

RESIDENT INSPECTION PROGRAM FIRE PROTECTION (ANNUAL/QUARTERLY)

Effective Date: 01/01/2021

PROGRAM APPLICABILITY: 2600C

88135.05-01 INSPECTION OBJECTIVES

01.01 The objective of this procedure is to provide inspection requirements and guidance for U.S. Nuclear Regulatory Commission (NRC) Resident Inspectors to determine whether the operational status, material condition, and design of fire protection systems at fuel cycle facilities meet the applicable requirements in NRC regulations and the facility's license.

88135.05-02 GENERAL GUIDANCE

For fuel cycle facilities, the two principal risks to health and safety are nuclear criticality events and the release/dispersal of hazardous chemicals and radioactive material as a result of a fire or explosion. Fire-induced nuclear criticality events may include failures of "geometric control," which involves the set of measures used to maintain nuclear materials in a subcritical condition during storage, transportation, and disposal, to prevent the occurrence of a self-sustaining nuclear chain reaction. Such criticality events may result from (1) collapse of structures that are designed to maintain spacing, (2) addition of a moderator through automatic or manual fire suppression activities, or (3) movement of containers during manual fire-fighting efforts. By contrast, hazardous releases and dispersal events are most likely to result from fire-induced breaches of airborne particle filtration systems or other systems/components that contain hazardous chemicals or radioactive material.

Fire protection programs for fuel cycle facilities should prevent, detect, extinguish, limit, or control fires and explosions and their associated hazards and damaging effects. Paragraphs (a)(3) and (4) of Section 70.23, "Requirements for the Approval of Applications," requires licensees to provide equipment, facilities, and procedures that are adequate to protect health and minimize danger to life or property. Additional NRC regulatory requirements for fuel cycle facilities containing at least a critical mass of special nuclear material are established in Subpart H and Section 70.64 of 10 CFR Part 70. In particular, Subpart H sets forth performance requirements that limit the risk from individual events, including those initiated by fire. Section 70.64 contains baseline design criteria that require protection from fire and explosions to be explicitly considered in designing new facilities or new processes that are added to existing facilities.

This inspection focuses on assessing the material condition and operational status (rather than the design) of fire detection and suppression systems and fire barriers used to prevent fire

damage or fire propagation. The selection of fire protection features to be reviewed depends on the specifics of each licensee's program. Fire protection requirements for licensees vary greatly because of the significant differences in operations and licensing bases at fuel cycle facilities and thus any safety or security impact from fire. Therefore, the inspector should, as part of inspection preparation, review fire protection program documentation specific for the licensee to be inspected. Specific requirements are documented in the regulations, the license, the Safety Analysis Report (SAR), the Integrated Safety Analysis (ISA), the building code(s) of record, licensee policies and procedures, or Fire Hazards Analysis (FHA).

For those fire protection structures, systems, and components installed to satisfy NRC requirements, and designed to National Fire Protection Association (NFPA) codes and standards, the code edition in force at the time of the design and installation is the code of record to which the design is evaluated. Deviations from the codes should be identified and justified in the license application or FHA. A licensee may apply the equivalency concept in meeting the provisions of the NFPA codes and standards. When the licensee states that its design "meets the NFPA code(s)," or "meets the intent of the NFPA code(s)" and does not identify any deviations from these codes, the NRC expects that the design conforms to the codes, and therefore the design should be inspected against the NFPA codes.

The Director, Office of Nuclear Material Safety and Safeguards (NMSS), NRC, or designee is considered to be the authority having jurisdiction as described in NFPA documents.

For each sample, conduct a routine review of problem identification and resolution activities using the guidance in Inspection Procedure (IP) 88135.02, "Plant Status," Section 03.05, "Identification and Resolution of Problems."

88135.05-03 INSPECTION REQUIREMENTS AND INSPECTION GUIDANCE

03.01 Fire Area Walkdown.

- a. Inspection Requirement. Verify, once per quarter, the adequate implementation of the fire protection program by conducting a walkdown of a selected plant areas that is important to safety and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness.
- b. Inspection Guidance. Do not attempt to address all plant areas during each inspection. It is expected that the residents perform the number of walkdowns necessary to assure themselves that fire protection requirements are being met. The main focus of the quarterly inspections is on the material condition and operational status of fire detection and suppression systems and equipment, and fire barriers used to prevent fire damage or fire propagation.

