under the direct supervision and approval of a QFPE, including but not limited to:

- Fire Prevention and Housekeeping Inspections
- Life Safety and Means of Egress Inspections
- Fire Extinguisher Inspections
- Fire Protection System Condition Surveys
- Combustible Loading Control Surveys
- Flammable/Combustible Liquids, Hazardous Chemical, and Compressed Gasses surveys

1.3.10 Hanford Fire Marshal (HFM)

CPCCo institutionalizes and recognizes the HFM's authority as contained in the "Authority, Responsibilities, Duties and Enforcement" section of the DOE-approved Hanford Fire Marshal Charter, HNF-52336, *Authority, Responsibilities and Duties of the Hanford Fire Marshal*. CPCCo has formed an agreement or memorandum of understanding with the HFM to implement this authority, HNF-51041, *Administrative Interface Agreement for Fire Protection Flow-Down of Roles, Responsibilities, Authorities and Enforcement between CH2MHill Plateau Remediation Company, Washington Closure Hanford and Mission Support Alliance, LLC.*

1.3.11 All Site Personnel

- Notifies 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.
- Notifies 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.
- Performs activities safely to prevent the occurrence of a fire.
- Notifies 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.
- Notifies the HFD of any hazardous material spill, or any other incident or emergency requiring response by the HFD.
- Directs, if possible, the HFD to the scene of the emergency.
- Reports to the cognizant FPE, DFM, or HFMO any life safety concerns such as locked exit doors and blocked or partially blocked egress routes.

- Parks and drives all vehicles (private and government) so that they do not block fire department equipment access or delay emergency response vehicles.

1.3.12 Site Organizations

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

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

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

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

1.4 Training and Orientation

1.4.1 General Employees

Site employees and subcontractors, including visiting subcontractors, are provided an overview of the Hanford Site and the CPCCo 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 is provided initially, with annual retraining through Hanford General Employee Training (HGET, course 000001) and CPCCo General Employee Training (CGET, course 000006). This includes:

- Good housekeeping practices
- Proper response/notification in the event of a fire
- Instruction on the use of portable fire extinguishers
- Recognition of potential fire hazards

In addition, personnel assigned the role of a Hot Work firewatch receive hands-on portable fire extinguisher training.

1.4.2 Responsible Building Manager (RBM)

The RBM or designate with fire prevention and protection responsibilities is responsible for reading, understanding, and implementing their responsibilities pertaining to at least the following:

- CPCCo Fire Protection Program
- Principles of Fire Prevention
- Passive and Active Fire Protection
- Functional Requirements for facility-specific Fire Protection Systems

- Fire Prevention Facility Responsibilities
- Housekeeping
- Life Safety Means of Egress
- Occupancy Permits
- Fire Protection Impairment Handling
- Combustible Load Control
- Flammable/Combustible Liquid, Hazardous Chemical, and Compressed Gases Hazard Control
- Fire Extinguisher Inspection
- Coordination Responsibilities with FPE/DFM

It is expected that the incumbent becomes familiarized with the fire safety responsibilities and processes associated with their position within a brief period after initial assignment and reviews and becomes familiar with changes to related procedures and standards at a practical level.

1.4.3 Design Authority/System Engineer

Demonstration of practical application of knowledge components is satisfied through the *Design Authority Qualification Card* (course 005102) and CPCC-PRO-EN-16331, *System Engineer Program*, as applied to fire protection-specific systems, structures, and components. The DA/SE assigned passive or active fire protection system responsibilities is responsible for reading, understanding, and implementing their responsibilities pertaining to at least the following:

- CPCCo Fire Protection Program
- Passive and Active Fire Protection
- Functional Requirements for Various Types of Fire Protection Systems
- Fire Protection Impairment Handling and Discrepancy Resolution
- FHA/FFPA Support Responsibilities
- Coordination Responsibilities with FPE/DFM

It is expected that the incumbent becomes familiarized with the fire safety responsibilities and processes associated with their position within a brief period after initial assignment and reviews and becomes familiar with changes to related procedures and standards at a practical level.

1.4.4 Planners and Field Work Supervisors (FWS)

Planners and FWS are responsible for reading, understanding, and implementing their responsibilities pertaining to fire protection for the following subjects, at a minimum:

- Hot Work Permit Procedure
- Construction Work Package Related Hanford Fire Marshal Permits
- Fire Protection System Impairment Handling
- Fire Prevention Pre-Requisites and Precautions for Work Packages

It is expected that the incumbent becomes familiarized with the fire safety responsibilities and processes associated with their position within a brief period after initial assignment and reviews and becomes familiar with changes to related procedures and standards at a practical level.

1.4.5 Fire Prevention and Life Safety Inspectors

The Fire Prevention and Life Safety Inspector obtains training within 1 year of appointment and maintains competency for at least the following:

- Housekeeping
- Life Safety Means of Egress
- Occupancy Permits
- Fire Protection Impairment Handling
- Combustible Load Control
- Flammable/Combustible Liquid, Hazardous Chemical, and Compressed Gases Hazard Control
- Fire Extinguisher Inspection
- Coordination Responsibilities with cognizant FPE/DFM

Orientation will consist of a presentation provided by a qualified fire protection engineer and recorded in facility operations records.

1.4.6 Hot Work Permit Authorizing Individuals (PAI), Hot Work Workers, and Fire Watch

The Hot Work PAI, Hot Work Workers, and Fire Watch obtains training within 1 year of appointment and maintains competency for at least the following:

- Hot Work Permit process and implementation as described in CPPC-PRO-FP-40421, *Hot Work*.

Orientation will consist of a presentation provided by a qualified fire protection engineer and recorded in facility operations records.

1.4.7 Fire Protection Impairment Coordinators (FPIC), Fire Surveillance, and Fire Alarm Panel Watch

The FPIC, Fire Surveillance, and Fire Alarm Panel Watch obtains training within 1 year of appointment and maintains competency for at least the following:

- Fire System Discrepancies
- Fire Protection Impairment Handling
- Fire Surveillance Responsibilities
- Fire Alarm Panel Responsibilities

Orientation will consist of a presentation provided by a qualified fire protection engineer and recorded in facility operations records.

1.4.8 Training and Qualification Requirements for Fire Protection Staff and Technicians

Associate Fire Protection Engineer (AFPE). Per DOE O 420.1C, Chg. 3, Implementation Direction, and CPCCo Qualification Card 600193, an AFPE is an engineer that is a graduate of an accredited university or college with a Bachelor of Science degree in an engineering or related technical field and meets the qualifications for Associate Member in the Society of Fire Protection Engineers.

An AFPE meets the CPCCo Qualifications for Site Engineer within 2 years of appointment to the position.

In-house training and development consists of:

- Mentoring and review by a QFPE throughout the term as an AFPE
- DOE Fire Protection Program Hierarchy of Codes and Standards
- HFMO Policies and Procedures
- CPCCo FPP Policy and Procedure
- Site Engineering Program Policies, Procedures, and Structure
- Design Review Process
- Hot Work Procedure
- Fire Protection Impairment Handling Procedure
- Fire Protection Analyses
- FPE Portfolio (at least one item each)
    - Fire Hazards Analysis
    - Facility Fire Protection Assessment
    - Peer Reviewed Fire Marshal Permits for Occupancy, Flammable/Combustible Liquids/Hazardous Chemicals, Hot Work Area Permit, Hot Work Permit, Fire Protection Impairment
    - Peer Reviewed Work Package
    - Peer Reviewed Design
    - Sprinkler System Hydraulic Calculation (Manual and Software Prepared)
    - Computer Fire Model Analysis

Outside professional development should be made available by Fire Protection management at least once every 3 years, consisting of at least:

- Professional development seminar or conference
- Fire system calculation training
- Fire model calculation training
- Professional certification preparation course
- Formal course work in Fire Protection Engineering

During the term as an AFPE, the individual should consider obtaining credentialing in at least one of the following:

- Fundamentals In Engineering (FIT)
- NFPA certified Fire Protection Specialist
- Fire Inspector I & II (NFPA or ICC)
- Fire Protection Plans Examiner (NFPA or ICC)
- Commercial Building Plans Examiner (ICC)

Fire Protection Engineer (FPE). Per DOE O 420.1C, Chg. 3, an FPE is an engineer that is a graduate of an accredited university or college with a Bachelor of Science degree in an engineering or related technical field and meets the qualifications for 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.

An FPE meets the CPCCo Qualifications for Site Engineer within 2 years of appointment to the position.

In-house training and development consists of:

- DOE Fire Protection Program Hierarchy of Codes and Standards
- HFMO Policies and Procedures
- CPCCo FPP Policy and Procedure
- Site Engineering Program Policies, Procedures, and Structure
- Design Review Process
- Hot Work Procedure
- Fire Protection Impairment Handling Procedure
- Fire Protection Analyses
- FPE Portfolio (at least one item each)
    - Fire Hazards Analysis
    - Facility Fire Protection Assessment
    - Peer Reviewed Fire Marshal Permits for Occupancy, Flammable/Combustible Liquids/Hazardous Chemicals, Designated Hot Work Area Permit, Field Hot Work Permit, Fire Protection Impairment
    - Peer Reviewed Work Package
    - Peer Reviewed Design
    - Sprinkler System Hydraulic Calculation (Manual and Software Prepared)
    - Computer Fire Model Analysis
    - Himes Model Analysis

Outside professional development should be made available by Fire Protection management at least once every 3 years, consisting of at least:

- Professional development seminar or conference
- Fire system calculation training
- Fire model calculation training
- Professional certification preparation course
- Formal course work in Fire Protection Engineering

The individual should consider obtaining credentialing in at least one of the following:

- Fundamentals In Engineering (FIT)
- Professional Engineer – Fire Protection Engineering
- NFPA Certified Fire Protection Specialist
- Fire Protection Plans Examiner (NFPA or ICC)
- Commercial Building Plans Examiner (ICC)
- FCIA UL/FM Certified Firestopping System Inspector
- Combination of ICC Certification Examinations Leading to Master Code Professional

Qualified Fire Protection Engineer (QFPE). In accordance with DOE O 420.1C, Chg. 3, Implementation Direction, a QFPE is an engineer that is a graduate of an accredited university or college with a Bachelor of Science degree in an engineering or related technical field and meets the qualifications for Professional Member Grade in the Society of Fire Protection Engineers (SFPE), 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.

