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Fire Protection Program Criteria and Review Approach Document		
Authorization and Approval	Sarah C. Rich Acting Director, Office of Nuclear Safety and Environmental Assessments EA-31 Date: June 17, 2020	Lead, Rosemary B. Reeves Nuclear Engineer EA-31 Date: June 17, 2020

1.0 PURPOSE

The mission of the U.S. Department of Energy (DOE) Office of Environment, Safety and Health Assessments (EA-30) is to assess the effectiveness of safety and emergency management systems and practices used by line and contractor organizations and to provide clear, concise, rigorous, and independent evaluation reports of performance in protecting workers, the public, and the environment from the hazards associated with DOE activities.

In addition to the general independent oversight requirements and responsibilities specified in DOE Order 227.1A, *Independent Oversight Program*, this criteria and review approach document (CRAD), in part, fulfills the responsibility assigned to EA in DOE Order 226.1B, *Implementation of Department of Energy Oversight Policy*, to conduct independent oversight and appraisals of high consequence activities. This CRAD specifically relates to assessments of fire protection programs under DOE Order 420.1C, *Facility Safety*, Attachment 2, Chapter II, "Fire Protection," which establishes comprehensive fire protection program requirements for DOE, including the National Nuclear Security Administration, facilities and emergency response organizations.

The CRADs are available to DOE line and contractor assessment personnel to aid them in developing effective DOE oversight, contractor self-assessment, and corrective action processes. The current revision of EA's CRADs are available at http://www.energy.gov/ea/criteria-and-review-approach-documents.

This CRAD supersedes EA CRAD 31-12, revision 1.

2.0 APPLICABILITY

The following CRAD is approved for use by the Office of Nuclear Safety and Environmental Assessments (EA-31) at DOE Hazard Category 1, 2, and 3 facilities.

3.0 FEEDBACK

Comments and suggestions for improvements on this CRAD can be directed to the Director, Office of Environment, Safety and Health Assessments.

4.0 CRITERIA AND REVIEW APPROACH

The review of contractor fire protection programs (FPP) will evaluate the implementation and effectiveness of fire protection programs and processes; preplanning for fire emergency response; wildland fire management; the integration of the fire hazards analysis (FHA) with the Documented Safety Analysis (DSA); design and implementation of engineered design features for fire protection; Technical Safety Requirements (TSR) surveillances; inspection, testing, and maintenance of fire protection systems; and contractor self-assessments of the program. The review will also evaluate the effectiveness of any alternate approach for implementing DOE Order 420.1C, Attachment 2, Chapter II, as provided in DOE-STD-1066-2016, *Fire Protection*. The review may include an evaluation of DOE Field Element oversight of fire protection at DOE hazard category 1, 2 or 3 nuclear facilities in accordance with DOE Order 226.1B and DOE Order 420.1C.

This fire protection CRAD is separated into the following major assessment areas:

4.1 Fire Protection Program
4.2 Fire Hazard Analysis and Documented Safety Analysis Integration
4.3 Fire Prevention and Protection SSCs and Design Requirements
4.4 TSR Surveillance Requirements, Inspection, Testing, and Maintenance
4.5 Contractor Self-Assessment
4.6 DOE Field Element Oversight

These functional areas are designed as stand-alone sections to be used in any combination, based on the needs of the specific site or the assessment objectives. Section 4.1, Fire Protection Program (FPP) identifies the elements necessary for a complete FPP and is intended to serve as a basis for an assessment of the program. Section 4.2 thru 4.5 are used for assessing various aspects of the implementation of the FPP. Section 4.6 is used when assessing the effectiveness of oversight of the fire protection program and related systems and equipment conducted by the DOE field element for the site or selected facility.

Note: Throughout this CRAD, the revision year of referenced NFPA codes and standards has been omitted. It is up to the reviewer to verify the applicable codes and standards of record for the facility

being assessed at the time of the review, as applicable to the site contractor within the context of the specific contractual agreement(s) for each DOE site and facility.

OBJECTIVES

4.1 Fire Protection Program

FP.1: Site contractor line management has established and implemented a comprehensive FPP in DOE facilities and emergency response organizations to ensure the effectiveness of all fire protection activities. (10 CFR Part 830; 10 CFR Part 851; DOE O 420.1C, Attachment 2, Chapter II, *Fire Protection*)

Criteria:

1. Policy: The site contractor has an established Policy Statement that affirms the contractor's commitment to provide a comprehensive fire protection and emergency response program in accordance with applicable DOE directives and other related requirements. (DOE O 420.1C, Attachment 2, Chapter II)
   - Has the site contractor issued a policy statement or equivalent directive that articulates management expectations regarding fire safety and emergency services?
   - Do the existing contract(s) for operation of the site specify requirements for essential elements of a complete fire safety program?