Select plant areas that are important to safety (i.e., areas that could impact the more risk-significant facility operations) and that employ fire-safety controls (i.e., items-relied-on-for safety) to meet 10 CFR 70.61 performance requirements. The inspector should use the ISA Summary or other safety analysis to determine the risk-significant operations. The areas selected should be areas in which licensed nuclear materials are either processed or stored.

- Look for fire hazards that could increase risk and overall status of fire protection equipment.
- Concentrate on areas where a fire, or its effects, would pose the greatest threat of loss of control or release of nuclear material.
- Look for potential fire hazards, especially in areas where high-enriched uranium (HEU) or process chemicals are stored or processed.
- Ensure that water or other moderators would not be introduced into moderation controlled areas to fight fires unless nuclear criticality safety evaluations and appropriate management approvals have been established.
- Emphasis should be placed on liquid HEU processing systems and components and potential fire hazards that could provide a driving force to spread a hypothetical release offsite.
- Review the pre-fire plan and/or fire hazard analysis for the area selected against the fire protection program defined hazards and defense-in-depth features to verify that the fire plan is adequate.

Perform an area walkdown to evaluate the elements below where applicable. Walkdowns should be coupled with interviews with personnel (i.e., operators, fire protection engineer, onsite fire marshal), review of maintenance/tests and operational logs, and observation of fire protection equipment as well as work-in progress.

1. Control of Transient Combustibles and Ignition Sources.

(a) General

- (1) Metals such as uranium and zirconium, and their alloys, are known to be combustible, especially when in a finely divided form.
- (2) Transient combustible material amounts and locations are being controlled in accordance with the licensee's procedures. Give special focus to transient combustibles located near ignitions sources and equipment important to safety.
- (3) Ignition sources (e.g. hot work, welding, cutting, grinding, brazing, flame or plasma arc-cutting, or arc gouging) are being controlled in accordance with the licensee's procedures, FHA, and/or ISA.

(b) Machining Operations of Combustible Metals

- (1) Machining operations in the facility such as sawing, grinding, machining, and abrasive cutting which have the potential for combustible dust cloud formation and combustible scrap and swarf accumulation, are controlled. Fire protection measures for these metals are similar. NFPA 484, "Standard for Combustibles Metals," provides guidance.
- (2) Scrap and swarf generated by machining operations and accumulated in the immediate area should be swept as frequently as necessary and collected under water in covered metal containers. Such collections should be removed daily (or as

required in the FHA) from the process areas. Dust and sludge collected in the dust separators and ducts should be removed as often as necessary.

- (3) Machining operations on combustible metals **should be** performed in enclosures with a dust collection system in operation. The collected dust should be ducted to a dust collector and a HEPA filter, if required, for removal of radioactive particles. The collection hood and duct leading to the filter should be designed to minimize deposition of the fines and to facilitate cleaning. **NFPA 652, "Combustible Dust," provides guidance.**
- (4) **Extinguishing agents suitable for the particular metal fire (i.e., Class D), as well as suitable scoops or applicators, are readily available to the operator performing the machining.**
- (5) No open flames are permitted in the areas where machining operations of combustible metals are performed. If maintenance operations, such as welding, are to be performed in the vicinity, machining operations should be halted, and metal scraps should be removed.

(c) **Incinerators**

- (1) **Incinerators are separated from the remainder of the facility by fire barriers having a minimum 1-hour fire resistance rating.**
- (2) The exhaust from an incinerator that is used to burn radioactive contaminated waste is ducted to a filtration system before release to the environment. The exhaust may also be ducted to the facility off-gas system.

(d) **Boilers and Boiler Furnaces**

- (1) **Fuel storage tanks are separated from the furnace area by fire barriers having a minimum 1-hour fire resistance rating, and the fuel lines are laid out to minimize the possibility of damage.**
- (2) **Boilers for the supply of steam for process operation and boiler furnaces are separated from the remainder of the facility by fire barriers having a minimum 1-hour fire resistance rating.**

(e) **Stationary Combustion Engines**

- (1) **Stationary combustion engines located in part of a structure housing fuel processes are in enclosures having a fire resistance rating of at least 1 hour.**
- (2) **Fuel storage tanks, except for day tanks are located outside the room.**

(3) The engine exhaust system will prevent ignition of any combustible material by contact with hot metal surfaces or by leaking exhaust gases or sparks.

