

## ATTACHMENT 71111.05T

INSPECTABLE AREA: Fire Protection (Triennial)

CORNERSTONE: Initiating Events  
Mitigating Systems

EFFECTIVE DATE: January 31, 2013

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

- (1) preventing fires from starting;
- (2) rapidly detecting, controlling, and extinguishing 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 (SSD) of the reactor

Licensees are also expected to take reasonable actions to mitigate postulated events that could potentially cause loss of large areas of power reactor facilities due to explosions or fires. NRC Order EA-02-026, "Order for Interim Safeguards and Security Compensatory Measures" spanned a wide range of security-related actions required to be taken by power reactor licensees in response to the events of September 11, 2001. Section B.5.b of the Order dealt specifically with these postulated events. In response to this Order (and the subsequent requirements of Title 10 of the *Code of Federal Regulations* (10 CFR) 50.54 (hh)(2), licensees implemented alternative mitigating strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under such circumstances. These are collectively referred to as B.5.b requirements.

LEVEL OF EFFORT: Every 3 years, an inspection team that includes inspectors who are knowledgeable in the areas of fire protection, reactor operations, and electrical inspections will conduct a design-based, plant-specific, risk-informed, onsite inspection of the DID elements used to mitigate the consequences of a fire. The review will include an

assessment of the licensee's capability of problem identification and resolution of fire protection issues.

In addition, every 3 years inspectors trained to review alternative mitigating strategies should review several mitigating strategies to ensure they remain feasible. Additionally, inspectors should review the storage, maintenance, and testing of B.5.b related equipment.

**CHANGES IN SCOPE:** For triennial inspections that started January 2011, the scope of this procedure had been changed to focus inspection efforts on fire-induced circuit failures and operator manual actions associated with assuring safe shutdown capability. The Fire Protection Stabilization Plan, Commission paper SECY 09-0161, Task 3 and 4, relate to closure of fire-induced circuit failure and operator manual actions issues. Part of this plan is to validate that the guidance in these technical areas is sufficient for licensees to perform actions to achieve compliance. This change in scope for IP 71111.05T provides validation that licensees have appropriately implemented NRC/industry guidance.

National Fire Protection Association Standard 805: Because the transition process to NFPA 805 requires an in-depth safety circuit analysis for equipment identified for nuclear safety functions (i.e., safe shutdown), the NRC alters the scope of this triennial fire protection inspection during the transition period by excluding circuit inspections for some plants.

## 71111.05-01 INSPECTION OBJECTIVES

01.01 The inspection team will evaluate the design, operational status, and material condition of the licensee's FPP, including assumptions made in plant and area specific fire protection analyses, by verifying that the licensee's program includes:

- a. adequate controls for combustibles and ignition sources inside the plant;
- b. adequate fire detection and suppression capability;
- c. passive fire protection features in good material condition;
- d. adequate compensatory measures for out-of-service, degraded or inoperable fire protection equipment, systems, or features;
- e. adequate protection to ensure the post-fire capability to safely shut down the plant, including implementation of NRC/industry fire-induced circuit failure analysis guidance;
- f. feasible and reliable manual actions when appropriate to achieve SSD; and

- g. adequate review and documentation of FPP changes.

Inspection Procedure (IP) 71111.05AQ, "Fire Protection (Annual/Quarterly)," is designed to complement the triennial inspection in the areas of fire brigade capability and water supply and delivery system maintenance and adequacy. The inspection team should consider the need for additional inspections in these areas based on previous assessments and potential issues.

01.02 The inspection team will verify that B.5.b mitigating strategies are feasible in light of operator training, maintenance of necessary equipment, and any plant modifications.

## 71111.05-02 INSPECTION REQUIREMENTS

### 02.01 Inspection Preparation.

- a. Fire Areas. Every 3 years, an inspection team will select three to five risk-significant fire areas or zones (depending on the team's makeup, scope, and resources) and conduct risk-informed inspections of selected aspects of the licensee's FPP. The team may adjust the number of fire areas inspected during the inspection based on the complexity of issues.

The initial selection of areas to be inspected should be based on inputs from a senior reactor analyst (SRA), a fire protection specialist and an electrical engineer. For each area the selection process will consider but will not be limited to the following:

1. A review of the fire hazard analyses
2. Potential ignition sources
3. The configuration and characteristics of combustible materials
4. Routing of circuits important to accomplish and maintain safe shutdown condition
5. The licensee's fire protection and fire fighting capability
6. The licensee's use of operator manual actions

The inspection should focus on post-fire safe shutdown capability and should inspect alternative or dedicated shutdown capability, as applicable.

- b. B.5.b Mitigating Strategies. As part of the inspection, a review of B.5.b mitigating strategies should also be performed. The team should select one or more strategies to review, and part of this review should address the storage, maintenance, and testing of B.5.b related equipment. When determining which strategies and equipment to review, the team should consider the following:

1. Strategies for which the licensee has modified the regulatory commitment since the last performance of this inspection (or the performance of Temporary Instruction 2515/171). Any such strategies should be the main focus of the inspection effort.
2. Complexity of the strategies.
3. Risk significance of the strategies.
4. Strategies from different categories. For the purpose of this inspection the mitigating strategies are broadly characterized as fire fighting, command and control, spent fuel pool, and reactor and containment related.

02.02 Fire Protection Inspection Requirements. The inspection guidance is designed to verify that the systems required to achieve and maintain post-fire SSD are capable of controlling reactivity, reactor coolant makeup, reactor heat removal, process monitoring, and to support associated system functions, and that the licensee's engineering and licensing documents (e.g., NRC guidance documents, license amendments, safety evaluation reports (SERs), exemptions, deviations) support the selection of the designated systems and equipment.

