

ATTACHMENT 71111.05AQ

INSPECTABLE AREA: Fire Protection (Annual/Quarterly)

CORNERSTONES: Initiating Events
Mitigating Systems

INSPECTION BASES: Fire can be a significant contributor to reactor plant risk. In many cases, the risk posed by fires is comparable to or exceeds the risk from internal events. The fire protection program shall extend the concept of defense in depth (DID) to fire protection in plant areas important to safety by:

- (1) preventing fires from starting,
- (2) rapidly detecting, controlling, and extinguishing those fires that do occur, and
- (3) providing protection for structures, systems, and components important to safety so that a fire that is not promptly extinguished by fire suppression activities will not prevent the safe shutdown of the reactor plant.

LEVEL OF EFFORT: Quarterly Inspection: The resident inspector will perform a DID walkdown of four to six plant areas important to safety (on a plant specific basis) each calendar quarter per Section 02.01.

Annual Inspection: Each year, the resident inspector will evaluate the fire brigade performance by observing selected fire drills. Fire brigade drills may be announced or unannounced. Observation of the fire brigade response to an actual fire can be considered as part of the evaluation.

71111.05AQ-01 INSPECTION OBJECTIVES

01.01 The inspectors will evaluate the licensee's fire protection program for operational status, and material condition and verify the adequacy of:

- controls for combustibles and ignition sources within the plant;
- fire detection and suppression capability;
- material condition of passive fire protection features;
- compensatory measures in place for out-of-service, degraded or inoperable fire protection equipment, systems or features; and
- procedures, equipment, fire barriers, and systems so that the post-fire capability to safely shut down the plant is ensured.

01.02 To assess the performance of the fire brigade.

71111.05AQ-02 INSPECTION REQUIREMENTS

02.01 Quarterly Inspection. The inspector should review the fire plan for the area selected against the fire protection program defined hazards and DID features to verify that the fire plan is adequate. The fire plan should then be used as a tool in evaluating the attributes below for the selected fire areas. For the areas selected evaluate the following:

a. Control of Transient Combustibles and Ignition Sources. Verify the following:

1. Transient combustible materials and location of transient combustible materials are being controlled in accordance with the licensee's administrative control procedures and the licensee's fire PRA analysis (special focus should be made on transient combustibles located in the vicinity of ignition sources and safe shutdown cables and equipment).
2. Hot work, welding, cutting, heat treating, grinding, brazing, flame or plasma arc cutting, or arc gouging is being done in accordance with the licensee's administrative control procedures.

b. Fire Detection Systems.

Verify the physical condition of the fire detection devices and note any that show physical damage, blockage or potential interference with functionality (see Compensatory Measures section below).

c. Water-based Fire Suppression Systems. Verify the following:

1. Sprinkler heads and nozzles are not obstructed by major overhead equipment (e.g., ventilation ducts), or temporary scaffolding, are not damaged or painted, and are installed in the proper orientation (e.g., upright, pendent, or sidewall). Verify that floor drains in areas protected by sprinkler/water spray systems are open/unobstructed and that drainage is directed to areas that will not be adversely affected by the runoff.
2. 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). Verify that trim valves on alarm check valves and deluge valves are aligned to the correct position for automatic operation.
3. Material conditions such as mechanical damage, painted sprinkler heads, corrosion, etc. will not affect performance of the system.

d. Gaseous Fire Suppression Systems. Verify the following:

1. Gaseous suppression system (e.g. Halon, CO2, FM200, Inergen, etc.)

nozzles are not obstructed or blocked by plant equipment such that gas dispersal would be significantly impeded.