(f) Storage and Handling of Flammable and Combustible Liquids and Gases

(1) Indoor storage of flammable and combustible liquids is only permitted in limited quantities in approved closed containers for the purpose of day-use (such as for diesel engine operation) and maintenance work.

(2) Flammable/combustible liquid storage areas and floor drain systems in selected plant areas that could affect plant safety controls and IROFS are identified and the necessary precautions understood.

(3) Flammable/combustible liquid spills, leakage or explosions associated with oil storage areas, large oil-filled transformers or batteries in or adjacent to the areas selected for inspection are identified and the necessary precautions understood.

(4) Appropriate portable fire extinguishers are available in the affected area.

(5) NFPA 30, "Flammable and Combustible Liquids Code," provides safeguards to reduce the hazards associated with the storage, handling, and use of flammable and combustible liquids.

2. Fire Detection Systems.

(a) General condition of fire detection devices is satisfactory (i.e., control unit trouble alarms, remote annunciator, initiating devices, etc.)

(b) Evaluate whether detection devices are missing, improperly installed, ~~that~~ showing physical damage, blocked or showing potential interference that could impact functionality (i.e., missing ceiling tiles can interfere with the performance of smoke detector devices as smoke can bypass the device).

(c) Visual and/or audible indication is received at a control room or at a central staffed location, that a fire detection system has been activated.

(d) NFPA 72, "National Fire Alarm and Signaling Code," provides additional guidance on application, installation, location, performance, inspection, testing, and maintenance of fire alarm systems.

3. Water-based Fire Suppression Systems.

(a) Suppression system is in an operable stand-by mode (i.e., water supply control valves to the system are open and the fire water supply and pumping capability is operable and capable of supplying the water supply

demand of the system). Verify through visual observation or surveillance record (see Monticello Nuclear Generating Plant Special Inspection (ADAMS Accession No. ML11363A182 and NRC Information Notice 2013-06, "Corrosion in Fire Protection Piping Due to Air and Water Interaction," ADAMS Accession No. ML13031A618) for an example of fire water system corrosion blockage). Verify that trim valves on alarm check valves and deluge valves are aligned to the correct position for automatic operation.

- (b) Sprinkler heads and nozzles are the correct type, are installed in the proper orientation (e.g., upright, pendent, or sidewall), and are not missing, damaged, painted, or obstructed by major overhead equipment (e.g., ventilation ducts, cable trays/conduits, or temporary scaffolding). As a general rule, NFPA 13, "Installation of Sprinkler Systems," requires a minimum of 18 inches of clearance below the sprinkler deflector. Fire sprinkler head obstructions are covered in NFPA 13 and NFPA 25.
- (c) Floor drains in areas protected by sprinkler/water spray systems are open and unobstructed, and drainage is directed to areas that will not be adversely affected by the runoff. (e.g., sprinkler-caused flooding of other safety controls).
- (d) System provides adequate water spray/sprinkler coverage for the in situ hazard the system is protecting.
- (e) Operators have written procedures available to indicate what actions are required to manually place the water-based fire suppression systems into operation.
- (f) Building and/or fire suppression system modifications have not compromised the effectiveness of the suppression system.

4. Gaseous (e.g., halon or CO₂) Fire Suppression Systems.

- (a) Suppression system is in an operable stand-by mode (i.e., fire extinguishing agent charge pressure is within the normal band, extinguishing agent supply valves are open, and the system is in the appropriate mode). Observe any corrosion, physical damage to system tanks and cylinders or potential interface with functionally. System actuation panels are powered on, and the panels are free of trouble indications or standing alarms. Look for longstanding uncorrected equipment problems.
- (b) Dampers and electrically supervised self-closing fire doors are unobstructed so that they can close automatically upon actuation of the gaseous system. Observe any material condition that may affect the performance of the system, such as mechanical damage to doors or dampers and open penetrations (i.e., open floor drains may preclude proper gaseous concentration following actuation).

- (c) The nozzles of gaseous extinguishing systems (e.g., Halon 1301, carbon dioxide, and clean agents (e.g., FM200, Inergen)) are not missing, misaligned, obstructed, or blocked by equipment (e.g., ventilation ducts cable, trays/conduits or temporary scaffolding) that would significantly impede the dispersal of a gaseous agent.
- (d) In rooms protected with a total flooding gaseous fire extinguishing system, verify that all egress doors are properly labeled to warn the occupants of the danger of a system discharge and that egress door latches fully engage to maintain design concentrations. Note properly mark/label pull stations and audible and visual pre-discharge alarms to indicate their functions.