The verification of fixed fire protection systems, including the installation, design, and testing of the systems, and their adequacy to control and/or suppress fires associated with the hazards of each selected area will be done against the National Fire Protection Association (NFPA) code of record.

If a fire brigade drill is observed, the inspection team should consider the lines of inspection inquiry outlined in IP 71111.05AQ.

Manual actions not part of an NRC approved exemption or deviation used in lieu of one of the means specified in 10 CFR Part 50, Appendix R, Section III.G.2 to ensure one of the redundant trains is free of fire damage are only temporary compensatory measures and therefore will be evaluated using guidance provided in paragraph 02.02.j.2 of this document. If one of the redundant trains in the same fire area is free of fire damage by one of the specified means in section III.G.2, then the use of feasible and reliable operator manual actions, or other means necessary to mitigate fire-induced operation or mal-operation of important to safe shutdown components may be used without prior approval.

a. Protection of Safe Shutdown Capabilities.

Verify that the fire protection features in place to protect SSD capability, including power, control, and instrumentation cables, satisfy the separation and design requirements of Section III.G of Appendix R (or, for reactor plants reviewed under the Standard Review Plan, license specific separation requirements).

b. Passive Fire Protection.

Verify through observation of material conditions that the fire ratings of fire area boundaries, raceway fire barriers, and equipment fire barriers appear to be appropriate for the fire hazards in the area.

Verify through review of installation or repair records that material of an appropriate fire rating (equal to the overall rating of the barrier itself) has been used to fill openings and penetrations and that the installation meets engineering design. The NRC established the basis for effective fire barriers in Generic Letter 86-10, "Implementation of Fire Protection Requirements" and NUREG-1552, Supplement 1, "Fire Barrier Penetration Seals in Nuclear Power Plants."

Verify through review of installation or repair records that material of an appropriate fire rating has been used as fire protection wraps, that the installation meets engineering design and standard industry practices, and that it was either properly evaluated or qualified by appropriate fire endurance tests. Sample completed surveillance and maintenance procedures for selected fire doors, fire dampers, and fire barrier penetration seals to ensure that they are being properly inspected and maintained.

Verify that an evaluation has been performed using appropriate fire test data for unusual installation configurations and/or application of unusual materials.

c. Active Fire Protection.

Verify and review the material condition, operational lineup, operational availability, and design of fire detection systems, fire suppression systems, manual firefighting equipment, and fire brigade capabilities.

Verify that detection, and automatic and manual suppression systems are installed, tested, and maintained in accordance with the code of record and would effectively control and/or extinguish fires associated with the hazards of each selected area.

Verify that the design capability of suppression agent delivery systems meet the requirements of the fire hazards. The team should compare the fire brigade pre-plan strategies with as-built plant conditions and fire response procedures. This review is done to verify fire fighting pre-plan strategies and drawings are consistent with the fire protection features and potential fire conditions described in the FPP.

d. Protection from Damage from Fire Suppression Activities.

Verify that redundant trains of systems required for hot shutdown, which are located in the same fire area, are not subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems, and that the licensee has addressed each of the following:

1. A fire in a single location that may, indirectly, through the production of smoke, heat, or hot gases, cause activation of automatic fire suppression that could potentially damage all redundant trains.
  2. A fire in a single location (or inadvertent manual or automatic actuation, or rupture of a fire suppression system) that may indirectly cause damage to all redundant trains (e.g., sprinkler-caused flooding of other than the locally affected train).
  3. Adequate drainage is provided in areas protected by water suppression systems.
- e. Alternative Shutdown Capability.
1. Methodology.

Verify that the licensee's alternative shutdown methodology has properly identified the systems and components necessary to achieve and maintain SSD conditions for each fire area, room or zone selected for review. Specifically determine the adequacy of the systems selected for reactivity control, reactor coolant makeup, reactor heat removal, process monitoring and support system functions.

If the above high level performance criteria are not met, review the licensee's engineering and/or licensing justifications (e.g., NRC guidance documents, license amendments, technical specifications, SERs, exemptions, deviations).

Verify that hot and cold shutdown from outside the control room can be achieved and maintained with or without the availability of off-site power for fires in areas where post-fire SSD relies on manipulating shutdown equipment from outside the control room.

Verify that the transfer of specified plant control functions from the control room to the alternative location(s) has been demonstrated such that the function would be unaffected by fire-induced circuit faults (e.g., by the use of separate fuses and power supplies for alternative shutdown control circuits).
  2. Operational Implementation.

Verify that the training program includes an evaluation of alternative or dedicated safe shutdown capability for licensed and non-licensed personnel.

Verify that personnel required to place and maintain the plant in hot shutdown following a fire using the alternative dedicated shutdown system are properly trained and are available at all times among the onsite shift staff, exclusive of the fire brigade.

Verify that adequate procedures for use of the alternative shutdown system are in place.

Verify that human factors attributes were addressed in the development of the alternative shutdown procedures (e.g., placement and accessibility of equipment, environmental conditions, etc.). Consider conducting a walk down of the procedure step by step paying special attention to the human factors elements.

Verify that the operators can reasonably be expected to perform and complete the instructions of the procedures within applicable shutdown time requirements.  
- see Section 02.02j.2.

Verify that the licensee conducts periodic operational tests of the alternative shutdown transfer capability and instrumentation and control functions. Also verify that the tests are adequate to prove the functionality of the alternative shutdown capability.

f. Circuit Analyses.