2. Codes and Standards: The applicable building code and National Fire Protection Association (NFPA) codes and standards are identified in the fire protection and emergency response programs. (DOE O 420.1C, Attachment 2, Chapter II; applicable codes and standards from the site-specific contract)
   - Are the applicable codes and standards of record (e.g., DOE Orders and Standards, International Building Code (IBC), NFPA) identified for the site and/or specified facility?
   - Do the fire protection engineers and emergency management personnel exhibit an understanding of the codes and standards in effect, along with any exceptions or approved deviations?

3. FPP Programmatic Elements: A documented FPP exists as required by applicable safety criteria and includes the elements and requirements for design and operations, emergency response, fire analysis and assessments, wildland fire, and site-specific fire protection criteria. (10 CFR Part 830; 10 CFR Part 851; DOE O 420.1C, Attachment 2, Chapter II)
   - Does the fire protection program use DOE STD-1066-2016 as the basis for the program or an approved alternate approach?
   - Are all program elements identified in DOE O 420.1C and DOE STD-1066-2016 addressed and documented in the fire protection program?
   - Has a complete spectrum of fire prevention controls and procedures been developed and implemented?
   - Are the principles of "highly protected risk" or "improved risk" and fire safety "defense-in-depth" adequately applied across the site?
   - Is the technical baseline for fire protection systems specified and maintained?
   - Are fire modeling or other analytical tools used in the assessment of (fire) risk appropriate for the application and are they validated? Are the conclusions conservative?
   - Are process hazards adequately addressed and appropriately protected?
   - Are life safety systems and approaches in compliance with code requirements and comprehensively evaluated?

- If the role of fire protection authority having jurisdiction (AHJ) is delegated to the contractor, is the level of authority documented in the FPP?
- Verify through work observations and interviews that workers are familiar with FPP elements applicable to their work and that appropriate FPP elements are effectively incorporated into work planning and execution.

4. Fire Hazards Analyses (FHA): An FHA has been prepared for each nuclear facility and for facilities that represent unique fire safety risks. (DOE O 420.1C, Attachment 2, Chapter II, NFPA 801)
   - Does an FPE perform a review of the FHA on a regular basis but not less than every 3 years and revise as appropriate?
   - Does the FHA address all essential elements for a complete analysis of fire hazards as delineated in DOE O 420.1C and DOE-STD-1066, Appendix B.
   - Does the FHA list approved equivalencies and exemptions including the documented basis supporting each equivalency and exemption?
   - Are the equivalencies and exemptions reviewed during each FHA update to verify conditions have not changed and that the justifications remain valid?
   - Have FHAs been adequately revised to accommodate changes to the facility, processes (operations), occupancy, safety basis, or BNA; or when new fire safety risks are introduced?
   - Does the FHA specify adequate mitigation strategies for fire and related events, including isolation, segregation, or special fire control systems?
   - Does the FHA analyze the spread paths and impacts (radiological, toxic, or biological) where smoke or contamination spread may be a special concern for the safety of the workers?
   - Have external fire exposures been addressed with an evaluation of the potential for fire and smoke spread from one fire area to another, as well as an evaluation of external smoke or water damage to safety systems and equipment?

5. Building Fire Protection Assessments: Facility fire protection assessments are conducted annually for facilities with a replacement value in excess of that permitted by DOE Orders and Standards, facilities considered a high hazard, or those with vital programs; or at least every three years for low and ordinary hazard facilities; or at a frequency with appropriate justification approved by the DOE head of field element. (DOE O 420.1C, Attachment 2, Chapter II)
   - Are facility/building fire protection assessments conducted at the appropriate frequency for the recognized hazards within the facilities?
   - Are facility/building fire protection assessments performed under the supervision of a qualified FPE?
   - Do the assessments comprehensively address the topics identified in DOE-STD-1066?
   - Do the facility workers have an appropriate understanding of the building fire protection systems?