5. Manual Firefighting Equipment and Capability.

Manual firefighting equipment includes equipment such as portable fire extinguishers, yard fire hydrants, hydrant hose houses, fire hoses, dry powder, and hose racks. The inspector should verify through observation and review of records that the licensee is maintaining proper material condition of manual firefighting equipment and in accordance with licensee's fire protection program. Determine whether:

- (a) Portable fire extinguishers:
 - (1) General condition of extinguishers is satisfactory (e.g., no corrosion, securely mounted, pressure gauge reads in the acceptable range, nozzles are clear and unobstructed, charge test records indicate testing within the normal periodicity).
 - (2) Portable fire extinguishers are appropriate for the class of fire hazard and are available at their designated locations in or near the area being inspected.
 - (3) Access to the extinguishers is unobstructed by plant equipment or other work related activities.
 - (4) NFPA 10, "Standard for Portable Fire Extinguishers," provides requirements to ensure that portable fire extinguishers work as intended.
- (b) Fire hoses:
 - (1) General condition of hoses and hose stations is satisfactory (e.g., no holes in or chafing of the hose, hose jacket is dry with no signs of excessive dirt, debris, cuts, abrasions, or other obvious damage, nozzle not mechanically damaged nor obstructed, hose rack swings freely, and no excessive rust and corrosion on hose rack, hose station piping, and supports)

- (2) No damaged, missing, clogged, or incorrect nozzles (non Underwriters Laboratories/Factory Mutual (UL/FM) electric safe nozzles) are attached to the system.
- (3) Hose stations are installed at their designated locations with a maximum of 100 feet (plus the 30 feet for water stream) of hose per station such that the entire fire protected area is covered, including the overhead (see NFPA 14).
- (4) Verify that the hose is properly connected to the standpipe hose connection, hose is properly placed on the hose rack, shutoff valve is closed, hand-wheel is in place, and valve is not leaking (e. g., compress the first hose section from hose connection to rack for signs of water in the hose).
- (5) Fire hoses have a hydrostatic test date not exceeding one year.
- (6) Properly calibrated/adjusted pressure reduction device, if installed (25 percent or less calibration/adjustment error).
- (7) Water supply control valves to the standpipe system are open.
- (8) NFPA 14, "Standard for the Installation of Standpipe and Hose Systems," provides requirements for the installation of standpipes and hose systems to ensure that hose systems work as intended to deliver adequate and reliable water supplies in a fire emergency.

(c) Fire hydrants and water supply.

- (1) The general condition of yard fire hydrants is satisfactory to ensure water supplies are available in a fire emergency (e.g., material conditions such as mechanical damage, corrosion, damage to yard fire hydrants).
- (2) Firefighting foam and equipment is in proper working condition (i.e., visually inspect that it operates smoothly, and is free of obstructions). Firefighting foam containers have a shelf life date, which has not exceeded or expired.
- (3) Fire water supply and pumping capability is operable and capable of supplying the water flow and pressure demand.
- (4) If tanks are used for fire water supply, they should be free from corrosion, corrosion could occur at tank bottom at inaccessible locations.

(d) Manual Initiating Devices

- (1) Access to manual initiating devices for fixed suppression systems (e.g., gaseous systems, dry sprinkler systems) are easily seen and readily available for use.

- (2) Physical path to manual initiating devices is kept clear by overhead obstructions or work-related activities.

6. Passive Fire Protection Features.

Passive fire protection features includes equipment such as fire doors, fire dampers, fire barrier penetration seals, oil collection systems, and electrical raceway fire barrier systems (ERFBS). The inspector should verify through observation and review of records that the features are properly installed and the licensee is maintaining proper material condition of passive fire protection features and to perform their function in accordance with licensee's fire protection program. Determine whether:

(a) Fireproofing

- (1) General condition of structural fireproofing is satisfactorily (e.g. no physical damage that could affect the structural integrity of the fire proof material and allow a direct path for flame/hot gas travel to the protected component, for example, loose or sagging fire proof material wrap, water damage, loose bands, etc.).
- (2) Structural steel fireproofing, such as fibrous or concrete encapsulation, is installed in such a way that the structural steel is uniformly covered (no bare areas).
- (3) Fire ratings of fireproofing systems are compatible with the anticipated fire duration and intensity.
- (4) Evaluations and/or tests performed to verify that each type of fireproof material will maintain the integrity of structural members for the time specified, have not been invalidated by plant changes. (See the UL Fire Resistance Directory.)