NOTE: This section is not applicable to plants that have been actively transitioning to NFPA 805 for less than three years since the date acknowledged by the NRC as the start of transition activities. Plants that do not meet the aforementioned criteria are subject to inspection per this section. Licensees in transition to NFPA 805 who are inspected under this section shall address all circuit related issues in accordance with their approved fire protection program and will typically receive enforcement discretion for these issues, per Section 9.0 of the NRC Enforcement Policy.

Verify that the licensee has identified structures, systems, and components (SSCs) important to SSD of the reactor and their demonstrated compliance with 10 CFR Part 50.48.

Verify for the selected areas that the licensee has performed a post-fire SSD analysis.

Review specific process and instrumentation diagrams (P&IDs) for flow diversions, loss of coolant, or other scenarios which could adversely affect the nuclear power plants capability to achieve and maintain hot shutdown. Verify that the licensee's analysis identified and considered such processes and circuits, and that the analysis has shown that hot shorts, and/or shorts to ground will not prevent SSD.

Verify that circuit breaker coordination and fuse protection have been properly analyzed, and are capable of protecting the power source of the designated redundant or alternative safe shutdown system/equipment.

Verify that circuits for which hot shorts, open circuits, and shorts to ground could affect SSD success path equipment within a fire area (outside primary containment) have been protected with III.G.2 type protection

For cables that are important to SSD but not part of the success path, and that do not meet the separation/protection requirements of section III.G.2 of 10 CFR 50, Appendix R, verify that the circuit analysis considered the following for the areas being evaluated:

1. Cable failure modes.

- (a) For any single thermoplastic or thermoset multiconductor cable (including armored), review any combination of conductors within the cable (e.g. intra-cable) for which a short will cause spurious actuation(s).
- (b) For any 2 adjacent thermoplastic cables (within the same cable tray or conduit), review any combination of conductors between the two cables for which a short will cause spurious actuation(s).

Combinations of two adjacent cables should be evaluated for cases where multiple cables may be damaged by the same fire. Multiple spurious actuations may be evaluated, depending on the number of conductors, and the circuit configuration.

- (c) For cases involving direct current (DC) control circuits, consider the potential spurious operation due to failures of the control cables (even if the spurious operation requires two concurrent hot shorts of the proper polarity, e.g., plus-to-plus and minus-to-minus, when the conductors are within the same cable). Consider potential spurious actuations when the source and the target conductors are in two independent multiconductor cables for high low pressure interfaces.
- (d) For cases involving decay heat removal (DHR) system isolation valves at high-pressure and low-pressure interfaces verify that the three-phase power cables to the valves (either thermoset or thermoplastic jacketed) are not vulnerable to three-phase proper polarity hot shorts.

2. Verify that the licensee has either (1) determined that there is not a credible fire scenario (through fire modeling), (2) implemented feasible and reliable manual actions to assure SSD capability, or (3) performed a circuit fault analysis demonstrating no potential impact on SSD capability exists.

- (a) For ungrounded circuits, fire induced faults are not assumed to clear, whereas grounded circuits may be assumed to clear in 20 minutes.
- (b) For concurrent faults in equipment that is not sealed in or latched, two cables should be considered for non-high low interface equipment. For high low pressure interface cables, three separate cables should be considered to fault concurrently.

g. Communications.

Verify, through inspection of the contents of designated emergency storage lockers and review of emergency control station alternative shutdown procedures, that portable radio communications and/or fixed emergency communications systems are available, operable, and adequate for the performance of the designated activities. Assess the



capability of the communication systems used for fire event notification and fire brigade fire fighting activities and to support the operators in the conduct and coordination of their required actions (e.g., consider ambient noise levels, clarity of reception, reliability, and coverage patterns). If specific issues arise relating to alternative or dedicated shutdown communications adequacy, then, observe a licensee-conducted communications test in the subject plant area or areas.

Verify that a fire would not affect communications equipment such as repeaters, transmitters, etc..

h. Emergency Lighting.

Review emergency lighting provided, either in fixed or portable form, along access routes and egress routes, at control stations, plant parameter monitoring locations, and at manual operating stations:

1. If emergency lights are powered from a central battery or batteries, verify that the distribution system contains protective devices so that a fire in the area will not cause loss of emergency lighting in any unaffected area needed for SSD operations.
2. Verify that battery power supplies are rated with at least an 8-hour capacity.
3. Verify that illumination is sufficient to permit access to and verification of components for the monitoring of SSD indications and/or the proper operation of SSD equipment.
4. Verify that the operability testing and maintenance of the lighting units follow licensee procedures and accepted industry practice.
5. Verify that emergency lighting unit batteries are being maintained consistent with the manufacturer's recommendations.

i. Cold Shutdown Repairs.

Verify that the licensee has procedures, equipment, and materials to repair components required for cold shutdown which might be damaged, that these components can be made operable, and that cold shutdown can be achieved within the required time frames. Verify that the repair equipment, components, tools, and materials (e.g., pre-cut cable connectors with prepared attachment lugs) are available and accessible on site.

j. Compensatory Measures.

1. Compensatory Measures for Degraded Fire Protection Components. Verify that compensatory measures are in place for out-of-service, degraded, or inoperable fire protection and post-fire safe shutdown equipment, systems, or features (e.g. detection and suppression systems and equipment, passive fire barriers, or

pumps, valves or electrical devices providing safe shutdown functions or capabilities). Short term compensatory measures should compensate for the degraded function or feature by enhancing one or more defense-in-depth elements until appropriate corrective action can be taken. Review the licensee's effectiveness in returning the equipment to service in a reasonable period of time (typically days or weeks).