6. Baseline Needs Assessment: The site emergency response capabilities meet site needs as established in the baseline needs assessment (BNA), safety basis requirements, and applicable regulations, codes and standards. (DOE O 420.1C, Attachment 2, Chapter II; applicable codes and standards from the site-specific contract; site FPP description document; site emergency preparedness program)
   - Are roles and responsibilities, command and control, and communications protocols for site emergency services and the fire department (or fire brigade) defined, documented, and implemented?
   - Does the BNA specify minimum fire department staffing, apparatus, equipment and procedures?
   - Is the mobile apparatus inventory sufficient and adequately maintained for operability during anticipated site emergencies, with appropriate reserve capability?

- Are off-site emergency response obligations clearly defined in a "mutual aid" agreement that includes roles and responsibilities, command and control systems, and communications protocols? Are agreements periodically reaffirmed and updated?
- Is the BNA reviewed and updated as appropriate at least every three years or whenever a significant new hazard that is not covered by the current BNA is introduced?
- Is there documented evidence of training and exercises to verify mutual aid functionality and do the workers and emergency responders understand their roles and responsibilities?

7. Pre-Incident Plans: Pre-incident strategies, plans, and standard operating procedures have been established to enhance the effectiveness of emergency response activities. (DOE O 420.1C, Attachment 2, Chapter II)
   - Does the site or selected facility have a pre-incident plan for credible fire scenarios to manage fire emergencies effectively?
   - Do pre-incident plans identify external fire exposures and the evaluation of potential fire and smoke spread from one fire area to another within the selected facility?
   - Is the physical access and appropriate equipment for manual firefighting listed in pre-incident plans?
   - Do pre-incident plans include input from the fire protection engineering staff, facility subject matter experts, and emergency responders?
   - Are pre-incident plans and standard operating procedures that govern the use of firefighting water in moderator-controlled areas reviewed by the criticality safety staff?

8. Wildland Fire: Consistent with the *Federal Wildland Fire Management Policy*, the site contractor has an integrated site-wide wildland fire management plan that has been established and implemented in accordance with relevant portions of NFPA 1143, *Standards for Wildland Fire Management*. (DOE O 420.1C, Attachment 2, Chapter II)
   - Does the site wildland fire management plan address the appropriate elements identified in DOE-STD-1066-2016, *Fire Protection?*
   - Is the wildland fire management plan effectively implemented at the site?
   - Verify that the contractor responsible organization understands the site-specific wildland fire prevention and mitigation requirements consistent with NFPA 1143, *Standards for Wildland Fire Management*.

4.2 Fire Hazard Analysis and Documented Safety Analysis Integration

FP.2: The FHA has been coordinated with and integrated into the Documented Safety Analysis (DSA). Fire protection SSCs and features are available to meet the fire safety objectives identified in the DSA. (10 CFR Part 830; DOE O 420.1C, Attachment 2, Chapter II; NFPA 801)

Criteria:

1. Design Basis Documentation and FHA/DSA Integration: Key design documents, including design basis and supporting documents (calculations, hazard analyses, etc.) are established and integrated to support the development and implementation of the facility safety basis. (10 CFR Part 851; 10 CFR Part 830; DOE O 420.1C, Attachment 2, Chapter II; applicable NFPA codes and standards from the site-specific contract)
   - Do safety basis accident analyses clearly identify and describe the fire protection system's credited functional requirements and are they consistent with the FHA?
   - Within the scope of the review, are the FHA conclusions incorporated into the safety authorization basis (PSDR, PDSA, or DSA, as appropriate)?

- Do the FHA and DSA demonstrate the adequacy of controls provided by the system to eliminate, limit, or mitigate identified hazards, and define the process for maintaining the controls and controlling their use?
- Have structures, systems, and components (SSCs) credited in the safety basis for fire safety been identified as preventive and/or mitigative controls in the FHA?
- Are the fire protection functional and performance requirements and supporting analysis documented?
- Have controls (e.g., ventilation, containment, or drainage systems) necessary for mitigating contaminant spread or release been identified and credited appropriate to their safety level (safety class, safety significant or defense-in-depth) and functional requirements?
- Does the safety basis identify credible facility radiological, biological, and chemical hazards and are they consistent with the FHA?
- Does the DSA analyze the spread paths and impacts (radiological, toxic, or biological) where smoke or contamination spread may be a special concern for the safety of the workers and are they consistent with the FHA?
- Do the FHAs address all essential elements for a complete analysis of fire hazards as delineated in DOE O 420.1C and are they appropriately translated to the DSA?
- Have credible fire-related failure modes been considered within the DSA for safety equipment, including the potential for spurious signals and fire-induced electrical faults that may cause equipment to operate in an unintended manner or trip upstream electrical equipment, and are they consistent with the FHA?