In addition to the requisites above for FPE, a QFPE meets the CPCCo requirements for Site Engineer and CPCCo Qualification Card 600179 for QFPE.

Deputy Fire Marshal (DFM). In addition to the requisites for QFPE, a DFM meets the HFMO qualification requirements for DFM (HFD-PRO-PPP-60658, *Deputy Fire Marshal Qualifications*).

Fire Safety Officer (FSO). An FSO has a Bachelor of Arts/Bachelor of Science with at least 2 years of education in either fire protection or engineering, or an equivalent combination of education and experience, or certification or in fire prevention inspection or fire systems, plus a minimum of 1 year nuclear-related experience.

In-house training and development consists of:

- Principles of Fire Science
- DOE Fire Protection Program Hierarchy of Codes and Standards
- HFMO Policies and Procedures
- CPCCo FPP Policy and Procedure
- Hot Work Procedure
- Combustible and Transient Fuel Controls
- Life Safety Means of Egress
- Fire Prevention and Housekeeping
- Passive and Active Fire Protection
- Functional Requirements for Various Types of Fire Protection Systems
- Fire Protection Impairment Handling and Discrepancy Resolution

Outside professional development should be made available by Fire Protection Management at least once every 3 years, consisting of at least:

- Professional certification preparation course
- Formal course work in Fire Protection Engineering Technology

The individual should consider obtaining credentialing in at least one of the following:

- Fire Prevention Inspector I and II (ICC or NFPA
- Fire Protection and/or Fire Alarm Engineering Technician (NICET)
- Fire Protection Plans Examiner (NFPA or ICC)
- Commercial Building Plans Examiner (ICC)
- FCIA UL/FM Certified Firestopping System Inspector

Fire Protection Technicians. In addition to the Fire Protection staff, fire inspectors and technicians performing fire code-compliant services are trained and qualified as stated below:

- DOE STD-1066-2016 (5.2.1.3) requires that fire protection technicians performing ITM activities should meet the standards of National Institute for Certification in Engineering Technologies (NICET).
- DOE STD-1066-2016 (2.2.4) “State and Local Codes. State, regional and local codes represent important regional interests and conditions. As such, applicable state, regional, and local building codes should be incorporated as directed by the AHJ.” Accordingly, Washington State training and qualification requirements should also be met.

1.5 Fire Protection Program Structure

The CPCCo FPP meets overall fire protection, prevention, and life safety requirements established in federal regulations, DOE Orders, DOE Standards, and DOE supplemental directives listed in Section 1.1. The FPP also regulates site-specific requirements and is structured to be generally consistent with the organization of the table listed in Appendix C, “Fire Protection Program Standard to Procedures Cross-Walk.” In an effort to improve organizational efficiency, clarity, and procedural integrity, entire sections of this standard were moved into other Central Plateau Cleanup Contract (CPCC) new and existing procedures. A brief explanation of the program element is provided in Sections 2 through 6 of this standard with direction to the applicable procedure for requirements and details. Appendix C provides a reference (crosswalk) from this standard to the present set of procedures following the original headings.

1.6 Corrective Actions

Fire protection system impairments, system restrictions, and deficiencies are prioritized and addressed in CPCC-PRO-FP-40426, *Fire Protection System Discrepancies*. The appropriate priority for correction of impaired, restricted, and deficient fire protection systems is determined by the HFMO according to the “Discrepancy Priority/Risk Ranking” section of the CPCCo-endorsed document HMIS-RD-FP-7899.

Findings, recommendations, and observations that are generated through audits, assessments, and analyses (including FHAs) of fire protection programs or features are screened, tracked, and prioritized through the Integrated Contractor Assurance System (iCAS).

When necessary, appropriate compensatory measures are initiated in response to discrepant fire protection systems or findings, the cognizant FPE establishes appropriate compensatory measures, including the level of fire surveillance that is required. Compensatory measures coincide with and support applicable safety basis requirements.

1.7 Requirements

CPCCo FPP procedures are based on the basic intent and requirements of the following broad list of codes, standards, and guides.

1.7.1 Code of Federal Regulations

Compliance with the following *Code of Federal Regulations* is a contract requirement:

- 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

1.7.2 DOE Standards and Guidance

Compliance with the following DOE standards and requirement documents and/or guidance is required:

- DOE O 420.1C, Chg. 3, *Facility Safety*
- DOE O 420.1C, Chg. 3, Facility Safety, Implementation Direction
- DOE-STD-1066-2016, *Fire Protection*

1.7.3 National Fire Protection Association (NFPA) Codes

The use of NFPA codes and standards is subject to the conditions related to the code of record, building modification, or related design for a new application.

- The FHA documents a code of record for historical building applications where NFPA is referenced
- Building modifications to existing or installation of new active or passive fire protection requires that the current code or code of record be enforced and documented, depending upon the extent of modifications and hazards posed
- For ITM, the code edition enforced is as listed in the CPCCo-endorsed document, HMIS-RD-FP-7899.

Compliance with the most recent edition of the applicable NFPA code and standard are required for non-ITM operational aspects of fire protection.

1.7.4 International Building and Fire Codes

New facilities and facility modifications conform to the requirements of directive DOE O 420.1C, Chg. 3.

1.7.5 Hanford Specific Requirements

NOTE: *Current Hanford Fire Marshal Advisory Bulletins are available from the main HMIS website by following the link for Functional Service Areas / Hanford Fire Protection & Emergency Services / Fire Marshal's Office.*

In addition to the implementation documents referenced above, additional site-specific requirements are also contained in the following documents:

- HNF-52336, *Authority, Responsibilities, and Duties of the Hanford Fire Marshal* (Fire Marshal's Charter)
- HNF-51041, *Fire Protection Flow-Down of Roles, Responsibilities, Authorities, and Enforcement between Central Plateau Cleanup Company and Hanford Mission Integration Solutions, LLC*
- HNF-36174, *Hanford Fire Protection Requirements*
- Fire Marshal Advisory Bulletins

1.7.6 Improved Risk Standards

Factory Mutual Global (FM Global) standards, as delineated in the FM Data Sheets, that directly apply to the CPCCo FPP should be relied on for technical guidance. The FM Global standards are the lowest recognized guidance in the program. These standards are used to supplement NFPA codes and standards when necessary.

The "Improved Risk" criteria defined by this program denotes the level of fire protection required for company facilities. An Improved Risk facility is characterized by a sufficiently high level of fire protection to fulfill requirements for insurability by FM Global, XL Catlin Global Asset Protection Services (GAPS) (formerly Industrial Risk Insurers [IRI]), or other private industrial fire insurance companies who limit their underwriting to the best protected class of industrial risks. This requires predominately noncombustible and/or fire resistive construction, adequate fire separations, protection of special hazards, adequate and reliable fire protection water supplies, adequate built-in fire extinguishing systems, stand pipe hose racks, adequate portable extinguishing units, and fire detection and alarm systems. The standards of the above-referenced insurance companies are used as guides for assuring compliance with Improved Risk requirements.

The Improved Risk level of protection requires that the "maximum possible fire loss" is the basis for determining the need to provide automatic fire suppression systems and for additional fire protection systems and features.

FM Global Loss Prevention Datasheets or other related Improved Risk standards that directly apply to the CPCCo FPP should be relied on for technical guidance. These standards are used to supplement NFPA codes and standards when necessary.

1.7.7 Specialized Codes and Standards

The CPCCo FPP may utilize specialized codes and standards to address unique applications or hazards not specifically covered by the code sets identified in Sections 1.7.1 thru 1.7.6. 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 CPCCo FPP as reference or guidance during routine activities, or, at the discretion of the DOE authority having jurisdiction (AHJ), may be invoked as a required code for a specific fire protection-related application.

1.8 CPCCO Management Coordination with the Hanford Fire Department

CPCCo management provides required facility-specific training, alarm reporting, fire-scene technical support, and fire prevention in support of the HFD. Additionally, management :

- Ensures proper scheduling priority is provided for correction of fire system impairments, fire system deficiencies, and fire prevention findings.
- Coordinates all fire system modifications, deletions, and system replacements with the HFM and the Fire Systems Maintenance (FSM).
- Ensures all fire system acceptance test procedures are reviewed and approved by the HFM and are scheduled with FSM before performance of the test.
- Recognizes that the fire system testing and ITM, performed by FSM, fulfill the facility manager's requirements for this activity.
- Coordinates all work requiring deactivation of fire suppression or detection systems, to include compensatory measures taken to ensure the safety of facility employees.
- Provides immediate facility access for emergency response crews.
- Coordinates with the HFM and provide necessary support and facility access for fire prevention inspections.
- For Category 2 and Category 3 facilities:
    - Provides site plot plan to HFD for approval
    - Ensures the pre-incident plan is provided by HFD prior to initiation of field operations that meets the requirements of NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*

Facility management is responsible for ensuring that all fire system ITM activities are completed within the specified frequencies.