(b) Fire Doors

- (1) General condition of fire doors is satisfactory (e.g. no rust/corrosion, no holes or breaks on door surface or frame, no missing hardware, etc.)
- (2) Fire doors close freely from a fully-opened state (without dragging or sticking) and door latch hardware engages and latches securely. Generally, for the metal doors encountered during inspections, a 3-hour door needs a 5/8 inch latch throw and a 1-hour door needs 1/2 inch latch throw. (Refer to NFPA 80 if an issue arises).
- (3) Fire door frame and door to floor clearance gaps are not excessive (do they exceed the criteria of NFPA 80).
- (4) Fire doors and frames are UL labeled and the label fire rating is compatible with the fire ratings of their associated fire barriers.

(5) Evaluations and/or tests performed to verify that each fire door will maintain its integrity for the time specified, have not been invalidated by plant changes. (See the UL Fire Resistance Directory.)

(c) Ventilation Fire Dampers

(1) General condition of ventilation system fire dampers is satisfactory (e.g. no obvious signs of damage, no buildup of dirt, dust, oil, rust, or other items on the track or coiled springs that would interfere with proper operation, fusible link is properly installed, and there's no obstruction which would prevent closure.)

(2) Accessible fire dampers are UL labeled and the label fire rating is compatible with the fire ratings of their associated fire barriers.

(3) For inaccessible dampers, which cannot be readily observed, review the licensee's surveillance efforts directed towards verifying the continuing operability of ventilation fire dampers.

(d) Penetration Seals

(1) General condition of penetration seals is satisfactory. Inspectors should visually inspect the physical condition and structural integrity of each penetration within a firewall, floor, or ceiling for the following:

- Penetration has a seal installed and there is NO passage of light or air movement through the sealant.
- Penetration seal surfaces don't have cracks greater than 1/8 inch in width, holes greater than 1 inch in depth, nor tears or rips in the functional portion of the sealant.
- There are no open (unsealed) conduits or open pipes protruding through the seal and terminating on either side of the fire barrier.
- Damming boards, when installed, such as Carborundum™, Duraboard®, Durablanket®, or Masonite board are an integral part of the seal. Verify that the damming boards and seams or TSI material is undamaged and in its originally installed condition.

(2) Fire ratings for penetration seals are compatible with the fire ratings of their associated fire barriers.

(e) Electrical Raceway Fire Barrier Systems (ERFBS)

(1) General condition of ERFBS required to provide necessary power for safety controls or IROFS, such as cable tray fire wraps for cables and blanket material, is satisfactory. Inspectors should visually

inspect the physical condition and structural integrity of ERFBS to confirm the following:

- Wrap materials are continuous and attached securely in place. In particular, check that material joints or seams are not separated from attachments or have gaps at the firewall structure.
- No exposed metal is present which might act as a thermal short-circuit from structural supports (i.e., all attachment supports, stud bolts, nuts, and washers are properly covered with the fireproofing material).
- Banding, wire tie, and other fastener pattern and spacing appears appropriate.
- No breaks, tears, cracks, holes, blisters, or bubbles are present.
- No crumbling of material, sagging, or water damage is observed.

(f) **Flammable/Combustible** Spill, Leakage and Containment/Collection Systems

Flammable/combustible liquid leakage, containment/collection, and **floor drain** systems are fire protection features designed to collect leakage, spills, and spray from equipment and/or storage tanks that contain flammable or combustible liquids (See NFPA 30, "Flammable and Combustible Liquids Code").

(1) **General condition of flammable/combustible liquid leakage and containment/collection systems is satisfactory. Inspectors should visually inspect** the physical condition and structural integrity of each **flammable/combustible liquid** leakage and containment/collection system for the following:

- **Containment/collection system has sufficient volume for collecting and holding the contents from the largest container allowed to prevent overflow from endangering important structures, facilities, safety systems, or other safety basis requirement in the FHA or ISA.**
- **Containment/collection dike is subject to routine inspection to verify it is liquid tight.**
- Any piping passing through the dike walls has closed isolation block valves installed. Verify that the valve(s) access under fire conditions is permitted without entering the diked area. Where provision is made for draining water from diked areas, the drains should be controlled to prevent combustible liquids from entering areas where they would constitute a hazard to important structures, facilities, or safety systems.