2. Unreviewed Safety Question (USQ): An unreviewed safety question process has been established and is being appropriately implemented to control changes to fire protection safety systems. (10 CFR 830.203)
   - Have fire protection design changes been appropriately evaluated using the unreviewed safety question process?

3. Configuration Management: Configuration management programs and processes are adequate to ensure fire protection systems designated as safety systems continue to meet safety basis requirements and changes are properly controlled. (10 CFR 830.122; 10 CFR 830.203; DOE O 420.1C, Attachment 2, Chapter II)

4.3 Fire Prevention and Protection SSCs and Design Requirements

FP.3: Engineered design features and analyses are technically adequate and implement the requirements of DOE O 420.1C as documented in the DSA such that adequate protection of the public, the workers, and the environment from fires and other hazards is demonstrated. (10 CFR 830.122; DOE O 420.1C, Attachment 2, Chapter II, *Fire Protection*)

Criteria:

1. Design Requirements: Fire protection design requirements are documented and incorporated into plans and specifications, including protection thresholds that are consistent with the safety authorization basis and FHAs. (10 CFR Part 851; DOE O 420.1C, Attachment 2, Chapter II; site DSA; site and facility FHAs; applicable NFPA codes and standards from the site-specific contract)
   - Are fire protection design criteria for new construction and modifications to existing facilities based on either a fire protection design analysis or FHA?
   - Were fire protection design criteria developed under the direction of a qualified FPE?

- Were applicable regulations, DOE directives, and industry standards (such as applicable National Fire Protection Association codes and standards) incorporated into the design?
- Is NFPA 801, *Standard for Fire Protection for Facilities Handling Radiological Materials*, used as the design basis for hazard category 2 and 3 nuclear facilities in accordance with DOE-STD-1066?
- Are operation and system alignments consistent with fire protection design basis assumptions?
- Are hydraulically designed sprinkler systems designed for a supply pressure of at least 10 percent, but not less than 10 psi, below the water supply curve?
- For facilities that have radioactive materials and potential surface contamination, is there a fire water containment system, capable of collecting fire suppression water for a minimum of thirty minutes (or approved equivalency)?
- Are redundant water supplies (storage tanks and pumping systems) available when either a fire protection water supply is classified as SC, or when the maximum possible fire loss (MPFL) exceeds that permitted by DOE Orders and Standards in any site facility? (Refer to DOE O 420.1C and DOE STD-1066-2016, section 4.2.7)
- Are facilities adequately subdivided as required into separate fire areas so the MPFL for each fire area does not exceed that permitted by DOE Orders and Standards? If not, are multiple fire protection approaches, such as a fire suppression system and fire detection and alarm system used in such areas?
- Do new facility designs require automatic fire detection and an automatic means of notification of facility occupants and emergency responders in accordance with NFPA 72, *National Fire Alarm and Signaling Code*?
- Are fire protection safety controls susceptible to non-safety system failure interaction (two over one)?
- Are systems required to support operability of Safety Class and Safety Significant Fire Protection controls likewise classified?
- Are the interior finishes in Hazard Category 1, 2, and 3 facilities a minimum of Class A or evaluated in the FHA?
- Are process confinement systems constructed of non-combustible materials?
- Are electrical transformers that will be installed inside buildings of a dry type, with no combustible dielectric fluids?
- Does the design process include NFPA 780, *Standard for the Installation of Lightning Protection Systems*, for determining the need for and installation of lightning protection systems?

4. Engineering: Engineered SSCs and processes are designed using sound engineering/scientific principles and appropriate standards. (10 CFR 830.122, Criterion 6)
   - Have fire protection design bases and design assumptions identified in the safety analysis been appropriately translated into design calculations?
   - When a building is seismically designed, is sway bracing for seismic supports of sprinkler piping based on the site-specific acceleration criteria?
   - Do the bases for technical safety requirements (TSRs) for the fire protection system appropriately reflect facility configuration and required performance of safety functions, operational parameters, and key programmatic elements?
   - Are acceptance criteria for tested parameters supported by calculations or other engineering documents to ensure that fire protection design bases assumptions are met?

5. Design Verification and Validation: Verification and validation of the fire protection design is completed before approval and implementation of the design. (10 CFR 830.122, Criterion 6)
   - Have the completed designs been recorded in design output documents, such as drawings, specifications, test/inspection plans, maintenance requirements, and reports?