CPCCo is responsible for the facilities assigned to them in their contract with DOE (Central Plateau Cleanup Contract – 89303320DEM000030). HMIS is responsible for providing certain fire systems inspection, testing, and maintenance services to Hanford Site contractors. Additionally, management :

- Administers lock and tag and special permit requirements for fire system work in their facilities.

- Seeks funding for the installation of new fire systems and modifications of existing systems.

Managers of CPCCo facilities and areas notify the HFD of the following conditions or events:

- Any special hazards that require additional information for emergency response crews
- All unplanned fire protection system impairments, outages, activations, or system trouble

Managers of CPCCo facilities and areas notify the HFD in advance and complete the necessary permitting before any of the following planned or anticipated conditions or events:

- Power outages
- All planned fire system impairments
- Water outages
- Road closures
- Conditions that prevent fire suppression and detection systems from activating
- Any condition that could delay or obstruct emergency response vehicles

Managers of CPCCo facilities and areas also provide the HFD management with advance notification of emergency drills, exercises, etc., in which HFD participation is expected.

- Planned impairments require a Permit per CPCC-PRO-FP-40422, *Fire Marshal Permit Interfaces.*
- Treat fire protection systems impaired as a result of either an unexpected or planned outage of a utility system as either a planned impairment, system restriction, or emergency impairment, as appropriate.

Employees promptly notify or contact the HFD after any of the following conditions or events are noticed. If possible, employees should direct the HFD to the scene of the medical, fire-related, or hazardous material incident.

- All fires, whether extinguished or not
- Smoke smells
- Unusual or irritating odors
- Any suspected emergency condition that requires HFD response
- Any hazardous material spill or incident requiring response by the HFD hazardous materials response team
- Any employee that is suspected of being unexpectedly ill or injured, even if the employee states that they do not want medical assistance. When requesting medical assistance, tell the operator the type of emergency and patient's exact location and condition (if known).

2.0 FIRE PROTECTION SYSTEM DESIGN

Design requirements for fire protection systems will be provided by the cognizant FPE. The primary basis for these parameters are NFPA and Improved Risk standards. Fire safety and protection are incorporated in all plans, designs, and layouts of new buildings, equipment, and processes, and in alterations of existing facilities.

All plans and specifications are reviewed by a QFPE for fire safety and protection aspects.

All facilities of significance, including facilities where a fire could cause unacceptable offsite consequences to health and safety, should be protected by an automatic fire suppression system (usually a wet pipe sprinkler system). A decision to install another type of fire suppression system should be based on engineering analysis performed by the cognizant FPE.

Documents should be reviewed by the cognizant FPE when they involve plans, specifications, and test procedures and results for new facilities and modifications to existing facilities unless there are no fire-related implications. For CPCCo-managed and -leased facilities, this includes documents affecting:

- Facility siting
- Design
- Analysis
- Construction
- Modifications
- Engineering change notices
- Decommissioning

Review of the following fire protection-related documents are performed under the direction of the cognizant FPE.

- Fire system acceptance test procedures
- Fire system testing/inspection/maintenance procedures
- Fire equipment procurements
- Emergency response procedures
- Operating and maintenance procedures related to fire protection or NFPA 101, *Life Safety Code*
- Fire hazards analysis
- Fire protection evaluations

Reviews are documented using a *Review Comment Record (RCR)* (Site Form A-6004-835), and/or a formal plan review letter.

CPCC-STD-FP-54128, *Fire Protection System Design,* provides specific requirements with respect to the design and evaluation of both passive and active fire protection systems and features, as well as types of designs that should be included in the cognizant FPE's review.

CPCC-PRO-FP-40425, *Fire Protection Inspection, Testing and Maintenance*, provides direction for both active and passive fire protection ITM.

CPCC-PRO-FP-40426, *Fire Protection System Discrepancies*, provides direction for timely corrective action for the repair and precautions needed during periods in which a fire system may be impaired.

The following provides a basic level of understanding of fire protection processes and controls, and fire protection and alarm systems, at CPCCo facilities. It is intended for a general awareness of these systems and is not a substitute for formal training needed to carry out management, engineering, or technician level activities associated with these systems.

3.0 FIRE PREVENTION

3.1 Fire Prevention Inspections

A regular program is established and carried out for the periodic inspection of all facilities and equipment to detect and eliminate fire hazards, including control of ignition sources, maintaining an unobstructed means of egress, and control of combustible materials. Records of all such inspections and corrective actions should be maintained. Such inspections will be conducted by personnel trained to recognize fire hazards and reviewed by the RBM or designate. CPCC-GD-FP-54132, *Fire Prevention Self-Inspections,* provides details for conducting these inspections.

3.2 Permits

The process for requesting and maintaining HFM Permits for occupancy, flammable and combustible liquids and hazardous materials use and storage, and non-emergency hydrant fire water use is detailed in CPCC-PRO-FP-40422, *Hanford Fire Marshal Permit Interfaces.*

CPCC-PRO-FP-40421, *Hot Work,* covers requirements for requesting and obtaining HFM Designated Hot Work Area Permits, as well as CPCCo non-designated Field Hot Work Permit procedures.

CPCC-PRO-FP-40426, *Fire System Discrepancies,* details the CPCCo Fire Protection Impairment Permit handling process.

3.3 Controlling the Introduction of Combustibles

A combustible control program is required by DOE-STD-1066-2016, *Fire Protection*, Section 5.1.4.3, as a required element of all fire protection programs. Per Appendix B.4.3.1, the FHA should identify fixed combustibles and their locations and determine limits and locations of transient combustible. These limits are usually enforced through formal combustible loading administrative controls and/or permits for each significant combustible material brought into the area.

CPCCo's written fire protection program has been reviewed and approved by DOE and is implemented by CPCC-POL-FP-40402, *Fire Protection Policy,* and this standard*,* which apply to all CPCCo facilities and activities, including CPCCo subcontractor activities at the Hanford Site. Requirements from this standard flow down to CPCC-PRO-FP-40420, *Fire Protection*

Analyses, CPCC-PRO-FP-40422, *Fire Marshal Permits/Interfaces*, CPCC-GD-FP-54132, *Fire Prevention Self-Inspections*, and CPCC-STD-FP-54133, *Control of Combustible Materials*.

Per Section 3.3 of this standard combustible materials that are required for conducting operations within a radiological facility are brought to the attention of a qualified FPE for their evaluation. Appropriate active and/or passive fire protection strategies are initiated and maintained to mitigate the hazard of these combustibles. Additional features may be required for nuclear, high hazard, explosive, and mission critical facilities.

CPCC-STD-FP-54133 is the key element of CPCCo's combustible control program. This standard contains the criteria for the management of combustible materials in CPCCo facilities. It comprehensively addresses general, qualitative controls for all CPCCo-managed areas regardless of location, and specific combustible material controls for sprinkler-protected and non-sprinkler protected, radiological and non-radiological, operations, maintenance, office, and storage areas. Qualitatively, the combustible limits within nuclear, high hazard, and high value facilities are intended to control combustible amounts to as low as reasonably achievable (ALARA).

CPCC-STD-FP-54135, *Control of Compressed and Flammable Gases,* CPCC-PRO-FP-54137, *Control of Flammable and Combustible Liquids,* and CPCC-PRO-FP-40422 (implementing the requirements matrix for permit threshold and maximum allowable quantity limits [MAQ]) establish controls for flammable and combustible liquids and compressed and flammable gases. These conditions are further analyzed in the FHA as special considerations to the facility.

CPCC-PRO-FP-40420 directs the development of key (critical) FHA) assumptions, to include a description, basis and recommended controls (e.g., combustible material controls, method or process of how operations are conducted, etc.) to ensure that facility work processes and activities remain bounded within the key FHA assumptions and that the conclusions of the FHA remain valid.

Transient combustible materials (see Appendix A, *Glossary*, for definition) are controlled to prevent unacceptable accumulations of combustibles. Transient combustible materials are a normal part of operations, however, those materials should be prevented from becoming significant fuel packages that could, if ignited, damage surrounding critical equipment or operations, or spread contamination, whether inside a building/facility or outside of the building/facility boundary. The prevention of the accumulation of transient combustible materials in non-sprinklered (and especially radiological non-sprinklered) areas requires additional regulation/restriction as described by the bounding assumptions of the FHA and Documented Safety Basis (DSA), occupancy permits, and facility's fire prevention plans.

Administrative controls identified by the FHA to limit combustibles are addressed by CPCC-STD-FP-54133. Quantitative controls developed by the FHA that are also necessary to maintain the DSA are implemented by a facility's Technical Safety Requirements (TSR). DOE STD-1066-2016, Section B.3 "Fire Modeling*,"* acknowledges that fire modeling is a not required tool for determining combustible loading controls –

> "While not usually needed, (fire modeling) is a tool that **may** (emphasis added) be used in the development of an FHA …"

When combustible loading cannot, or is not required to be quantitatively determined through the use of fire modeling, it is acceptable to establish an acceptable alternative limit with a basis to ensure that hazardous conditions are controlled.

Where quantitative combustible material controls are required by TSRs or FHA AC, CPCC-STD-FP-54133 requires facility operations to perform a monthly surveillance to ensure compliance with the combustible control program and an annual assessment of the facility program effectiveness by a qualified FPE.

Combustible loading inspections are encouraged by CPCC-STD-FP-54133 for non-nuclear facilities and portions of nuclear facilities where a quantitative combustible loading control is not in effect. In these cases, CPCC-GD-FP-54132 should be followed to perform these inspections.