2. Suppression agent charge pressure is within the normal band, extinguishing agent supply valves are open, and the system is in the appropriate mode. Verify that system actuation panels are powered on and that the panels are free of trouble indications or standing alarms. Look for longstanding uncorrected equipment problems.
 3. Dampers/doors are unobstructed so that they will be permitted to 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, open penetrations (open floor drains may preclude proper gaseous concentration following actuation). In rooms protected with a total flooding gaseous suppression agent, 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 such that design concentrations will be maintained
 4. Room penetration seals are sealed and in good condition to prevent airflow and to prevent loss of gaseous suppression agent following discharge.
 5. Material conditions such as mechanical damage, corrosion, damage to doors or dampers, open penetrations, or nozzles blocked by plant equipment that may affect performance of the system.
- e. Manual Firefighting Equipment and Capability. Verify the following:
1. Portable fire extinguishers are provided at their designated locations in or near the area being inspected, access to the fire extinguishers is unobstructed by plant equipment or other work related activities, and appropriate for the class of fire hazard.
 2. The general condition of fire extinguishers is satisfactory (e.g., pressure gauge reads in the acceptable range, nozzles are clear and unobstructed, charge test records indicate testing within the normal periodicity).
 3. Fire hoses are installed at their designated locations and the general condition of hoses and hose stations is satisfactory (e.g., no holes in or chafing of the hose, nozzles not mechanically damaged and not obstructed, valve hand wheels in place), and access to the hose stations is unobstructed.
 4. Water supply control valves to the standpipe system are open and the fire water supply and pumping capability is operable and capable of supplying the water flow and pressure demand.

5. Access to manual actuators for fixed suppression systems (e.g. gaseous systems, dry water systems) is unobstructed by plant equipment or work-related activities.
- f. Passive Fire Protection Features. Verify the following:
1. Electrical raceway fire barrier systems such as cable tray and conduit (including associated support system) fire wraps, or blanket materials are in good condition with no cracks, gouges, or holes in the barrier material, and no gaps in the material at joints or seams, and that banding, wire tie, and other fastener pattern and spacing appears appropriate.
 2. Fire doors self-close without gapping (e.g. due to fire door damage from previous obstructions), and that the door latching hardware functions securely.
 3. Ventilation system fire damper's material conditions, including fusible links where applicable, are adequate to ensure unobstructed operability. For those dampers which can not be readily observed in the selected plant areas, review the licensee's surveillance efforts directed towards verifying the continuing operability of ventilation fire dampers.
 4. Structural steel fire proofing, such as fibrous or concrete encapsulation, is installed in such a way that the structural steel is uniformly covered (no bare areas).
 5. Fire barrier and fire area/room/zone electrical and piping penetration seals are not missing from locations where they are needed to complete a fire barrier wall, and determine that seals appear to be properly installed and in good condition.
 6. Reactor coolant pump oil collection systems designed to collect oil leakage and spray from all potential reactor coolant pump oil system leakage points have been installed and properly maintained (Time permitting, the actual installation should be verified during outages after work on the pumps has been completed). Visually inspect the oil collection pans and spray shields to verify they are collecting all oil leakage.
- g. Compensatory Measures and Fire Watch. Verify the following:
1. Compensatory measures are put in place by the licensee for out-of-service, degraded or inoperable fire protection equipment, systems or features (e.g. detection and suppression systems and equipment, passive fire barrier features, or safe shutdown functions or capabilities). Fire watch is often the compensatory measure of choice for a large variety of fire protection malfunctions and deficiencies. Assure that the fire watch or other compensatory measure is commensurate with the significance of the

deficiency.

2. Verify that assigned fire watches are being completed. This can be done by checking a completed fire watch log for the time and individual making the completed tour, then checking it against security key card entry records. Another method could be to wait in an area requiring a fire watch inspection to see if the individual performing the fire watch comes through the area. This later method could be combined with inspecting that area as a fire area sample.
3. Licensee's plans for permanent corrective actions including effectiveness in returning the equipment to service in a reasonable period of time.
4. For plants that have transitioned to NFPA 805 inspectors should do sample walkdowns of the revised procedures for assessing the feasibility of the manual actions that the licensees are implementing as part of their corrective actions.

02.02 Annual Inspection. The annual inspection evaluates the licensee's fire brigade performance. While the evaluation is an annual process, observation and evaluation of all the important drill activities as part of single drill may not be effectively accomplished. Therefore, inspectors may need to observe the conduct of several fire brigade drill segments (announced and unannounced) through the year to be able to formulate an appropriate assessment for the period. The licensee's fire brigade capability to meet 10 CFR 50, Appendix R, Section III H and I requirements for training, dedicated size and membership, equipment, etc., can be verified independent of drills (Appendix R requirements may not apply to all sites). This review is conducted to ensure the capability of the fire brigade members, the leadership ability of the brigade leader, use of turnout gear and fire-fighting equipment, and the effectiveness of the team operation.