7. Compensatory Measures.

Each level of defense in fire protection (i.e., prevent fires, detect and suppress fires, and the design of safety systems to limit fire damage), should meet certain minimum requirements; however, strengthening any one can compensate in some measure for weaknesses, known or unknown, in others. In some cases, reductions in defense in depth can be immediately corrected (e.g. combustibles can be removed if found in a combustible free zone). In other cases, more time is needed to correct the problem (e.g., repair an inoperable fire detection system, or install a missing fire barrier). In still other cases, fire protection features are purposefully removed from service (e.g., a fire barrier penetration seal may be removed to allow a new cable run). When immediate corrective actions cannot be taken, compensatory measures are implemented to mitigate the increased fire risk created by the degraded, inoperable, or nonconforming condition until permanent corrective actions can be implemented.

The use of compensatory measures, on a short-term basis, is an integral part of licensees' fire protection programs. For typical fire protection system deficiencies (e.g., inoperable fire detection and suppression systems) the plant administrative procedures should specify the appropriate compensatory measures.

Fire watches are the most common form of compensatory measure for typical fire protection system deficiencies. Fire watches are personnel trained to inspect for the control of ignition sources, fire hazards, and combustible materials; to look for signs of incipient fires; to provide prompt notification of fire hazards and fires; and, in some cases, to take actions to begin fire suppression activities. The primary purpose of the fire watch is to look for fire hazards and other conditions that could lead to a fire. Therefore, the fire watch strengthens the first echelon of fire protection defense-in-depth (fire prevention) by compensating for the weakness introduced by the inoperable, degraded, or nonconforming condition.

Fire watches may also detect fires, call out the fire brigade, give exact information regarding the nature and location of the fire to the fire brigade, and initiate fire suppression activities for incipient stage fires. These actions all strengthen the second level of defense in fire protection (fire detection and suppression). Whether or not a fire watch engages in incipient stage firefighting activities is based on the individuals' training and procedures.

The inspector should verify that compensatory measures are put in place by the licensee in accordance with procedures for out-of-service, degraded or inoperable required fire protection equipment, systems or features (e.g., detection and suppression systems and equipment, passive fire barrier features, etc.). Determine whether:

- (a) Compensatory measures are adequate to provide at least the same reduction in fire risk (considering the out of service time) as the fire protection item(s) for which the compensatory measures are applied.

- (b) Licensee's plans for permanent corrective actions, and the effectiveness of the corrective actions for returning the equipment to service in a reasonable period of time, are adequate.
- (c) For identified impaired fire protection features, compensatory actions (usually a posted fire watch) are established and continued until the component is restored.
- (d) The **training and** duties of posted compensatory action fire watchers are adequate, and fire watch rounds are completed within specified procedural time frames.

03.02 Fire Brigade Drill Performance Sample.

- a. Inspection Requirements. Evaluate licensee personnel **readiness** to prevent and fight fires **during a fire brigade training drill or an actual event.**
- b. Inspection Guidance. The annual inspection evaluates the licensee's onsite fire brigade performance. Although the evaluation is an annual process, inspectors may not be able to observe and evaluate all of the important drill activities as part of a single drill. Therefore, inspectors may need to observe the conduct of several fire brigade drill and/or training -segments (announced and unannounced, if applicable) throughout the year to adequately sample this area. The purpose of this sample is to ensure the capability of the fire brigade team members, the leadership ability of the brigade leader, use of turnout gear and firefighting equipment, and the effectiveness of the team operation.

Select an unannounced drill, if applicable, or actual activation of the fire brigade in response to a fire event. An announced fire drill is acceptable but not the preferred option. If a drill is not scheduled to take place during the inspection, the inspection requirement may be accomplished by interviewing Fire Brigade members to determine the actions they would take in the event of a fire response. Different fire scenarios should be provided to determine the extent of Fire Brigade training.

Observe and/or evaluate the licensee's fire brigade performance in the following activities and programs to assess their operational effectiveness in combating fires.

1. Brigade Staffing Size. Collateral responsibilities of the fire brigade team members should not conflict with their responsibilities related to the fire brigade during a fire.
2. Proper Donning of Fire Gear. Each team member sets out his/her designated protective clothing and turnout gear and properly dons the gear.
3. Proper Donning, Availability, and Program Control of Self-Contained Breathing Apparatuses (SCBAs). SCBAs are available and are properly worn and used. Each individual should completely don his or her bunker gear (e.g., helmets, hood, pants, coats, gloves, boots, and air packs). This includes donning an SCBA, before entering the fire scene. Evaluate the SCBA program, including storage, training, expectations for use, and maintenance.