Finally, implementation of combustible loading controls established by the FHA is achieved through the Hanford Fire Marshal Permitting System in accordance with CPCC-PRO-FP-40422. Within CPCCo's fire protection program, the purpose of a Fire Marshal Permit is to:

(1) Identify an occupancy or activity for notification to and/or preparation by the Hanford Fire Department, and

(2) Provide precautions and rules of engagement for operations to bound the fire safety envelope of that occupancy or activity, which includes review and reference to established controls by the FHA and/or TSR.

The following are definitions and action levels for combustible controls:

- **Combustible Material:** A material that, in the form in which it is used and under the conditions anticipated, will ignite and burn.
- **Combustible Liquid:** A liquid having a flash point at or above 100°F (37.80°C).
- **Flammable Liquid:** A liquid having a flash point below 100°F (37.81°C) and having a vapor pressure not exceeding 40 pounds per square inch (absolute) at 100°F (37.81°C).
- **Fixed Combustibles:** Flammable or combustible material permanently installed as part of the construction, occupancy, or associated operating equipment for an area or building or stored in a permanent staging area.

  Fixed combustibles include but are not limited to wood, plastic, or composite building materials such as paneling, wood framing and structural members, doors and millwork; plastic furniture and cabinets, carpet and curtains or other textile goods permanently mounted; pictures, bulletin boards, signage, and ornamentation; equipment containing hydraulic fluids (except FM-approved industrial fluids), lubricating oil in excess of 1 gallon, and fuel.

  No permit is required. However, the impacts of these materials from a DOE Maximum Possible and Maximum Credible Fire Loss (MPFL/MCFL) standpoint must be considered in the FHA or FFPA, as applicable.

- **Transient Combustibles:** Flammable or combustible material not permanently installed or stored in a permanent staging area.

Transient combustibles include but are not limited to paper, wood (including fire retardant lumber), plastic sheeting, wood scaffolding, plastic furniture, foam padding, spill sorbent pads and pigs, rubber mats, combustible waste in containers and bags, decontamination clothing, respirators, hydraulic fluid (except for FM-approved industrial fluids), tents and enclosures.

Construction/Maintenance/Demolition Permits or other Permits associated with authorized work packages will be required.

- **Permanent Staging (Storage) Locations:** Fire Protection Engineering approved areas or buildings where placement of flammable or combustible materials is allowed.

  Compensatory actions or combustible permits are not required for storage in these areas. However, occupancy permits and permits for quantities of materials beyond NFPA 1 Permit Thresholds are completed and implemented.

3.4 Storage, Use, and Handling of Flammable/Combustible Liquids and Hazardous Materials

Generally, the use, storage, and handling of flammable and combustible liquids are in accordance with NFPA 30, *Flammable and Combustible Liquids Code*, and NFPA 400, *Hazardous Materials Code*. Spray application operations involving flammable or combustible liquids are in accordance with FM Global Data Sheet 7-29, *Ignitable Liquid Storage in Portable Containers*, NFPA 27, *Spray Application of Ignitable and Combustible Materials*, and 29 CFR 1010.107, *Spray Finishing using Flammable and Combustible Materials*.

- Flammable and combustible liquid storage tanks, valves, and piping are clearly identified.
- Flammable liquids for shop, bench, and laboratory use are restricted to the minimum reasonable quantities, generally a 1-day supply, but should not exceed 2 liters.
- All portable flammable liquid dispensing containers/safety cans are FM Global-Approved/UL-Listed, painted red, and are labeled to allow quick identification of the contents.
- When flammable liquids are to be used in unusual circumstances, an HFM Permit is requested to ensure prevention of dangerous mixtures and to establish safe working conditions.
- Flammable liquids (having a flash point of less than 100°F) are not used as general cleaning solvents.

CPCC-STD-FP-54137, *Control of Flammable and Combustible Liquids,* provides requirement details for the proper storage, arrangement, and use of flammable and combustible liquids, as well as hazardous materials controlled under NFPA 1, *Fire Code*.

Precautions and protection associated with fuel-fired stationary equipment, heat-producing appliances, and generators are detailed in CPCC-PRO-FP-54131, *Fueled Equipment and Heat-Producing Appliances*.

3.5 Flammable Gases

Cylinders of flammable gas are located outside and at a safe distance from the building or against a blank fire resistive wall and segregated from oxygen cylinders as required by the NFPA codes. Where fixed piping is provided, a shutoff valve is provided in the main supply line at an accessible location just inside the building. This valve is in addition to shutoffs outside the building and should be identified by a sign located directly above it. Liquefied petroleum gases are stored, handled, and used in strict compliance with NFPA 58, *Liquefied Petroleum Gas Code*.

Requirement details of the location, storage, arrangement, and use of compressed gases is provided in CPCC-STD-FP-54135, *Control of Compressed and Flammable Gases*.

3.6 Electrically Powered Equipment

Fire prevention requirements for electrically powered mobile equipment are discussed in CPCC-PRO-FP-54131, *Fueled Equipment and Heat-Producing Appliances.*

3.7 Glovebox Fire Protection

Glovebox fire protection requirements are addressed in CPCC-STD-FP-54128, *Fire Protection System Design,* and in CPCC-STD-FP-54133, *Control of Combustible Materials.*

3.8 Heat-Producing Appliances

Fire prevention and protection for heat-producing appliances, including portable electric heaters, space heaters, cooking appliances, lighting, personal hygiene appliances, portable generators, and fuel-fire heaters is discussed in detail in CPCC-PRO-FP-54131, *Fueled Equipment and Heat-Producing Appliances.*

3.9 Field Hot Work

Welding, cutting, and other hot work outside designated hot work areas is controlled by a permit system that, as a minimum, requires the following:

- Inspection of the work area and the approval signatures of line supervision and an authorized safety representative
- Elimination or protection of all flammables and combustibles in the work area
- Protection of all personnel in the area from burns, arc flash, etc.
- Provision of a fire watch with proper fire extinguishing equipment, to continue at least 60 minutes after the job is complete

CPCC-PRO-FP-40421, *Hot Work,* covers additional requirements for Low Energy Hot Work, Hot Work in areas of low combustibles, and requirements for requesting and obtaining HFM-designated Hot Work Area Permits, as well as CPCCo non-designated Field Hot Work Permit procedures.

3.10 Fire Department Access

The requirements for the arrangement and maintenance of HFD access to CPCCo facilities is contained CPCC-STD-FP-54128, *Fire Protection System Design.*

3.11 Off-Road Vehicle Travel

The process for requesting and maintaining HFM Permits for off-road vehicle use is detailed in CPCC-PRO-FP-40422, *Hanford Fire Marshal Permit Interfaces.*

3.12 Exterior Nuclear/Radiological Waste Storage

The process and requirements regarding fire prevention measures for exterior nuclear/ radiological waste storage are covered in CPCC-STD-FP-54133, *Control of Combustible Materials.*

3.13 Ventilation

Air-handling, heating, ventilation, and exhaust systems must comply with the requirements of NFPA 90A, *Standard for the Installation of Warm Air Heating and Air Conditioning Systems International Building Code*, except as modified by DOE-STD-1066-2016, for radiological facilities. Adequate ventilation is provided for all operations, whether by natural or forced draft. The required minimum number of air changes or rate sis based on the type of operations, air contaminants, and the number of employees in a particular area. International Building Code (IBC), International Maintenance Code (IMC), and NFPA 90A are followed.

The fire protection aspects of design of ventilation systems is detailed CPCC-STD-FP-54128, *Fire Protection System Design.* Fire protection ITM requirements for ventilation systems are covered in CPCC-PRO-FP-40425, *Fire Protection System Inspection, Testing and Maintenance.*

3.14 Portable Fire Extinguishers

An employee's first responsibility is to protect their own safety, the safety of others immediately around them, and to notify the HFD to take appropriate action. If an employee does not feel comfortable for any reason approaching a fire with an extinguisher, they are not required to do so.

If the fire is in the incipient stage and the choice is made to attempt to extinguish the fire, the employee complies with the following:

1. Notifies HFD before attempting any fire extinguishment activity.

2. Ensures a safe, clear escape route is visible and remains so throughout the attempt to use the extinguisher.

3. Ensures the type of material (A-B-C-D) burning is known to determine if the correct extinguisher is available.

4. Consider the following before attempting to use extinguisher:

    a. Location and rate of fire growth
    b. Potential for smoke generation
    c. Area is a potentially toxic atmosphere
    d. Obscuration of the escape path

5. If the individual still considers that the fire is at a sufficiently small stage and can reasonably be suppressed, the individual will use ONLY ONE fire extinguisher in the attempt.

    a. If this ONE attempt fails, the individual will immediately exit the area by the safest route available.
    b. Only if safe to do so, the individual will close the doors or windows in the room of the fire and shut off fire-involved equipment as they are exiting the area.

CPCC-PRO-FP-54129, *Portable Fire Extinguishers*, defines selection, use, and ITM requirements in accordance with NFPA 10, *Standard for Portable Fire Extinguishers*, Chapter 7 and 8. Distribution, installation, and operability requirements of portable fire extinguishers are also included.

The HFD maintains responsibility to perform the annual portable fire extinguisher inspections under conditions of a separate contract between DOE and the HMIS prime contractor and is implemented through a memorandum of agreement (MOA) and service delivery document (SDD) between CPCCo and HMIS.