As part of the observation of fire brigade drills, verify that the fire brigade considers the following aspects when it responds and conducts their fire fighting activities:

- a. The specified number of individuals assigned to the fire brigade response including the fire brigade leader. Minimum of five dedicated members with no ancillary duties.
- b. Each member sets out his/her designated protective clothing and turnout gear, and properly dons the gear. Identify the required gear and verify availability of correct sizes.
- c. Self-contained breathing apparatus (SCBA) are available and are properly worn and used. Verify that bunker gear, including the complete SCBA, was completely donned before entering the fire scene. Evaluate the SCBA program including storage, training, expectations for use, and maintenance. Findings in this area should be assessed for significance using IMC 0609 Appendix B, Emergency Preparedness SDP.

- d. Control room personnel follows procedure for verification of the fire and initiation of response, including identification of fire location, dispatching fire brigade, and sounding alarms. Emergency action levels are declared and notifications are made in accordance with NUREG 0654 and 10 CFR 50.
- e. Fire brigade leader exhibits command of the fire brigade and has a copy of the pre-fire plans or strategy. Manager in charge of the response, for example, the shift supervisor or SRO (not the fire brigade leader), has access to pre-fire plans or strategy and applicable procedures.
- f. Starting at the muster area fire brigade leader maintains control. Members are briefed, discuss plan of attack, receive individual assignments, complete communications checks, and generally get ready to combat the fire. Plan of attack discussion should be consistent with the pre-fire plans or strategies and include potential hazards in the fire area.
- g. Fire brigade arrives at the fire scene in a timely manner, taking the appropriate access route specified in the strategies and procedures. For fire drills conducted in the radiation control areas, the specified most direct route may not be followed by the brigade.

Control/command is set up near the location of the fire after assessing the fire, and communications are established with the control room and fire brigade members.

Radio communications between the command post, control room, and plant operators and among fire brigade members remain efficient and effective for the duration of the drill.

- h. 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.
- i. The fire area of concern is entered in a controlled manner following the principle of "two-in/two-out" (two fire brigade members enter while two remain outside the area of concern). Additionally, the fire brigade members stay low to the floor and feel the door for heat prior to entry into the fire area of concern.
- j. The fire brigade brings sufficient fire-fighting equipment to the scene to properly perform its fire-fighting duties.
- k. Members of the fire brigade check for fire victims and propagation into other plant areas.
- l. Effective smoke removal operations are simulated in accordance with pre-fire plans and strategies by aligning ventilation in the fire area or by placing smoke removal units at the proper doors. Areas protected by gaseous suppression 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 availability and condition of such equipment (e.g. fans, hoses, etc.).

- m. The fire-fighting pre-fire plan strategies were utilized.
- n. The licensee's drill scenario was followed, and the acceptance criteria for the drill objectives were met.
- o. The licensee performs a post-drill critique to discuss any failures and weaknesses associated with the fire drill performance. Training and other improvement needs are identified.
- p. At the conclusion of the drill, all fire fighting equipment is returned to a condition of readiness to respond to an actual fire.

02.03 Identification and Resolution of Problems. During quarterly and annual resident inspections, verify that the licensee is identifying issues related to this inspection area at an appropriate threshold and entering them into the corrective action program. For a sample of selected issues documented in the corrective action program, verify that the corrective actions are appropriate. See Inspection Procedure 71152, "Identification and Resolution of Problems," for additional guidance.

71111.05AQ-03 INSPECTION GUIDANCE

General Guidance.

For those fire protection structures, systems, and components installed to satisfy NRC requirements, designed to NFPA codes and standards, that 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 FSAR 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 such codes, the NRC expects that the design conforms to the codes and the design is subject to inspection against the NFPA codes.

The "Authority Having Jurisdiction" as described in NFPA documents refers to the Director, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, or designee, consistent with the authority specified in 10 CFR 1.43.

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.