- Has the adequacy of the fire protection design been verified or validated by individuals or groups other than those who performed the work?

4.4 TSR Surveillance Requirements, Inspection, Testing and Maintenance

FP.4: Installation and operation of fire protection SSCs, implementation of the FPP controls and procedures, and TSR surveillances ensure the fire safety systems are operable as needed. (DOE O 420.1C)

FP.5: Surveillances, and other inspections, testing, and maintenance (ITM) activities are properly planned, scheduled, and performed to ensure that fire protection systems can reliably perform their intended safety functions when required. (DOE O 420.1C)

Criteria:

1. Installation and Operation: All fixed fire protection features (e.g., appropriate construction types, fire barriers, fire alarm and signaling systems, manual and automatic fire suppression systems), required by authorization basis documents and FHAs, have been installed, operated, and are inspected, tested, and maintained as required by applicable fire safety criteria. (DOE O 420.1C, Attachment 2, Chapter II; applicable NFPA codes and standards from the site-specific contract)
   - Are procedures to implement the FHA and DSA fire protection controls adequately written, reviewed, approved, controlled, maintained, and fully performed?
   - Have required fire safety features (including those associated with emergency notification and egress) been confirmed in accordance with authorization basis documents, FHAs, DOE directives, and NFPA standards?
   - Are fire and related hazards that are unique to DOE and not addressed by industry standards protected by isolation, segregation, or special fire control systems (e.g., inert gas, explosion suppression)?
   - Do fire protection system inspection, testing, and maintenance programs (scope and frequencies) conform to NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, and NFPA 72? This includes, but is not limited to:
     - Supply system sectional isolation valves periodically verified to be functional.
     - Tanks and water supply systems periodically inspected for degradation.
     - Pressure, level, and flow indicators appropriately calibrated and verified to be within acceptance criteria.
     - Indicator communications, notification and alarm systems monitored, reliable, and periodically verified to be functional.
   - Are passive fire barrier elements complete and fire dampers and door closure systems verified to be functional?
   - Are appropriate fire safety systems and features maintained operable for facilities undergoing decontamination and decommissioning? If not, are compensatory measures being adequately implemented?
   - Are system or equipment outages for maintenance, testing, or special operations appropriately approved and communicated to impacted groups?
   - Are fire protection impairments, including compensatory actions, for planned, unplanned and emergency impairments clearly identified, communicated, and tracked?
   - Are compensatory measures implemented as needed, periodically evaluated, and restored to normal operations in a timely manner?
   - Are ITM results documented and tracked for monitoring fire protection systems and assuring system health?

2. TSR Surveillance Testing:

   A. TSR surveillance testing of safety significant and safety class fire protection systems demonstrates that the systems can accomplish their safety functions and continue to meet applicable system requirements and performance criteria. (DOE O 420.1C, Attachment 2, Chapter II; applicable NFPA codes and standards from the site-specific contract)
   - Are surveillance tests performed to demonstrate the safety-related performance requirements of all fire protection SSCs? Do the tests adequately verify the performance requirements are satisfied?
   - Is safety basis TSR surveillance testing performed in the SSC's as found condition and separately from testing required by NFPA standards to assure the SSC being tested is not preconditioned?
   - Does the fire protection system design include provisions necessary for conducting the tests?
   - Is there a clear association between test acceptance criteria and the safety performance requirements?

   B. Surveillance testing confirms that key operating parameters for the overall fire protection system and its major components remain within safety basis, NFPA, and applicable consensus standards operating limits. (DOE O 420.1C, Attachment 2, Chapter II; applicable NFPA codes and standards from the site-specific contract)
   - Do results of testing demonstrate that adequate safety margins are maintained?
   - Are appropriate data recording provisions included or referenced and used to record results?
   - Do fire protection test procedures include criteria for identifying and listing discrepancies?
   - Do fire protection test procedures require timely notification to facility management on any failure or discrepancy that could impact operability?

3. Acceptance Criteria: The acceptance criteria from the surveillance tests used to confirm fire protection system operability are consistent with the safety basis. (DOE O 420.1C, Attachment 2, Chapter II)
   - Are acceptance criteria capable of confirming that safety/operability requirements are satisfied?
   - Can parameters that demonstrate compliance with the safety basis and applicable NFPA codes and standards be measured or physically verified?