2. Manual Actions as Compensatory Measures for Safe Shutdown. The three acceptable methods that meet the requirement for maintaining one of the redundant trains in the same fire area free of fire damage are based on the combination of physical barriers, spatial separation, fire detection and automatic suppression systems. These methods are described in 10 CFR Part 50 Appendix R, Section III.G.2. Licensee implemented manual actions to respond to potential maloperations of SSD success path components that may result from the failure to meet this requirement do not correct the underlying performance deficiency and therefore will not be accepted as final corrective action. However, the staff concluded that for an interim period, while appropriate corrective actions are implemented or while preparations are made by the licensee to submit exemptions or deviations, compensatory measures in the form of manual actions may be acceptable if the manual actions meet the criteria provided below.

If the inspectors determine that the manual actions cannot be reasonably accomplished and therefore implementation may lead to an unsafe plant condition, alternate compensatory measure(s) or temporary corrective action(s) must be implemented.

- (a) Applicability. This guidance is provided for assessing manual actions implemented in conjunction with a licensee requirement to meet Section III.G.2 (for plants licensed before January 1, 1979), or a licensee commitment within their licensing basis to provide safe shutdown capability (for plants licensed after January 1, 1979).

Verify that the licensee is committed to meet the requirements of Section III.G.2. Determine whether the requirements are met with or without the use of manual actions. If manual actions are not invoked, this guidance is not applicable.

If manual actions were previously approved by the staff and an exemption or deviation has been issued, verify that the licensee continues to meet the terms of the exemption or deviation.

- (b) Diagnostic Instrumentation. Verify that adequate diagnostic instrumentation, unaffected by the postulated fire, is provided for the operator to detect the specific spurious operation that occurred. Some licensees may have protected only the circuits specified in Information Notice 84-09. Additional instrumentation may be needed to properly assess a spurious operation. Annunciators, indicating lights, pressure gages, and flow indicators are among the instruments typically not

protected from the effects of a fire. Instrumentation should also be available to verify that the manual action accomplished the intended objective.

- (c) Environmental Considerations. Evaluate environmental conditions the operators may encounter while traveling to the area where the manual action will be performed and within the area where the manual action will take place. The conditions to be verified may include the following:
  - (1) Radiation levels shall not exceed normal 10 CFR Part 20 limits.
  - (2) Emergency lighting is provided as required in Appendix R, Section III.J, or by the licensee's approved FPP.
  - (3) Temperature and humidity conditions are such that they do not affect the operator's ability to perform the manual action.
  - (4) Fire effects such as smoke, toxic gases, and fire fighting suppression agents (i.e., water, CO<sub>2</sub>) do not affect the operator's ability to perform the manual action.
- (d) Staffing. Evaluate licensee shift staffing to determine whether enough qualified personnel are available to perform the required manual actions and to safely operate the reactor exclusive of fire brigade staffing.
- (e) Communications. Verify that manual action coordination with other plant operations can be accomplished, and that communications capability is protected from effects of a postulated fire.
- (f) Equipment Availability.
  - (1) Evaluate the need for special tools and verify that such tools are dedicated and readily available.
  - (2) Evaluate the accessibility of tools and equipment. If special access equipment is needed (such as a ladder), verify the availability of the equipment. Verify that an operator can reach the required location without personal hazard.
  - (3) If the manual action involves reliance on equipment from a different unit, verify there are controls in place that the equipment would be available.
- (g) Training. Verify that operator training on the manual actions and the associated procedure(s) is adequate and current.
- (h) Procedures. Review procedural guidance to ensure that it is adequate and given in an emergency procedure.

- (1) Operators should not rely on having time to study normal plant procedures to find a method of operating plant equipment that is seldom used.
  - (2) If a symptom-based procedure is used, consider whether operators have to identify and diagnose multiple equipment damage scenarios in order to select the appropriate responses. Multiple cases requiring identify-diagnose-act steps increase the complexity and operator stress involved, potentially reducing the reliability of the manual actions.
  - (3) If procedures are used to preemptively de-energize a large number of components to avoid spurious operations of equipment that would impact the ability to safely shutdown in the event of a fire (up to and including a self-induced station blackout), the inspectors should assess whether this strategy unnecessarily removes equipment than might be available for safe shutdown with more complete cable routing information.
- (i) Verification and Validation. Determine whether the manual actions have been verified and validated by plant walkdowns using the current procedure. Ensure that the licensee has adequately evaluated the capability of operators to perform the manual action in the time available before the plant will be placed in an unrecoverable condition.
- (1) Sufficient time margin should be available to complete all critical manual actions in order to provide a high degree of assurance that the actions can be reliably performed. Critical actions are those actions that an unsuccessful performance would likely result in failure of the safe shutdown strategy.
  - (2) Complex tasks are more likely to require a detailed analysis to determine whether they can be performed reliably. Complex tasks involve several steps to restore a single function or include actions that require coordination between multiple operators in different locations. Examples of complex tasks include restoring plant functions, such as charging, auxiliary feedwater injection, reactor core isolation cooling, and manual starting and loading of diesel generators.
- k. Review and Documentation of FPP Changes. Verify that changes to the approved FPP do not constitute an adverse effect on the ability to safely shutdown. See Enclosure 3 for detailed information.
- l. Control of Transient Combustibles and Ignition Sources. IP 71111.05AQ, Fire Protection (Annual/Quarterly) is designed to complement the triennial inspection in the areas of controls for combustibles and ignition sources inside the plant. The team

should consider the need for additional inspections in this area based on previous assessments and potential issues.