4.0 FIRE PROTECTION IN ACTIVE FACILITIES

4.1 Life Safety

Life safety, including the arrangement of the means of egress, doors, stairs, emergency lighting, and exit signs is discussed in detail in CPCC-PRO-FP-54130, *Life Safety Features and Emergency Lighting.*

4.2 Fire Protection Systems

ITM requirements for both active and passive fire protection systems and features, including fire barriers, water-based fire protection systems, fire alarm systems, and dry chemical extinguishing systems is covered in CPCC-PRO-FP-40425, *Fire Protection System Inspection, Testing and Maintenance.*

Direction for the management of discrepancies and precautions for fire protection system impairments is provided in CPCC-PRO-FP-40426, *Fire Protection System Discrepancies.*

5.0 FIRE PROTECTION IN D&D FACILITIES AND FACILITIES UNDER CONSTRUCTION

CPCC-PRO-FP-54134, *Fire Protection in D4 Facilities and Facilities under Construction,* provides direction for configuring and managing life safety for buildings under construction; as well as deactivation of fire systems, facility transition, and demolition.

It is generally agreed that for any facility there are the following life-cycle phases:

- Construction (includes alterations/modifications and additions)
- Occupancy
- Demolition

NOTE: *Code years referenced are from the CPCCo-endorsed HMIS document, HMIS-RD-FP-7899.*

Construction and demolition are operationally governed by NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations*, from a fire prevention and fire protection standpoint and NFPA 101 - 2021 for safety to life for occupants and the public. It is important to note that Section 4.6.10 of NFPA 101- 2021 specifically addresses life safety provisions for construction and demolition; taking precedent over other sections of the Life Safety Code. Specifically, buildings and portions of buildings are permitted to be occupied during construction, repair, alterations/modifications, additions, or demolition when the occupied portion has a continuously maintained compliant means of egress and required fire protection features. A distinction is made between the “occupied” portion (i.e., those occupancies that conform to one or more of the classifications in NFPA 101 Chapters 11 through 43) and construction, alterations/modifications, additions, or demolition activities defined by NFPA 241.

- For facilities in which an Occupancy is designated and concurrently one or more of the activities of NFPA 241 exist:
  - The occupied portion must conform to the applicable occupancy chapter(s) of NFPA 101 and the applicable sections of Chapters 1 through 10 as applied by each applicable occupancy chapter in accordance with NFPA 101-2021, Section 4.6.10.1.
  - Separately, the provisions of NFPA 101-2021, Section 4.6.10.3 for escape facilities are applied to the construction, alteration, demolition segment(s) of the building.
  - Where further requirements for construction, alteration, addition, or demolition are specifically addressed by an occupancy chapter, they are also applied.
- For buildings or portions of buildings where construction, alteration/modification, addition, or demolition occurs the standard for life safety is that adequate escape facilities be maintained at all times, “in accordance with the general principles of the Life Safety Code insofar as they can be reasonably applied for buildings under construction.” In other words, there is a “reasonableness” application to the graded approach.
- NFPA 101 relies upon NFPA 241, Chapter 7, to establish a Fire Safety Program, as well as a formal pre-fire plan to establish sufficiently robust administrative controls to offset limited physical protection features present during construction or demolition. This ensures controlled access to authorized personnel with situational awareness and strict combustible and ignition source controls.

DOE STD-1066-2016 directs the implementation of NFPA 241 for “Transitional Facilities” (i.e., facilities that no longer have an operational mission and for which the eventual end state is demolition). Outside of the DOE, construction, alteration/modification, additions, and demolition are completed in 1 or 2 years, at most. However, for radioactively and chemically contaminated facilities, this process can extend over a period of years. As a result, terms, such as “Surveillance and Maintenance Mode,” “Min. Safe,” “Cold and Dark,” pre-demolition decontamination, and “D&D” have been used. While each of these has a meaning within the context of the nuclear safety arena, there is no direct correlation to these distinctions in NFPA codes. Therefore, it is important to describe and analyze the scope and fire hazards within a fire hazards analysis and clearly determine when a facility has entered into the “Transitional” phase. Concepts, such as applying legacy (formerly operational state) occupancy classifications for non-occupied portions for buildings need to be evaluated and the provisions of NFPA 241 and Section 4.6.10 of NFPA 101 need to be addressed.

Notwithstanding the guidance provided by DOE-STD-1066-2016, NFPA 1, *Fire Code*, 2021, does provide direction for idle or vacant buildings that may be useful in maintaining fire safety for buildings in which no direct demolition activity may be occurring and no ancillary occupancy exits.

NFPA 1, Section 10.12, requires that every person owning or having charge or control of any vacant building, premises, or portion thereof removes all combustible storage, waste, refuse, and vegetation and is required to lock, barricade, or otherwise secure the building or premises to prohibit entry by unauthorized persons. Reducing the fuel load in a vacant building (buildings used on a seasonal basis are exempt) is critical because, in the event of a fire, little or no combustible contents should contribute to the spread of the fire.

All fire protection systems must be maintained in service in seasonal and vacant buildings unless otherwise approved by the AHJ, the Hanford Fire Marshal. With the approval of the AHJ, fire protection and fire alarm systems in these buildings may be removed from service; see NFPA 1-2021, Section 10.12.2.1. All fire protection systems, including fire alarm, sprinkler, and standpipe systems, and all associated waterflow and supervisory alarm systems must be maintained in a manner acceptable to the AHJ. The maintenance of the associated alarm systems and supervisory systems is important to ensure that they are monitored properly and have the ability to transmit alarms when needed. DOE experience has demonstrated that once fire systems inspection, testing, and maintenance is curtailed, these systems rapidly deteriorate. As a result, merely shutting off a system so that it may be reactivated at some later date is not usually a viable option. Instead, as stated in NFPA 241, fire systems (both passive and active) should be maintained in service as long as possible into the demolition process and only removed when all feasible combustible loads have been removed. Until that time:

- Continue with the operation, supervision, and maintenance programs (per CPCC-PRO-FP-40425).
- Lock all fire protection control valves in position for operation and conduct regular inspections.
- Convert sprinkler systems to dry-pipe systems if building heat is not provided or convert to non-freeze systems for small, unheated areas.
- Manage automatic sprinkler impairments using a formal impairment program (per CPCC-PRO-FP-40426).

- If it is impractical to heat the building, arrange the automatic sprinkler system for cold weather operation in accordance to appropriate codes/standards. Do not drain the system and do not put it out of service.
- Ensure fire protection control valves, fire department connections and hydrants (public or private) are cleared of any vegetation and other unnecessary combustibles or obstructions.
- Remove or minimize combustible storage and maintain good housekeeping in and around the building(s) (e.g., maintain cleanliness, no trash/rubbish, no unnecessary storage, etc.).
- Prevent hot work operations (e.g., welding, cutting, grinding, soldering, brazing, etc.). If hot work is needed, substitute hot work with other safer methods or use a formal hot work permit system.
- Inform the fire department of the facility's idle or vacant situation and provide access, when necessary.
- Eliminate fire hazards within buildings by removing as many combustibles as possible.
- Remove any debris or other combustible items within 25 feet of any building.
- Cut vegetation short, ideally three inches or less or remove to establish at least a 35 feet clear space to wildland areas.
- Keep brush and weeds cleared from around buildings, yard transformers, and other outside service equipment.
- Remove all waste material such as idle pallets, empty cardboard cartons, or any trash.
- Turn off electrical equipment.
- Secure any utilities that are not going to be kept in service.
- Drain flammable/combustible liquid tanks and make sure they are secured by removing them or filling them with sand or concrete.
- Shut off unnecessary plumbing lines if they are exposed to extreme cold weather conditions.
- Where vital areas must remain in service (e.g., utility rooms or exhaust fan areas) and involve liquids:
    - Winterize plumbing, heating and water systems.
    - Wrap outside pipes.
    - Maintain minimum heat of at least 55 degrees to protect water lines from freezing and 85 degrees cooling to prevent humidity and mold proliferation.
    - Turn the faucets off and make sure that the flush valves stop flowing water.
    - Monitor the work of any employee or outside contractors during machinery and equipment removal.
- Post idle building as "Vacant – Entry By Authorized Personnel, Only. Contact: _____."
- Notify the Fire Department of the change of condition, invite them for a site visit to update Pre-Fire Plans.

- Update the current FHA or FFPA as applicable to reflect the idle status and following DOE STD 1066-2016 guidance for “Transitional Facilities.”

Vacant buildings of totally fire-resistant construction that are void of any combustible contents and that pose no hazard to exposures might be exempt from maintaining fire alarm, sprinkler, and standpipe systems where approved by the AHJ. The AHJ may also require other systems or components pertaining to fire protection to also be maintained. This might include fire doors, fire barriers, and other passive or active systems.

Finally, the AHJ has the authority to require an inspection and test of any fire protection system or fire alarm system that has been out of service for 30 days or more before being restored to service. Whenever a fire protection system is shut off for an extended period of time, an inspection and test of the system for system integrity are necessary before the system is put back in service. When any system is out of service, the potential exists for damage or vandalism that might not be detected until the system is tested.

This information is intended to be applied with engineering judgement, but should provide a more consistent approach to the ongoing development and revision to FHAs at Hanford.

6.0 EXPLOSIVES

CPCC-STD-FP-54136, *Control of Explosives,* identifies requirements for the safe handling and storage of explosives used at CPCCo facilities, in accordance with NFPA standards and Hanford Site direction.

7.0 FIRE ANALYSIS

7.1 Facility Fire Hazard Analysis

FHAs are completed for:

- Significant new facilities
  - New facilities that have a combined building and content replacement value of $29,500,000 or more [DOE O 420.1C, Chg. 3, Implementation Direction]
  - A new, moderate hazard non-nuclear facility
  - New high hazard nuclear facility
- Existing and new nuclear facilities
- Other facilities as defined in DOE O 420.1C, Chg. 3

CPCC-PRO-FP-40420, *Fire Protection Analysis,* covers the criteria for the development, format, and content of FHAs, as well as their interface with DSAs.