4. Command and Control. The fire brigade leader exhibits command of the fire brigade and has access to the prefire plans or firefighting strategy. Firefighting directions are thorough, clear, and effective.
5. Communications. Fire brigade team members are briefed, discuss the plan of attack, receive individual assignments, complete communications checks, and generally get ready to combat the fire. Control/command is set up near the location of the fire after the fire is assessed, and communications are established with the fire brigade team members and emergency organization, as applicable. Communications are efficient and effective for the duration of the drill.
6. Fire-Fighting Capability and Performance. The firefighting pre-plan strategies are used. Fire hose lines are capable of reaching all necessary fire hazard locations, the lines are laid out without flow constrictions, and the hose is simulated as being charged with water. The fire area of concern is entered in a controlled manner following the principle of “two-in/two-out” (two fire brigade team members enter while two remain outside the area of concern). Additionally, the fire brigade team members stay low to the floor and feel the door for heat before entering the fire area of concern. The fire brigade brings sufficient firefighting equipment to the scene to properly perform its firefighting duties. Team members of the fire brigade check for fire victims and propagation of the fire into other plant areas. Effective smoke removal operations are simulated in accordance with prefire plans and firefighting strategies by aligning ventilation in the fire area or by placing smoke removal units at the proper doors. Areas protected by gaseous fire extinguishing systems should not be ventilated before the brigade confirms that the fire is extinguished. If the simulation of smoke removal is not part of the drill, verify the availability and condition of such equipment (e.g., fans, hoses).
7. Scenario Adherence, Drill Objectives, Postdrill Critique, and Equipment Restoration. The licensee performs a post critique to discuss fire brigade performance and determine if drill scenario was properly implemented and acceptance criteria for the drill objectives were met.

88135.05-04 RESOURCE ESTIMATE

The annual resources to complete this inspection are estimated to be 26 hours annually; 16 hours for fire walkdowns and 10 hours for fire brigade drills. This estimate is only for direct inspection effort and does not include preparation for and documentation of the inspection. Time spent conducting activities associated with this procedure should be charged to IP 88135.05. Completion of the quarterly walkdowns and the annual fire brigade drill observation should be documented in the quarterly inspection report for the quarter in which they were performed.

88135.05-05 PROCEDURE COMPLETION

This procedure is completed when the inspection requirements are performed with a minimum of one (1) fire protection walkdown of a selected plant area each quarter and one (1) observation of a fire brigade training/drill per year.

88135.05-06 REFERENCES

06.01 National Fire Protection Association (NFPA) Codes

1. NFPA 10, "Portable Fire Extinguishers"
2. NFPA 11, "Low Expansion Foam and Combined Agent Systems"
3. NFPA 11A, "Medium and High Expansion Foam Systems"
4. NFPA 12, "Carbon Dioxide Extinguishing Systems"
5. NFPA 12A, "Halon 1301 Fire Extinguishing Systems"
6. NFPA 12B, "Halon 1211 Fire Extinguishing Systems"
7. NFPA 13, "Sprinkler Systems"
8. NFPA 14, "Standpipe and Hose Systems"
9. NFPA 15, "Water Spray Fixed Systems for Fire Protection"
10. NFPA 16, "Deluge Foam-Water Sprinkler and Foam-Water Spray Systems"
11. NFPA 20, "Centrifugal Fire Pumps"
12. NFPA 24, "Private Fire Service Mains and Their Appurtenances"
13. NFPA 30, "Flammable and Combustible Liquids Code"
14. NFPA 31, "Oil Burning Equipment"
15. NFPA 37, "Stationary Combustion Engines and Gas Turbines"
16. NFPA 45, "Laboratories Using Chemicals"
17. NFPA 50, "Bulk Oxygen Systems at Consumer Sites"
18. NFPA 50B, "Liquefied Hydrogen Systems at Consumer Sites"
19. NFPA 51B, "Fire Prevention in Use of Cutting and Welding Processes"
20. NFPA 54, "ANSI Z223.1-1984, National Fuel Gas Code"
21. NFPA 69, "Explosion Prevention Systems"
22. NFPA 70, "National Electrical Code"
23. NFPA 70B, "Electrical Equipment Maintenance"
24. NFPA 70E, "Electrical Safety Requirements for Employee Workplaces"
25. NFPA 72D, "Proprietary Protective Signaling Systems"
26. NFPA 72E, "Automatic Fire Detectors"
27. NFPA 75, "Electronic Computer/Data Processing Equipment"
28. NFPA 77, "Static Electricity"
29. NFPA 78, "Lightning Protection Code"
30. NFPA 79, "Industrial Machinery"
31. NFPA 80, "Fire Doors and Windows"
32. NFPA 80A, "Protection of Buildings from Exterior Fire Exposures"
33. NFPA 85D, "Fuel Oil-fired Multiple Burner Boiler Furnaces"
34. NFPA 86C, "Industrial Furnaces Using a Special Processing Atmosphere"
35. NFPA 90A, "Air Conditioning and Ventilating Systems"
36. NFPA 90B, "Warm Air Heating and Air Conditioning Systems"
37. NFPA 101, "Life Safety Code"
38. NFPA 204M, "Smoke and Heat Venting"
39. NFPA 220, "Types of Building Construction"