02.03 B.5.b Inspection Activities. The inspection team should review one sample of the licensee's preparedness to handle large fires or explosions by reviewing one or more mitigating strategies. This review should verify that the licensee continues to meet the requirements of its B.5.b related license conditions and 10 CFR 50.54 (hh)(2) by determining the following:

- a. Procedures are being maintained and adequate.
- b. Equipment is properly staged and is being maintained and tested.
- c. Station personnel are knowledgeable and can implement the procedures.

02.04 Identification and Resolution of Problems. The inspection team should verify that the licensee is identifying issues related to this inspection area at an appropriate threshold and entering the issues in the corrective action program. For a sample of selected issues documented in the corrective action program, the team should verify that the corrective actions are appropriate. See IP 71152, "Identification and Resolution of Problems," for additional guidance.

#### 71111.05-03 INSPECTION GUIDANCE

##### 03.01 Inspection Preparation.

- a. Inspection Team. The team assigned to conduct the multidisciplinary triennial fire protection inspection should include inspectors who are knowledgeable in the areas of reactor operations, electrical inspections, and fire protection.
  - 1. Reactor Operations. The inspector knowledgeable in this area will assess the capability of reactor and balance-of-plant systems, equipment, operating personnel, and procedures to achieve and maintain post-fire SSD and minimize the release of radioactivity to the environment in the event of fire. Therefore, the inspection team leader will ensure that the inspector is knowledgeable regarding integrated plant operations, maintenance, testing, surveillance and quality assurance, reactor normal and off-normal operating procedures, and boiling-water reactor and/or pressurized-water reactor nuclear and balance-of-plant systems design.
  - 2. Electrical Inspections. The inspector knowledgeable in this area will identify electrical separation requirements for redundant train power, control, and instrumentation cables. The inspector will review alternative shutdown panel electrical isolation design to establish the panel's electrical independence from postulated fire areas. Therefore, the inspection team leader will ensure that the inspector is knowledgeable regarding reactor plant electrical and instrumentation and control design and is familiar with industry ampacity derating standards.

3. Fire Protection. The inspector knowledgeable in this area will work with other team members in determining the effectiveness of the fire barriers and systems that establish the reactor plant's post-fire SSD configuration and maintain it free of fire damage. The inspector will determine whether suitable fire protection features (suppression, separation distance, fire barriers, etc.) are provided for the separation of equipment and cables required to ensure plant safety. Therefore, the inspection team leader will ensure that the inspector is knowledgeable regarding reactor plant fire protection systems, features and procedures.
  4. B.5.b Mitigating Strategies. The inspector knowledgeable in this area will work with other team members to identify which alternative mitigating strategies should be reviewed. The inspector will determine if these strategies remain feasible. Therefore, the inspection team leader will ensure that the inspector is knowledgeable regarding B.5.b mitigating strategies.
- b. Regulatory Requirements and Licensing Bases. The regulatory requirements and licensing bases against which post-fire safe shutdown capability is assessed are as follows:
1. 10 CFR Part 50. 10 CFR Part 50.48(a), "Fire Protection," requires each operating nuclear power plant to have a fire protection plan that satisfies the requirements of Criterion 3, "Fire Protection" of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." The NRC has identified an acceptable plan as one that meets the requirements of Appendix R to 10 CFR Part 50, or a plan that satisfies the guidance of standard review plan (SRP) Section 9.5-1.
  2. Plants licensed before January 1, 1979. These plants are subject to the requirements of 10 CFR 50.48 and Appendix R to 10 CFR Part 50. Appendix R, Sections III.G, "Fire protection of safe shutdown capability," III.J, "Emergency lighting," III.L, "Alternative and dedicated shutdown capability," and III.O, "Oil collection system for reactor coolant pump" were backfit on plants licensed before January 1, 1979. Licensees were required to meet the separation requirements of Section III.G.2, the alternative or dedicated shutdown capability requirements of Sections III.G.3 and III.L, or to request an exemption. Alternative or dedicated safe shutdown capabilities were required to be submitted to the Office of Nuclear Reactor Regulation (NRR) for review. NRR approvals are documented in SERs.
  3. Plants licensed after January 1, 1979. These plants are subject to requirements as specified in their current licensing basis, which includes conditions of their facility operating license, UFSAR, commitments made to the NRC, or deviations exemptions or licensee amendments granted by the NRC.
  4. Changes to the FPP. If the licensee has adopted the standard fire protection license condition, then the licensee may make changes to the approved FPP without prior approval by the Commission only if those changes would not

adversely affect the ability to achieve and maintain safe shutdown in the event of a fire. In addition the licensees may be required to retain the fire protection plan and each change to the plan as a record pursuant to 10 CFR 50.48(a).

5. Plants in transition to 10 CFR 50.48(c). The plants which have voluntarily agreed to comply with 10 CFR 50.48(c) must continue to satisfy the requirements of Criterion 3 of Appendix A to 10 CFR Part 50, according to their licensing basis.

c. Licensee Notification and Information Gathering.