7.2 Facility Fire Protection Assessments

FFPAs are completed:

- Annually for facilities valued in excess of $118,000,000 or in high hazard non-nuclear facilities. [Implementation Direction]
- Once every 3 years for facilities valued:
  - Between $5,900,000 and $118,000,000 [Implementation Direction]
  - Moderate hazard non-nuclear facilities
  - Category 2 and 3 nuclear facilities
- Once every 5 years for facilities valued between $1,200,000 and $5,900,000. [Implementation Direction]

CPCC-PRO-FP-40420, *Fire Protection Analysis,* provides direction for the development, format, and content of FHAs for CPCCo facilities.

7.3 Exemptions and Equivalencies

Equivalency or exemption requests are developed by CPCCo for facilities or conditions in which compliance with prescriptive provisions of codes and standards is not feasible or poses additional safety hazards. Equivalencies and exemptions must present alternative methods or compensatory measure to meet the intent of these prescriptive codes or standards. Once reviewed and approved by the appropriate DOE authority, conditions of approval must be tracked and implemented by the facility.

See CPCC-PRO-FP-40424, *Equivalencies, Exemptions, and Interpretation/Clarification Requests (ICRs).*

7.4 Fire Protection Program Assessments

Fire Protection Program Assessments are performed once every 3 years covering the effectiveness of implementation of DOE Fire Protection Program through CPCCo facilities. Fire Protection Program Assessments are performed in accordance with CPCC-PRO-FP-40420, *Fire Protection Analysis*.

7.5 Interpretations/Clarification Requests

ICRs are prepared by the cognizant FPE on behalf of the facility to clarify the intent of a particular code or standard. It is not intended to be a substitute for the equivalency or exemption process where relief may be sought from a prescriptive provision identified within that code.

ICRs are performed in accordance with CPCC-PRO-FP-40424, *Equivalencies, Exemptions, and Interpretation/Clarification Requests (ICRs)*.

7.6 Pre-Incident Plans

CPCCo Project Manager/FM/BM, DA/SE, and/or cognizant FPE provides assistance to the HFD in the development of pre-incident plans. Completed plans should be evaluated during the development of FHAs and FFPAs.

7.7 Ignitable and Reactive Waste Inspections

Ignitable and reactive waste inspections are performed by the responsible facility on an annual basis, with assistance provided by the cognizant FPE, in accordance with CPCC-PRO-EP-52900, *Performing Inspections of Storage Areas for Ignitable or Reactive Waste.* Further information is provided in CPCC-PRO-FP-40420, *Fire Protection Analysis*.

7.8 Annual Fire Protection Program Summary

CPCCo Fire Protection Engineering submits an annual fire protection summary report to DOE by February 15 of the following year. This input consists of CPCCo Fire Protection Engineering Costs as outlined in CPCC-PRO-FP-40420, *Fire Protection Analysis*. CPCCo Fire Protection Engineering also provides Annual Fire Protection Summary Information to DOE by April 30 of the following year for DOE to input into the Fire Protection Data Base. See DOE O 231.1B, Admin. Chg. 1 – 2011, *Environment, Safety, and Health Reporting,* Attachment 3, for details on the information and reporting process.

Damage potential in terms of fire loss is defined as the dollar cost of restoring damaged property to its pre-fire condition.

7.9 Miscellaneous Analysis

Miscellaneous analyses are performed in accordance with CPCC-PRO-FP-40420, *Fire Protection Analysis,* 2.6, or CPCC-STD-EN-40259, *Engineering Calculations*.

8.0 DOCUMENTS DERIVED FROM THIS STANDARD

Other fire protection-related documents prepared by CPCCo are consistent with the requirements of this standard. In cases where this standard provides sufficiently detailed information and direction, procedures and instructions may incorporate such information by reference to this standard.

CPCCo FP procedures are controlled and distributed under the Hanford Site Document Control Program.

CPCCo FHAs and derivatives of FHAs, FSAs, self-assessments, and calculations are controlled and distributed through Hanford Site Design Document Control (SDDC).

9.0 MAINTENANCE OF THIS STANDARD

The CPCCo FPPM is responsible for the maintenance of this standard. This standard is reviewed for required significant upgrades and is reviewed and reissued for minor updates on aa periodic basis. Changes to CPCCo FPP criteria and this standard are made in accordance with established site infrastructure process.

10.0 FORMS

The following forms are not generated by this standard but may be obtained and reviewed as needed for meeting program needs:

A-6001-431, *Hanford Site Fire Surveillance Log*
A-6002-692, *Construction/Demolition Fire Safety Inspection Checklist*
A-6003-347, *Facility Fire Protection Assessment - Long Format*
A-6003-348, *Facility Fire Protection Assessment – Short Format*
A-6003-681, *Nonemergency Hydrant Tie-in Permit*
A-6004-797, *CPCCo Engineering Review Checklist*
A-6004-835, *Review Comment Record (RCR)*
A-6005-334, *Ignitable/Reactive Waste Fire Inspection*
A-6006-115, *Field Hot Work Permit*

11.0 RECORD IDENTIFICATION

None

12.0 SOURCES

12.1 Requirements

1. DOE O 420.1C, Chg. 3, *Facility Safety*
2. DOE O 420.1C, Chg.3, *Facility Safety, Implementation Direction*
3. DOE-STD-1066-2016, *Fire Protection*
4. NFPA 24, *Standard for the Installation of Private Fire Service Mains*
5. CPCC-PRO-EN-8336, *Design Verification*
6. HNF-36174, *Hanford Fire Protection Requirements*
7. CPCC-PRO-WKM-12115, *Work Management*
8. ASTM 1354, *Test Method for Heat Release and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*
9. NFPA 241, *Standard for Safeguarding Construction, Alteration and Demolition Operations*
10. NFPA 101, *Life Safety Code*
11. NFPA 1, *Fire Code*
12. NFPA 253, *Standard Method of Test for Critical Radiant Flux of Floor Covering Systems* (ASTM-648)
13. NFPA 801, *Standard for Fire Protection for Facilities Handling Radioactive Materials*
14. NFPA 13, *Standard for the Installation of Sprinkler Systems*
15. NFPA 30, *Flammable and Combustible Liquids Code*
16. Hanford Fire Marshal Advisory Bulletin AB06-001, *BBQ Use and Safety*

17. NFPA 51, *Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting and Allied Processes*
18. NFPA 51B, *Standard for Fire Prevention during Welding, Cutting and Other Hot work*
19. NFPA 10, *Standard for Portable Fire Extinguishers*
20. ASTM-E84 (current), *Standard Test Method for Surface Burning*
21. DOE G 420.1-3, *Implementation Guide for Fire Protection and Emergency Services Programs*
22. NFPA 90B, *Standard for the Installation of Warm Air Heating and Air-Conditioning Systems*
23. HMIS-PRO-SEC-417, *Controlling Prohibited and Controlled Articles*
24. NFPA 701, *Standard Methods of Fire Tests for Flame Propagation of Textiles and Films*
25. WAC-173-303-395, *Dangerous Waste Regulations,* "Other general requirements"
26. NFPA 80, *Standard for Fire Doors and Other Opening Protectives*
27. NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*
28. CPCC-PRO-MN-472, *Cold Weather Protection*
29. NFPA 17, *Standard for Dry Chemical Extinguishing Systems*
30. NFPA 72, *National Fire Alarm and Signaling Code*
31. NFPA 25, *Standard for the Inspection, Testing and Maintenance of Water Based Fire Protection Systems*
32. NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response*
33. NFPA 45, *Standard on Fire Protection for Laboratories Using Chemicals*
34. DOE O 231.1B, Admin. Chg.1 (property loss evaluation), *Environment, Safety and Health Reporting*
35. DOE-STD-1189, *Integration of Safety into the Design Process*
36. NFPA 101A, *Alternate Approaches to Life Safety*
37. NFPA 27, *Spray Application of Ignitable and Combustible Materials*
38. NFPA 400, *Hazardous Materials Code*
39. NFPA 58, *Liquefied Petroleum Gas Code*

12.2 References

10 CFR 830, *Nuclear Safety Management*

10 CFR 851, *Worker Safety and Health Program*

100K-PRO-FP-50757, *Fire Protection Program*

29 CFR 1910, *Occupational Safety and Health Standards*

29 CFR 1926, *Safety and Health Regulations for Construction*

29 CFR 1010.107, *Spray Finishing using Flammable and Combustible Materials*

Central Plateau Cleanup Contract – 89303320DEM000030

CPCC-GD-FP-54132, *Fire Prevention Self-Inspections*

CPCC-POL-FP-40402, *Fire Protection Program Policy*

CPCC-PRO-EN-16331, *System Engineer Program*

CPCC-PRO-EP-52900, *Performing Inspections of Storage Areas for Ignitable or Reactive Waste*

CPCC-PRO-FP-40420, *Fire Protection Analyses*

CPCC-PRO-FP-40421, *Hot Work*

CPCC-PRO-FP-40422, *Hanford Fire Marshal Permit Interfaces*

CPCC-PRO-FP-40424, *Equivalencies, Exemptions, and Interpretation/Clarification Requests (ICRs)*

CPCC-PRO-FP-40425, *Fire Protection System Inspection, Testing and Maintenance*

CPCC-PRO-FP-40426, *Fire Protection System Discrepancies*

CPCC-PRO-FP-54129, *Portable Fire Extinguishers*

CPCC-PRO-FP-54130, *Life Safety Features and Emergency Lighting*

CPCC-PRO-FP-54131, *Fueled Equipment and Heat-Producing Appliances*

CPCC-PRO-FP-54134, *Fire Protection in D4 Facilities and Facilities Under Construction*