4. Calibration of Instrumentation: Instrumentation and test equipment for the fire protection system are calibrated and maintained. (DOE O 420.1C, Attachment 2, Chapter II; applicable NFPA codes and standards from the site-specific contract)
   - Was the test equipment used for surveillance and testing activities calibrated?

5. Maintenance: Maintenance of the fire protection system, including upgrade and replacement of deteriorated or obsolete equipment, as necessary, is performed to demonstrate that the system is adequate and reliable to accomplish its safety functions. (DOE O 420.1C, Attachment 2, Chapter II; applicable NFPA codes and standards from the site-specific contract)
   - Does the maintenance program include preventive maintenance to reduce failures and ensure the reliability of systems and equipment and corrective maintenance to ensure the timely repair of defective systems and equipment?
   - Are vendor recommended maintenance requirements incorporated in the maintenance program and performed as prescribed?
   - Are maintenance source documents such as vendor manuals, NFPA codes and standards, DOE orders, and other requirements used as technical bases for development of system maintenance work packages?

- Is the maintenance backlog for fire prevention systems and equipment effectively managed to ensure reliability and availability of fire safety systems?
- Is age-related system degradation and component aging appropriately addressed to ensure system reliability and performance?
- Is there adequate planning for life cycle management and replacement of obsolete systems or components?
- Are component failure or degradation rates identified and tracked? Are failure rates used in establishing priorities and schedules for maintenance or system improvements?
- Is post-maintenance or repair testing performed to assure the operability of the system or equipment?
- Are acceptance criteria defined and used for system modification, repair, and maintenance activities?
- Is there an accurate maintenance history that compiles maintenance, resource, and cost data in a system which is retrievable and capable of entering required-maintenance costs, actual maintenance costs, and availability data and failure rates for mission-critical and safety systems into the DOE Facility Information Management System?

4.5 Contractor Self-Assessment

FP.6: A documented comprehensive self-assessment of the fire protection program is performed by the site contractor at least every 3 years, or at a frequency with appropriate justification approved by the DOE head of field element. (DOE O 420.1C, Attachment 2, Chapter II)

Criteria:

1. Triennial Fire Protection Assessment: The site contractor conducts a triennial FPP assessment (or a series of more frequent assessments that when combined, are equivalent to the triennial assessment) that evaluates the full scope of the program. (DOE O 420.1C, Attachment 2, Chapter II)
   - Does the contractor conduct self-assessments of the FPP at least every 3 years, or at an approved frequency?
   - Are programmatic self-assessments performed under the supervision of a qualified fire protection engineer?
   - Does the contractor FPP self-assessment evaluate all elements of the program, such as those established in DOE-STD-1066, *Fire Protection*?
   - Are self-assessments conducted with sufficient depth and rigor to identify program element performance weaknesses?

4.6 DOE Field Element Oversight

FP DOE.1: DOE field element line management has established and implemented effective oversight processes to evaluate the adequacy and effectiveness of the contractor's fire protection program and verify implementation, including management of fire protection issues. (DOE Order 226.1B 4 b (1))

FP DOE.2: DOE field element maintains sufficient technical capability and knowledge of site and contractor activities to make informed decisions about hazards, risks, and resource allocation; provide direction to contractors; and evaluate contractor performance. (DOE Order 226.1B)

Criteria:

1. Oversight Processes and Programs

   A. DOE Head of Field Element has established and implemented an effective oversight program that includes fire protection. (DOE O 226.1B, 4.a.(1) and 5.e.(3))
      - Does the DOE field element oversight program include written plans and schedules for planned assessments of fire protection, operational oversight related to fire protection, and reviews of the contractor's self-assessments of fire protection processes and related fire safety systems?

   B. DOE Head of Field Element approves and oversees contractor fire protection programs to ensure that the facilities, activities, and programs under their purview operate in compliance with the requirements of DOE Order 420.1C and the Contractor Requirements Document. (DOE O 420.1C, 5.d(1) and (5))
      - Has the field element reviewed and approved the contractors' fire protection program?
      - Has the field element documented and implemented processes and procedures to oversee the contractor's FPP?
      - Are field office assessments and surveillances of the contractor's FPP and related documents scheduled, conducted, and adequately documented?
      - Does the field element perform adequate independent evaluation and verification of contractor performance in implementing an effective fire protection program?
      - Are the scope and frequency of field office oversight based on past contractor performance, weaknesses in the FPP, specific hazards at the facility, the degree of risk in the operations, and the potential consequences, with consideration to resource limitations?
      - Does the field office assessment plan adequately cover fire protection subjects, including annual contractor building assessments, the triennial comprehensive assessment of the FPP, and updates to the FHA as required in DOE 420.1B/C?
      - Do the field office assessments of the contractor's FPP include sufficient rigor and depth to identify weaknesses and deficiencies in fire protection and provide appropriate findings and observations that evaluate the performance of the contractor?