1. Licensee Notification Letter. The licensee should be notified of the triennial inspection in writing at least three months in advance of the onsite week. The information gathering visit shall be conducted no fewer than three weeks in advance of the onsite inspection week. The letter should discuss the scope of the inspection, request an information-gathering visit to the licensee reactor site or engineering offices, discuss documentation and licensee personnel availability needs during the onsite inspection week, and request a pre-inspection conference call to discuss administrative matters and finalize inspection activity plans and schedules. Attachment 1 provides a template notification letter from the NRC to the licensee concerning the triennial fire protection baseline inspection.
2. Information Gathering Site Visit. The inspection team should conduct a two to three day information gathering site visit. The purposes of the information gathering site visit are to (1) gather site-specific information important to inspection planning, (2) conduct initial discussions with licensee representatives regarding administrative items and inspection activity plans and schedules, and (3) walkdown potential inspection sample fire areas. In advance of the information-gathering site visit, the team leader should provide the licensee with a list of information and documents that may be needed for the team to prepare for and conduct the triennial inspection, as well as a list of any planned requests for licensee conducted evolutions (e.g., emergency lighting tests, communication tests, fire drills, shutdown walkthroughs, etc.).

Before the inspection information gathering trip, the team leader should contact the regional SRA to obtain a summary of plant specific fire risk insights (e.g., fire risk ranking of the plant fire areas, conditional core damage probabilities for those areas, and transient sequences for these rooms). After considering the focus and result of past fire protection and post-fire SSD inspections, the team should select three to five fire areas important to risk and conduct a walkdown of these areas prior to finalizing the sample selection and requesting documentation from the licensee.

After the information gathering site visit, the team leader should use the SRA developed fire risk insights, as well as technical input from the other team members and fire area walkdown results, to develop an inspection plan addressing (for the selected three to five fire areas, zones, as applicable) post-fire SSD capability and the fire protection features for maintaining one success path of this capability free of fire damage.

3. Information Required/Preparation. During the preparation period, the inspection team should gather sufficient information to become familiar with the following:
- (a) The reactor plant's design, layout, and equipment configuration.
  - (b) The reactor plant's current post-fire safe shutdown licensing basis through review of 10 CFR 50.48, 10 CFR Part 50 Appendix R (if applicable), NRC safety evaluation reports (SERs) on fire protection, the plant's operating license, updated final safety analysis report (UFSAR), and approved exemptions or deviations.
  - (c) The licensee's strategy and methodology, and derivative procedures, for accomplishing post-fire safe shutdown conditions. Among the sources of information are the UFSAR, the latest version of the fire hazards analysis (FHA), the latest version of the post-fire safe shutdown analysis, fire protection/post-fire safe-shutdown related changes that used 10 CFR 50.59, 50.48(a) or other criteria, and Generic Letter 86-10 review documentation and modification packages, plant drawings, emergency/abnormal operating procedures, and the results of licensee internal audits (e.g., self assessments and quality assurance audits in the fire protection and post-fire safe shutdown areas).
  - (d) The historical record of plant-specific fire protection issues through review of plant-specific documents such as previous NRC inspection results, internal audits performed by the reactor licensee (e.g., self-assessments and quality assurance audits), corrective action system records, event notifications submitted in accordance with 10 CFR 50.72, and licensee event reports submitted in accordance with 10 CFR 50.73.
  - (e) The safe shutdown systems and support systems credited by the licensee's analysis for each fire area, room, or zone for accomplishing of the required shutdown functions (e.g., reactivity control, reactor coolant makeup, reactor heat removal, and process monitoring and support functions) as necessary to comply with the SSD requirements of 10 CFR 50.48(a) and plant-specific licensing requirements. The shutdown logic for each area, room, or zone to be inspected must be thoroughly understood by the team members.
  - (f) The licensee's analytical approach for electrical circuit separation analyses, and the licensee's methodology for identification and resolution of circuits of concern. The team's electrical review should include addressing the assumptions and boundary conditions used in the performance of the licensee's analyses.

03.02 Fire Protection Inspection Activities. For those fire protection structures, systems, and components installed to satisfy NRC requirements designed to 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 to be evaluated.

Deviations from the codes should be identified and justified in the UFSAR 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.

If the inspectors determine that the operator manual actions are not reasonably accomplishable and therefore implementation may not lead to a safe plant condition, the preliminary finding will be identified and entered into the Significance Determination Process per Inspection Manual Chapter IMC 0609, "Significance Determination Process."

### 03.03 B.5.b Inspection Activities.

- a. NEI 06-12, "B.5.b Phase 2 & 3 Submittal Guideline," the licensee's submittals, the NRC's SER, and the conforming license conditions (codified as 10 CFR 50.54(hh)(2)), available on the [B.5.b Inspection Community of Practice](#) website provide the bases and acceptance guidelines for B.5.b related equipment and mitigating strategies. Previous inspection reports should be referenced for commitments made by licensees to correct deficiencies identified during prior performance of this inspection or performance of Temporary Instruction 2515/171.
- b. It is expected that most of the material that will be reviewed as part of this inspection effort will be sensitive unclassified non-safeguards information (SUNSI). However, based on the scope of the inspection, it is not expected that the inspection report will need to include any SUNSI material, and inspectors should avoid withholding information from public inspection reports to the maximum extent practical. If an inspection does require documentation of SUNSI, IMC 0612, "Power Reactor Inspection Reports," provides guidance on how to document the information. Additional guidance regarding SUNSI is available on the NRC internal website (<http://www.internal.nrc.gov/sunsi>).

03.04 Identification and Resolution of Problems. The inspection team should review a sample of corrective action documents detailing problems affecting fire protection or SSD capability. For licensees that received enforcement discretion for circuit protection issues, the team should verify that applicable problems were identified and entered into the corrective action program and addressed as described in the applicable enforcement guidance memorandum.

## 71111.05-04 RESOURCE ESTIMATE

The resource to perform this inspection procedure is estimated to be 240 hours every 3 years regardless of the number of reactor units at the site.