CPCC-PRO-IRM-10588, *Records Management Processes*

CPCC-PRO-QA-052, *Issues Management*

CPCC-STD-EN-40259, *Engineering Calculations*

CPCC-STD-FP-54128, *Fire Protection System Design*

CPCC-STD-FP-54133, *Control of Combustible Materials*

CPCC-STD-FP-54135, *Control of Compressed and Flammable Gases*

CPCC-STD-FP-54136, *Control of Explosives*

CPCC-STD-FP-54137, *Control of Flammable and Combustible Liquids*

HFD-PRO-PPP-60658, *Deputy Fire Marshal Qualifications*
HMIS-RD-FP-8589, *Hanford Fire Marshal Permits*

HMIS-RD-FP-9717, *Fire Protection for Construction/Occupancy/ Demolition Activities*

HNF-51041, Rev. 0, *Administrative Interface Agreement for Fire Protection Flow-Down of Roles, Responsibilities, Authorities and Enforcement between CH2MHill Plateau Remediation Company, Washington Closure Hanford and Mission Support Alliance, LLC.*

HNF-52336, *Authority, Responsibilities and Duties of the Hanford Fire Marshal*

12.3 Bases

CPCC-PRO-WKM-079, *Job Hazard Analysis*
DOE O 440.1A, *Worker Protection Management*
HMIS-PRO-FPROP-2827, *Facility & Mobile Office Number Management*
HMIS-RD-FM-10361, *Controlling Cross Connections*

Appendix A - Generic Fire Protection 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 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 standard to preclude the building establishing any Compensatory Measures as dictated by the building documents.

Containment Enclosure. A containment structure utilized for the control of radiological hazards and asbestos abatement activities.

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 maximum allowable quantity (MAQ).

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 hour and having all communicating openings properly protected by an assembly having a fire resistance of at least 1 hour.

Fire Barrier. A continuous membrane either a wall, ceiling, roof, or floor assembly, 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 walkdowns of areas affected by an impairment to the installed fire protection systems in order to verify safe configuration and detect any stage fires.

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.

Appendix A (Cont.) – Generic Fire Protection Glossary

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% 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%, regardless of the lower limit.

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, non-radiological, and mixed materials that are toxic, explosive, flammable, corrosive, or otherwise physically or biologically health threatening.

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.

Maximum Allowable Quantity. The quantity of hazardous material permitted in a control area.

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.

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, and 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.

Appendix B - Generic Fire Protection 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
CPCCo	Central Plateau Cleanup Company
D4	Deactivation, Decontamination, Decommissioning and Demolition
DFM	Deputy Fire Marshal
DNFSB	Defense Nuclear Facilities Safety Board
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
D&D	Decontamination and Decommissioning
FDC	Fire Department Connection
FFPA	Facility Fire Protection Assessment
FHA	Fire Hazards Analysis
FM	Factory Mutual
FMAB	Fire Marshal Advisory Bulletin
FPE	Fire Protection Engineer
FPP	Fire Protection Program
FPPM	Fire Protection Program Manager
FPR	Fire Protection Rating
FSM	Fire Systems Maintenance
FSO	Fire Safety Officer
HFD	Hanford Fire Department
HFM	Hanford Fire Marshal
HFMO	Hanford Fire Marshal Office
HMIS	Hanford Mission Integration Solutions, LLC
IBC	International Building Code
iCAS	Integrated Contractor Assurance System
IFC	International Fire Code
ITM	Inspection Testing and Maintenance
MAR	Material at Risk
MAQ	Maximum Allowable Quantity
MCFL	Maximum Credible Fire Loss
MOI	Maximum Offsite Individual
MPFL	Maximum Possible Fire Loss
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

Appendix B (Cont.) – Generic Fire Protection Acronyms

RFAR	Radio Fire Alarm Reporter
RMA	Radiological Material Area
RWP	Radiological Work Permit
SCO	Surface Contaminated Object
SDD	Service Delivery Document
SME	Subject Matter Expert
SMP	Safety Management Program
UL	Underwriters Laboratory

Appendix C - Implementation Direction

The following items are brief explanations, including some quotes or paraphrases, regarding the Implementation Direction to DOE O 420.1C, Chg. 3. The items selected are considered highlights. The Implementation Direction document itself should be consulted whenever the Order (DOE O 420.1C, Chg. 3, Attachment II, Chapter 2. *Fire Protection*) is used to ensure that differences between the documents are identified and the Implementation Direction is given priority.

From the “Purpose” section of the Implementation Direction:

“The purpose of this guidance is to provide implementation direction to various requirements listed in DOE O 420.1C, Change 3. This direction expands upon the requirements stated in the Order and reflects how Hanford implements these requirements in day-to-day operations.”

Although the word “guidance” is used in the statement above, CPCCo is contractually-obligated obligated to comply with the provisions of the Implementation Direction. The Implementation Direction also touches on engineering and design issues which might not typically be considered “day-to-day operations” such as which codes to apply to a facility.

Section 1) Building Code Application

States that the International Building Code (IBC) take precedence over NFPA 5000, *Building Construction and Safety Code,* and that the International Fire Code (IFC) is only used by DOE for ignitable/reactive wastes, otherwise NFPA 1, Fire Code, takes precedence.

Section 2) DOE-STD-1066-2016 Clarifications

This section states that DOE-STD-1066-2016 is to be applied with a graded approach and in conflicts between the Implementation Direction and DOE-STD-1066-2016, the Implementation Direction shall be followed.

Section 3) Water Supply

This section contains requirements for minimum water supply main diameter (12 in.), sectional valves, control valves, hydrants, fire flows, and looped underground fire protection water distribution systems.

Section 4) FPE Qualifications and Staffing

Qualifications from this section are incorporated into CPCCo procedures, specifically CPCC-PRO-FP-40404, *Fire Protection Program*.

Section 5) AHJ Clarification

The DOE AHJ is the decision-making authority in matters concerning fire protection, however, for most purposes, the Hanford Fire Marshal acts as the AHJ as this authority has been delegated from DOE to the Hanford Fire Marshal.

Appendix C (Cont.) – Implementation Direction

Section 6) Baseline Needs Assessments (BNAs)

CPCCo does not have an active role in Hanford Fire Department processes and does not review or revise BNAs.

Section 7) FHA Clarifications

Of note:

The dollar threshold for developing FHAs for significant new facilities is decreased from $117 million to $29.5 million.

“The FHA must 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 for the facility to meet the objectives. The FHA must … show the thought process and assumptions required for arriving at the conclusion”.

Assume a fire can happen if combustibles are present.

Combustible analysis will likely need to be modeled as average combustible loading as a means to characterize fire severity is not to be used.

Section 8) Assessments

This section is referring to facility assessments CPCCo conducts within FHAs and FFPAs. Facility values cited are already incorporated into CPCC-STD-FP-40420, *Fire Protection Analyses*.

Section 9) Safety System Assessments

Not specific to fire protection. Centered on the System Engineering program.

Section 10) Terminology

In total, this section states: “The term “site-wide Fire Protection Program” in DOE-STD-1066-2016 is clarified as “Contractor’s Fire Protection Program.”

Section 11) Fire Alarm Design

In total, this section states: “New projects and facility design, construction and modifications involving fire alarms systems, fire suppression, or water supplies shall be in accordance with the latest revision of HNF-36174, *Hanford Fire Protection Design Requirements*”.

Section 12) MPFL Value Determination Guidance

Use DOE O 231.1B, Environment, Safety and Health Reporting, and the Annual Fire Protection Summary Information Reporting Guide provided by the DOE. If relevant information is not available or other sources are used, document them in the MPFL evaluation after discussing with DOE.

Appendix C (Cont.) – Implementation Direction

Section 13) Permits

There is no information in this section, which is contrary to, or expanding on, the manner in which permits are currently required and issued at Hanford.

Section 14) IT&M Frequencies

This section states to use NFPA frequencies as modified by any DOE-approved equivalencies/exemptions.

Section 15) The Hanford Fire Protection Forum (HFPF)

The HFPF determines the duties of the HFM, updates the HFM charter every three years, reviews all changes to site-wide fire system IT&M requirements and site-specific fire protection design requirements. CPCCo is expected to provide fire protection representation at HFPF meetings.

Section 16) Fire Protection System Deactivations

This information is covered and expanded upon in in CPCC-PRO-FP-54134, *Fire Protection in D4 Facilities and Facilities Under Construction*.

Section 17) Unoccupied to Occupied Status

Discusses where to find and how to apply the definitions of “occupied” and “unoccupied”. CPCC-PRO-FP-54134 should also be consulted for this process.

Section 18) Hanford Fire Marshal

A list of duties and responsibilities of the Hanford Fire Marshal. Refer to the Implementation Direction for details.

Appendix D - Fire Prevention Elements

The following elements should be maintained and updated as part of the ongoing FPP:

- The facility should implement a written fire prevention plan and fire evacuation plan (either through direct reference to the CPCCo FPP or in project-specific procedures). Stopping unwanted fires from occurring is the most efficient way to handle them. The written plan should be available for employee review and orientation.
- Housekeeping procedures for storage and cleanup of flammable materials and flammable waste should be included in the plan. Recycling of flammable waste such as paper is encouraged; however, handling and packaging procedures should be included in the plan.
- Procedures for controlling workplace ignition sources such as smoking, welding, and burning should be addressed in the plan. Heat-producing equipment such as burners, heat exchangers, boilers, ovens, stoves, fryers, etc., should be properly maintained and kept clean of accumulations of flammable residues; flammables are not to be stored close to these pieces of equipment.
- All employees are to be apprised of the potential fire hazards of their job and the procedures called for in the employer's fire prevention plan. The plan should be reviewed with all new employees when they begin their job and with all employees when the plan is changed.