40. NFPA 251, "Fire Tests of Building Construction and Materials"
41. NFPA 321, "Basic Classification of Flammable and Combustible Liquids"
42. NFPA 482, "Production, Processing, Handling and Storage of Zirconium"
43. NFPA 600, "Private Fire Brigades"
44. NFPA 801, "Facilities Handling Radioactive Materials"
45. NFPA 803, "Light Water-cooled Nuclear Reactors"

06.02 U.S. Nuclear Regulatory Commission Documents

1. American National Standards Institute, N665-1985, "Facilities for Fabricating Fuel for Light Water Reactors (LWR) - Fire Protection"
2. American National Standards Institute/American Society of Heating, Refrigeration, and Air Conditioning Engineers, ANSI/ASHRAE 15, "Safety Code for Mechanical Refrigeration"
3. American Society for Testing and Materials, ASTM E-119, "Fire Test of Building Construction and Materials," 1976
4. American Society for Testing and Materials, ASTM E-84, "Surface Burning Characteristics of Building Materials," 1976
5. Draft Regulatory Guide No. DG 3006, "Standard Format and Content for Fire Protection Sections of License Applications for Fuel Cycle Facilities," September 1990
6. Draft Regulatory Guide 3.38, "General Fire Protection Guide for Fuel Reprocessing Plants," June 1976
7. Factory Mutual System Approval Guide, "Equipment, Materials, Services for Conservation of Property"
8. Federal-Register, "Guidance on Management Controls/Quality Assurance, Requirements for Operation, Chemical Safety, and Fire Protection for Fuel Cycle Facilities," Vol. 54, No. 53, March 1989
9. National Fire Protection Association, Fire Protection Handbook
10. NUREG 0762, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities," Rev. 1, November 1987
11. NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility (Final Report)"
12. NUREG 0800, Standard Review Plan 9.5.1, "Guidelines for Fire Protection for Nuclear Power Plants," Rev. 2, July 1981
13. Regulatory Guide 3.16, "General Fire Protection Guide for Plutonium Processing and Fuel Fabrication Plants," January 1974
14. Underwriters Laboratories Standard UL 555, "Standard for Fire Dampers and Ceiling Dampers"
15. Underwriters Laboratories Standard UL 586, (ANSI B 132.1), "High Efficiency Air Filtration Units"
16. Underwriters Laboratories, Building Materials Directory

END

Attachment:

Revision History for IP 88135.05

Attachment 1 - Revision History for IP 88135.05

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment Resolution and Closed Feedback Form Accession Number (Pre-Decisional,, Non-Public Information)
N/A	ML13233A174 01/31/14 CN 14-004	Initial issuance. IP 88135.05, "Fire Protection," is a new attachment to IP 88135 (which is being revised in its entirety).	N/A	ML13354B918
N/A	ML18099A294 10/01/18 CN 18-033	Revision includes editorial changes to remove Part 76 certificate holder references and transfer of resource hours from IP 88055 to IP 88135 (Resident Inspector Program)	N/A	N/A
N/A	ML20302A472 12/02/20 CN 20-067	Revised in its entirety to align with the Smarter Inspection Program changes (ML20077L247 and ML20073G659)	N/A	N/A