## 71111.05-05           PROCEDURE COMPLETION

Inspection of the minimum sample size will constitute completion of this procedure in the Reactor Programs System.

The minimum sample size for fire protection inspection activities is defined as 3 samples (inspection of three fire areas), regardless of the number of reactor units at that site.

The minimum sample size for B.5.b inspection activities is defined as 1 sample, regardless of the number of reactor units at that site.

## 71111.05-06           REFERENCES

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

Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process"

Inspection Procedure 71152, "Identification and Resolution of Problems"

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

Individual Plant Examination of Externally Initiated Events (IPEEE)

[Regulatory Guide 1.189](#), "Fire Protection for Nuclear Power Plants"

[Regulatory Issue Summary 2005-07](#), "Compensatory Measures to Satisfy the Fire Protection Program Requirements"

[Regulatory Issue Summary 2005-20](#), "Revision to Guidance Formerly Contained in NRC Generic Letter 91-18, 'Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability'"

Temporary Instruction 2515/171, "Verification of Site Specific Implementation of B.5.b Phase 2 & 3 Mitigating Strategies"

NEI 99-04, "Guidelines for Managing NRC Commitments" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML003680088)

[NRR Office Instruction 105](#), "Managing Regulatory Commitments Made by Licensees to the NRC"

NEI 06-12, Revision 2, "B.5.b Phase 2 & 3 Submittal Guideline" (ADAMS Accession No. ML070090060)

#### B.5.b Inspection Community of Practice

WCAP 16800-NP, Revision 0, "Insights for Operating Steam Generators to Minimize RCS Inventory Loss Following a Loss of All AC and DC Power" (ADAMS Accession No. ML091410184)

THIS ATTACHMENT IS CONSIDERED A TEMPLATE AND MAY BE MODIFIED AS NEEDED  
BY THE ISSUING OFFICIAL

## ATTACHMENT 1

[Mr. Site VP name]  
Licensee Nuclear Department  
Licensee Corporation or Company  
Address

SUBJECT: [SELECTED NUCLEAR POWER STATION, UNITS 1 AND 2] - NOTIFICATION  
OF CONDUCT OF A TRIENNIAL FIRE PROTECTION BASELINE INSPECTION

Dear [Mr. Site VP name]:

The purpose of this letter is to notify you that the U.S. Nuclear Regulatory Commission (NRC) staff will conduct a triennial fire protection baseline inspection at [facility name, units 1 and 2] in [month, year]. The inspection team will be led by [inspector name] from the NRC Region [#] Office. The team will be composed of personnel from the NRC Region [#] Office. The inspection will be conducted in accordance with IP 71111.05T, the NRC's baseline fire protection inspection procedure.

The schedule for the inspection is as follows:

- Information Gathering Visit - Week of [Date]
- On-site Inspection - Weeks of [Dates]

The purposes of the information gathering visit are to obtain information and documentation needed to support the inspection, to become familiar with the station fire protection programs, fire protection features, post-fire safe shutdown capabilities, plant layout, mitigating strategies to address Title 10 of the Code of Federal Regulations (10 CFR) 50.54(hh)(2); and, as necessary, obtain plant specific site access training and badging for unescorted site access.

An initial list of the documents the team will review during the conduct of the inspection are listed in Enclosures 1 and 2. The team leader will contact you with any additional specific document requests prior to the information gathering visit.

During the information gathering visit, the team will also discuss the following inspection support administrative details: office space size and location; specific documents requested to be made available to the team in their office spaces; arrangements for reactor site access (including radiation protection training, security, safety and fitness for duty requirements); and the availability of knowledgeable plant staff and licensing organization personnel to serve as points of contact during the inspection.

We request that during the on-site inspection weeks you ensure that copies of analyses, evaluations or documentation regarding the implementation and maintenance of the station fire protection program, including post-fire safe shutdown capability, be readily accessible to the team for their review. Of specific interest for the fire protection portion of the inspection are those documents which establish that your fire protection program satisfies NRC regulatory

requirements and conforms to applicable NRC and industry fire protection guidance (i.e., fire protection compliance assessment documents). For the 10 CFR 50.54(hh)(2) portion of the inspection, those documents implementing your mitigating strategies and demonstrating the management of your commitments for the strategies are of specific interest. Also, personnel should be available at the site during the inspection who are knowledgeable regarding those plant systems required to achieve and maintain safe shutdown conditions from inside and outside the control room, including the electrical aspects of the relevant post-fire safe shutdown analyses, reactor plant fire protection systems and features, and the station fire protection program and its implementation.

This letter does not contain new or amended information collection requirements subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). Existing information collection requirements were approved by the Office of Management and Budget, under control number 3150 0011. The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid Office of Management and Budget control number.

In accordance with 10 CFR 2.390 of the NRC Rules and Practices, a copy of this letter and its enclosures will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room

Your cooperation and support during this inspection will be appreciated. If you have questions concerning this inspection, or the inspection team's information or logistical needs, please contact [inspector name], the team leader, in the Region [#] Office at [inspector's phone number].

Sincerely,

[Branch Chief name], Chief  
Engineering Branch [#]  
Division of Reactor Safety

Docket Nos.: 50-[No.]; 50-[No.]  
License Nos.: NPF-[No.], DPR-[No.]