   C. DOE Head of Field Element reviews and where justified, approves equivalencies to DOE technical standards and industry codes and standards related to fire protection. (DOE O 420.1C, 5.d(3))
      - Does the DOE field office review and approve equivalencies to DOE technical standards and industry codes and standards when determined to be necessary and adequately justified?

   D. DOE Head of Field Element reviews and approves contractors' emergency services organization baseline needs assessments (BNAs). (DOE O 420.1C, 5.d(4))
      - Does the DOE Head of Field Element review and approve the contractors' baseline needs assessment(s)?

   E. DOE Head of Field Element fulfills the roles and responsibilities for the Authority Having Jurisdiction (AHJ) for matters involving fire protection, as defined by the NFPA, and the building code official, as defined in DOE-STD-1066-2012, including documentation of any delegation or assignment of related responsibilities. (DOE O 420.1C, 5.d(6))
      - Does the DOE Head of Field Element fulfill the roles and responsibilities for the Authority Having Jurisdiction (AHJ) for matters involving fire protection, as defined by the NFPA? If this role is delegated to the contractor, are the responsibilities adequately documented?

- Does the DOE Head of Field Element fulfill the roles and responsibilities for the building code official, as defined in DOE-STD-1066-2016? If this role is delegated to the contractor, are the responsibilities adequately documented?
- Where AHJ or building code official responsibilities are delegated to contractors, does the head of field elements assure appropriate periodic technical review, validation, and oversight of contactor AHJ and building code official determinations by federal managing authorities, SMEs, or FPEs?

2. Issues Management Program: The DOE Field Element has an issues management process that categorizes findings related to fire protection based on risk and priority, ensures findings are effectively communicated to the contractors, and ensures that fire protection problems are evaluated and corrected on a timely basis. (DOE O 226.1B, 4.b(4))
   - Does the DOE field element have an effective issues management process that is capable of categorizing fire protection-related findings and deficiencies based on risk and priority?
   - Are deficiencies in fire protection programs or performance identified by line management communicated to appropriate managers for resolution through a structured issues management process?
   - Does the issues management process ensure that problems are elevated and effectively corrected in a timely manner?
   - Are the results of each fire protection assessment, surveillance, or other oversight activity tracked to ensure the contractor responds to any findings and deficiencies, and completes appropriate corrective actions?
   - Are findings required to be tracked and resolved through structured and formal processes, including provisions for review of corrective action plans?
   - Are adequate resources available and budgeted to respond to identified weaknesses in the FPP implementation and address degradation of FPP related systems?

3. Technical Staff Performing Oversight:

   A. The DOE Field Element maintains sufficient technical capability and knowledge of site and contractor activities to make informed decisions about hazards, risks, and resource allocation; provide direction to contractors; and evaluate contractor performance, specifically related to fire protection. (DOE O 226.1B, 4.a.(2))
      - Does the DOE field element maintain adequate technical capabilities (either on site or through agreements with headquarters, integrated service centers, or independent support contractors) to perform oversight and contractor performance evaluations of the fire protection program and related safety systems, as required by applicable DOE orders?
      - Is there adequate FPE or appropriately trained subject matter expert coverage to perform all the oversight responsibilities?
      - Are fire protection-related basics and issues included in the training and qualifications programs for the Facility Representatives?
      - Do the FRs demonstrate adequate knowledge and awareness of fire protection hazards, systems, and controls in their assigned facilities?
      - Do processes exist to allow Facility Representatives access to technical expertise in fire protection to resolve questions on the contractor's fire protection program?

   B. The DOE Field Element oversight of fire protection systems and equipment is performed by qualified, trained fire protection staff competent to perform their role (that includes fire protection engineers, fire safety technicians, and firefighting personnel). (DOE Order 426.1A, 4.b.)