The resident inspectors may risk-inform the focus of their walkdowns by following the guidance provided below:

- The selection of areas to be inspected is based on risk insights from a senior reactor analyst (SRA), NRC Significance Process (SDP) worksheets, or the plant specific PRA. Similar information may be readily available from the past triennial fire protection inspection reports (IP71111.05T) as well.
- The selection of areas to be inspected factors in the plant configuration. In this regard, IP71111.04 “Equipment Selection” and IMC 2515, Appendix D provides insights on areas that are likely to result in risk-significant findings.
- For example, if train A of a safety system is out of service, then any finding in fire areas containing components of cables of train B are likely to result in potentially risk significant findings. Also, if the fire detection or suppression systems of a particular fire area are degraded or out of service, then findings in areas that house cables or components of the redundant train are likely to result in potentially risk-significant findings.
- For plants that have adopted a risk-informed, performance-based Fire Protection Program in accordance with 10CFR 50.48(c) and NFPA 805, the inspectors may use information developed by the licensee for understanding the risk insights for various plant areas.

Specific Guidance.

03.01 Quarterly Inspection. The resident inspector should not attempt to address all plant areas during each inspection. The routine plant DID walkdown should focus on four to six plant areas important to safety. The resident inspector should note transient combustibles and ignition sources (and compare these with the limits provided in licensee’s administrative procedures). The resident inspector should also note 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 fire plan should define the hazards and fire protection DID features to assist the inspector in determining whether the attributes of the fire area are within the limits of the licensing basis defined in the fire protection program. The required content of the fire plans will be defined in the fire protection program and will include information such as fire hazards, locations of hose stations and extinguishers, locations of sprinkler isolation valves, important equipment in the area, etc. The plan can be a great help in distinguishing what combustibles are transient combustibles (if it is not on the plan, it is probably transient). The accuracy of the fire plan is important because it will be an important tool in providing information and guidance to the fire brigade team leader in determining the most likely location of the fire in the fire area and the best strategy for approaching the fire.

03.02 Annual Inspection. Follow the guidance provided in section 02.02 of this procedure.

03.03 Identification and Resolution of Problems. No specific guidance provided.

71111.05AQ-04 RESOURCE ESTIMATE

The resources to perform this inspection procedure is estimated to be, on average, 35 hours per year for quarterly and annual inspections including time allocated for annual observation of a fire drill.

71111.05AQ-05 COMPLETION STATUS

Inspection of the minimum sample size will constitute completion of this procedure in the Reactor Programs System (RPS). That minimum sample size will consist of one sample representing observation of selected fire drills in accordance with Section 02.02, and 16 samples per year representing tours of plant areas important to safety in accordance with Section 02.01.

7111.05AQ-06 REFERENCES

NOTE: Some references contain hyperlinks to the specific document. These hyperlinks should be used with caution (the linked document should be verified to be the current version prior to use).

[Inspection Manual Chapter 0609 Appendix F “Fire Protection Significance Determination Process”](#)

[Information Notice 97-48 “Inadequate or Inappropriate Interim Fire Protection Compensatory Measures”](#)

[Regulatory Guide 1.189 “Fire Protection for Nuclear Power Plants”](#)

[Regulatory Issue Summaries 2005-07 “Compensatory Measures to Satisfy the Fire Protection Program Requirements”](#)

END

Attachment 1

Revision History for IP 71111.05AQ

Commitment Tracking Number	Issue Date	Description of Change	Training Needed	Training Completion Date	Comment Resolution Accession Number
N/A	08/31/06	Researched commitments back four years - none found.	N/A	N/A	N/A
N/A	07/07/05	Updated guidance to assess fire brigade performance.	No	N/A	None
N/A	09/05/06 CN 06-022	Added "Completion Status" identifying a sample size of 24.	No	N/A	None
N/A	01/31/08 CN 08-005	2007 ROP Re-alignment reduced the sample size to 16 and resource hours to 35 hours. Replace "tour" with "perform a defense-in-depth (DID) walkdown." (ROPFF 1155)	No	N/A	N/A
NA	11/16/09 CN 09-027	Updated the procedure to incorporate specific elements of NFPA-805.	No	N/A	ML092780063
N/A	09/30/10 CN 10-020	IP 71111.05AQ has been revised to address feedback form 71111.05-1542. The revision added a reference section to the procedure.	No	N/A	None