Fire prevention, at its most basic, is based upon the principle of keeping fuel sources and ignition sources separate.

Three elements must be present at the same time to produce fire:

1. Enough Oxygen to sustain combustion
2. Enough Heat to reach ignition temperature
3. Some Fuel or combustible material

Together, they produce the chemical reaction that is fire. Take away any of these elements and the fire will be extinguished.

The **fire triangle** is a simple model, from the science of firefighting, for understanding the ingredients necessary for most fires. (It has largely been replaced in the industry by the **fire tetrahedron**, which provides a more complete model.) The triangle illustrates the rule that in order to ignite and burn, a fire requires the three elements—heat, fuel, and oxygen. The fire is prevented or extinguished by “removing” anyone of them. A fire naturally occurs when the elements are combined in the right mixture (e.g., more heat needed for igniting some fuels, unless there is concentrated oxygen).

Appendix D (Cont.) – Fire Prevention Elements

Fire Triangle

When a fire runs out of ***fuel***, it will stop. Fuel can be removed naturally, as where the fire has consumed all the burnable fuel, or manually by mechanically or chemically removing the fuel from the fire. Fuel separation is an important factor in wildland fire suppression and is the basis for most major tactics. For example, in forest fires, burning logs are separated and placed into safe areas where there is no other fuel. Other fuels may also be chemically altered to prevent them from burning at ordinary temperatures, perhaps as part of a fire-prevention measure.

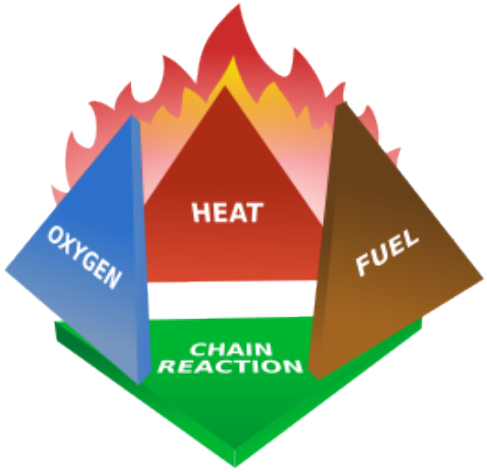
Without sufficient ***heat***, a fire cannot begin, and it cannot continue. Heat can be removed by dousing some types of fire with water; the water turns to steam, taking the heat with it. Note that water will actually increase or spread some other types of fires. Separating burning fuels from each other can also be an effective way to reduce the heat. Scraping embers from a burning structure also removes the heat source. Turning off the electricity in an electrical fire removes the heat source, although other fuels may have caught fire and continue burning until the firefighter addresses them (and their fire triangles too).

Oxygen may be removed from a fire by smothering it with an aqueous foam, or some inert gas (e.g., carbon dioxide, nitrogen), dry chemicals, or enclosing it where the fire will quickly use up all of the available oxygen. A candle snuffer uses this principle. Oxygen for the fire may also be instantaneously consumed, if only for a moment, by more “sophisticated” means such as using explosives to “snuff” an oil well gas fire. Once the gas fire is out, it is not hot enough to start again, but workers must be extremely careful not to create sparks.

The fire tetrahedron. The fire triangle is a useful teaching tool but fails to identify the fourth essential element of fire – the sustaining chemical reaction. This has led to development of the **fire tetrahedron**: a triangular pyramid having four sides (including the bottom). In most fires, it does not matter which element gets removed; the fire fails to ignite, or it goes out. However, there are certain chemical fires where knowing only the “fire triangle” is not good enough.

Appendix D (Cont.) – Fire Prevention Elements

Fire Tetrahedron



Combustion is the chemical reaction that feeds a fire more heat and allows it to continue. With most types of fires, the old fire triangle model works well enough, but when the fire involves burning **metals** (known as a Class-D fire, involving metals like lithium, magnesium, etc.), it becomes useful to consider the chemistry of combustion. Putting water on such a fire could result in the fire getting hotter (or even exploding) because such metals can react with water in an exothermic reaction to produce flammable hydrogen gas. Therefore, other specialized chemicals must typically be used to break the chain reaction of metallic combustion and stop the fire.

Class-A fires. Class-A fires are the most common type of fire that occurs when a material (such as wood) becomes sufficiently hot enough, and has oxygen available to it, causing combustion. At this point, the material bursts into flame and will continue burning as long as the fire triangle—heat, fuel, and oxygen—continues to be available to it. Class-A fires are used all around buildings and elsewhere in controlled circumstances, such as a campfire. A campfire has a fire triangle - the heat is provided by another fire (such as a match or lighter), the fuel is the wood, and the oxygen is naturally available in the open-air environment of a forest. This fire is not dangerous because the fire is contained to the wood alone and is usually isolated from the ground by rocks. However, when a Class-A fire burns in an environment where fuel and oxygen are in accessible positions, the fire can quickly grow out of control – this is the case where firefighting and fire control techniques are required.

Class-A fires are the most commonly encountered fires, and as such most fire departments have equipment to handle them specifically. Class-A fires are fairly simple to fight and contain – by simply removing the heat or oxygen (or in some cases fuel), the fire triangle collapses, and the fire dies out. The most common way to do this is by removing the heat by spraying the fire with water. Other means of control or containment would be to "smother" the fire with carbon dioxide or nitrogen from a fire extinguisher, cutting off its oxygen and causing the fire to die. While this is acceptable for most ordinary conditions, most firefighters find themselves having to call for special equipment such as foam in the case of other fires.

Appendix D (Cont.) – Fire Prevention Elements

Class-B fires. Class-B fires are combustible fuels, hydrocarbons, or solvents on fire. These fires follow the same basic fire triangle—heat, fuel, and oxygen—as Class-A fires, except that the fuel in question is a hydrocarbon or solvent. This changes the strategy that must be used when fighting them considerably. If the fuel is a lighter-than-water liquid such as oil or gasoline, as is the case with many Class-B fires, water that would ordinarily be used for fighting a Class-A fire would end up spreading the fire, as the on-fire hydrocarbon would float on top of the water and continue burning. Specialized methods not usually available to regular fire departments are required to contain and put out this kind of fire.

One method would be dropping or spraying a chemical retardant, such as *slurry*, onto the fire. This is usually done by plane, and the pumps required to handle a chemical retardant would not often be available to ground fire crews – this makes its use against Class-B fires limited. A carbon dioxide fire extinguisher may be used on small Class-B fires, though some fire extinguishers are not designed to fight against all classes of fire. The most common method for fighting Class-B fires would be to use a type of protein-based foam to cut off the fire's oxygen and cool the hydrocarbon/solvent. This can be fired from any pumper, even ones that were designed to hold only water, meaning that it does not require any specialized equipment. However, most fire departments do not have direct access to foam and require for it to be transported to them – this can delay firefighters severely and make fighting Class-B fires a logistical problem.

Class-C fires. Class-C fires are electrical fires, where the heat side of the fire triangle is caused by, for example, short-circuiting machinery or overloaded electrical outlets. These fires can be a severe hazard to firefighters using water—when the solid stream of water hits the electrical fire, the electricity is conducted through it and into the hose, then into the firefighter's body—electrical shocks have caused many firefighter deaths.

There are two main ways of fighting a Class-C fire: cutting off its oxygen or simply turning off the electricity to the fire from a breaker. A Class-C fire could be put out with a fire extinguisher rated for Class-C fires, or with protein foam, but the primary approach would be to simply turn off the power. This would cause the fire to become an ordinary Class-A fire, or perhaps die out entirely.

Class-D fires. Class-D fires are metal fires. Certain metals, such as sodium, titanium, magnesium, potassium, uranium, lithium, plutonium, calcium, and others are flammable. Magnesium fires and titanium are common. When one of these combustible metals ignites, it can easily and rapidly spread to surrounding Class-A materials. Generally, masses of combustible metals do not represent unusual fire risks because they have the ability to conduct heat away from hot spots so efficiently that the heat of combustion cannot be maintained; this means that it will require an extreme amount of heat to actually set the material on fire. Generally, metal fire risks exist when sawdust, machine shavings, and other metal fines are present.

Appendix D (Cont.) – Fire Prevention Elements

Water and other common firefighting materials can excite metal fires and make them worse. A special extinguishing agent is needed. This extinguishing agent is usually made up of *dry powder* firefighting materials, such as powdered copper (copper powder has a very high thermal coefficient, making powdered copper the most usual type of Class-D extinguishing agents). Dry powder extinguishing agents eliminate Class-D fires by removing heat and by smothering the enflamed metal.

It should be noted that some extinguishers use *dry chemical* extinguishing agents. This is easily confusable with *dry powder*. They are quite different, and using one of these extinguishers in error in place of dry powder can actually increase the size of a Class-D fire, much like water.

Class-D fires represent a unique hazard because of their rareness and extremely high temperature (a high temperature is required to set the materials on fire). Even a small Class-D fire can spread Class-A fires to the surrounding combustible materials extremely easily. Most fire stations do not have Class-D extinguishing agents available to them, making fighting these fires a logistical problem, much like foam; however, most places where these materials are found, there is a hopper filled with the proper extinguishing agent.

Class-K fires. Class-K fires are fires that involve cooking oils.