- Has DOE line management defined the requirements for education, experience, knowledge, skills, and abilities for personnel providing oversight of the FPP?
- Have appropriate qualification standards for personnel with oversight responsibilities been established, maintained, and implemented?
- Has appropriate training for personnel with FPP oversight responsibilities been completed?
- Are continuing training, professional certifications, graduate studies, or similar development activities actively supported?
- Has the DOE FPE demonstrated appropriate technical competence during meetings, interviews, walkthroughs or other interactions?
- Has the federal FPE demonstrated appropriate familiarity with the safety basis, fire hazards analysis, the fire protection program, procedures, facilities, equipment and systems?

C. The DOE Field Element evaluates contractor and DOE programs related to fire protection for effectiveness of performance (including compliance with requirements), based on the results of operational awareness activities; assessments of facilities, operations, and programs; and assessments of the contractor's assurance system. The level and/or mix (i.e., rigor or frequency) of oversight of fire protection is appropriately tailored based on considerations of hazards, the maturity and operational performance of the contractor's programs and management systems. (DOE O 226.1B, 4.b.(1))
   - Does the DOE FPE perform oversight activities on a frequent enough basis to maintain familiarity with the facilities and fire protection systems on site?
   - Does the field office FPE or appropriately trained subject matter expert participate or shadow the contractor's triennial self-assessment of the FPP?
   - Does the field office FPE or appropriately trained subject matter expert periodically participate with or shadow the contractor's facility assessments?
   - Do FPEs perform periodic planned and documented assessments of fire protection system performance, equipment configuration, and material condition to verify the contractor is maintaining functionality, operability, reliability, and performance of fire protection systems?
   - Are FPEs routinely included in reviews and assessments of safety basis related changes involving or impacting fire protection?
   - Does the DOE FPE possess the requisite knowledge and abilities to provide advice to the AHJ and field element manager when responding to a request for an equivalency or exemption from DOE requirements related to fire protection?
   - Do Fire Protection Engineers periodically meet with senior line managers within the field element to provide information related to the fire protection program at the site?

REVIEW APPROACH

Record Review:
- Documented Safety Analysis
- Technical Safety Requirements
- Calculations, reports, and other supporting documentation pertaining to fire protection systems performance criteria
- Facility FHAs
- Fire Protection Building Assessments
- FPP description documents, site-wide and for selected facilities
- Organizational chart
- List B of contract
- Facility-specific administrative procedures for fire protection and life safety systems

- Fire Protection SSCs system descriptions and drawings
- Underground Firewater Distribution Piping Health Reports
- Facility FPP variances, exemptions, equivalencies, and modifications
- Records of TSR required surveillance activities for fire protection systems (e.g., sprinkler systems, fire alarms, fire barriers, valve inspections)
- ITM records for fire protection systems, fire water distribution systems, fire pumps, and control valves
- Records of fire hydrant flow tests (last completed test)
- Fire pump certified baseline performance curves from vendor
- List of current fire protection system impairments and compensatory measures
- USQ evaluations for recent fire protection system changes
- Records of monthly combustible control inspections
- Program for inspection and test of emergency lighting and exit sign systems
- Training and qualification records for FPE and personnel performing inspections, tests, and maintenance.
- Records of triennial self-assessment findings, deficiencies, and open items
- Sample of assessment findings - causal analysis, corrective action plan, close-out and approval
- Combustible and flammable control program
- Hot work program
- AHJ authorization documentation and procedure for approval of exemptions and equivalencies
- Fire department BNA and DOE approval letter
- Pre-incident plans
- Wildland fire management plan

Interviews:
- Manager of the fire protection program
- Fire chief
- Fire marshal
- AHJ(s)
- Fire protection engineer(s)
- Fire protection coordinator(s)
- Facility manager(s)
- Fire protection system engineer(s)
- Maintenance manager
- Inspection, testing, and maintenance personnel
- Engineering manager
- DOE oversight manager
- DOE fire protection engineer(s)
- DOE safety system oversight personnel (or subject matter experts)
- DOE facility representative(s)

Observations:
- TSR surveillance activities (e.g., main drain test, inspectors test valve test, water flow tests, etc.)
- Facility walkthroughs for life safety, combustible loading, and general review of fire protection systems, panels and alarms
- Daily rounds for surveillances and inspections of fire protection SSCs
- Fire department walkthroughs
- Fire department hose evolutions (e.g., establishing minimum flow rates)

- Tabletop exercises demonstrating use of pre-incident plans
- Inspections, tests and maintenance activities involving a fire protection system or support system
- Hot work activity
- Demonstration of tracking system for status of fire protection related issues and corrective action plan
- Plan of day/plan of week meetings