Enclosures:

1. Fire Protection Program Supporting Documentation
2. Mitigating Strategies Supporting Documentation

cc: Distribution via ListServ

THIS ENCLOSURE IS CONSIDERED A TEMPLATE AND MAY BE MODIFIED AS NEEDED BY THE ISSUING OFFICIAL

## ENCLOSURE 1

### Fire Protection Program Supporting Documentation

The documents and information requested below should generally be made available to the inspection team during the on-site information gathering visit for the team's use both on-site and off-site during the inspection. Electronic format is the preferred media, except where specifically noted. If electronic media is made available via an internet based remote document management system, then the remote document access must allow inspectors to download, save, and print the documents in the NRC's regional office. Electronic media on compact disc or paper records (hard copy) are acceptable. At the end of the inspection, the documents in the team's possession will not be retained.

Approximately three weeks before the on-site information gathering visit, the following documents should be made available to the team leader for review in the regional office:

- Post-fire Safe Shutdown or Alternative Shutdown Analysis (request A.1)
- Fire Hazards Analysis (request A.2)
- Individual Plant Examination for External Events (Fire Chapter ONLY) (request A.3)
- Fire Probabilistic Risk Assessment (PRA) Summary Document (request A.4)

Based on review of the above four documents, team leader should identify a preliminary list of fire areas being considered for inspection prior to the on-site information gathering visit. During the information gathering visit, or shortly thereafter, the fire areas selected for inspection will be determined.

This document request is based on *typical documents* that a generic plant might have. As such, this generic document request is not meant to imply that any specific plant is required to have all of the listed documents. It is recognized that some documents listed below may not be available for your plant. In addition, the document titles listed below are based on typical industry document names; your plant specific document titles may vary.

#### A. DESIGN AND LICENSING BASIS DOCUMENTS

A.1 Post-fire Safe Shutdown or Alternative Shutdown Analysis.

A.2 Fire Hazards Analysis.

A.3 Individual Plant Examination for External Events (IPEEE) (Fire Chapter ONLY), including:

- Results of any post-IPEEE reviews; and

- LIST of actions taken or plant modifications performed in response to the IPEEE results.

A.4 Fire Probabilistic Risk Assessment (PRA) Summary Document.

A.5 Fire Protection Program and/or Fire Protection Plan.

A.6 LIST of post-fire safe shutdown or alternative shutdown systems (i.e., safe shutdown equipment list).

A.7 Fire Protection System Design Basis Document.

A.8 Post-fire Safe Shutdown or Alternative Shutdown Design Basis Document.

A.9 LIST of applicable NFPA codes and standards and issuance dates (i.e., codes of record).

A.10 LIST of deviations from NFPA codes of record.

A.11 NFPA Compliance Review Report.

A.12 Report or evaluation that compares the fire protection program to the NRC Branch Technical Position (BTP) 9.5-1 Appendix A.

A.13 COPY of licensee submittals and NRC safety evaluation reports that are specifically listed in the facility operating license for the approved fire protection program.

A.14 COPY of NRC Safety Evaluation Reports for fire protection program and post-fire safe shutdown or alternative shutdown features.

A.15 COPY of NRC approved exemptions for plant fire protection and post-fire safe shutdown or alternative shutdown features.

A.16 COPY of exemption requests submitted but not yet approved for plant fire protection and post-fire safe shutdown or alternative shutdown features.

A.17 Facility Operating License.

A.18 Technical Specifications (electronic format only).

A.19 Technical Requirements Manual (electronic format only).

A.20 Updated Final Safety Analysis Report (electronic format only).

## B. GENERAL PLANT DESIGN DOCUMENTS

B.1 Piping and instrumentation diagrams (P&IDs) and legend list for post-fire safe shutdown or alternative shutdown systems (C-size paper drawings).

- B.2 P&IDs and legend list for fire protection systems, including fire water supply, water suppression sprinklers & deluge, and CO2 and Halon systems (C-size paper drawings).
- B.3 Yard layout drawings for underground fire protection buried piping (C-size paper drawings).
- B.4 Layout or arrangement drawings of reactor coolant pump lube oil system leakage points and associated lube oil collection systems (C-size paper drawings) (PWRs only).
- B.5 AC and DC electrical system single line diagrams, from off-site power down to the highest safety-related bus level (typically 4kV, EDG bus) (C-size paper drawings).
- B.6 Single line diagrams for motor control centers (MCCs) that supply post-fire safe shutdown or alternative shutdown loads (only for selected fire areas) (C-size paper drawings).
- B.7 Equipment location drawings which identify the physical plant locations of post-fire safe shutdown or alternative shutdown equipment (C-size paper drawings).
- B.8 Plant layout drawings which identify: (C-size paper drawings)
  - Plant fire area boundaries;
  - Combustible control zone drawings;
  - Areas protected by automatic fire suppression and detection; and
  - Locations of fire protection equipment.

C. CLASSIC FIRE PROTECTION

- C.1 COPY of fire protection program implementing procedures (e.g., administrative controls, surveillance testing, fire brigade).
- C.2 LIST of calculations and engineering analyses, studies, or evaluations for the fire protection system, including the fire water system.
- C.3 Hydraulic calculation or analysis for fire protection water system.
- C.4 Last two completed surveillance's of fire protection features in the selected fire areas (detection, suppression, damper inspections, damper tests, penetration inspections, barrier inspections, etc.).
- C.5 LIST of routine tests, surveillances, and preventive maintenance on fire pumps, including pump controllers and batteries.
- C.6 Last two completed annual fire pump pressure and flow tests.
- C.7 Last two completed monthly and/or quarterly fire pump tests.



- C.8 Last two completed fire loop flow tests and loop flushes.
- C.9 CO2 and Halon initial discharge testing or calculation that determined appropriate concentrations and soak or hold times can be achieved (only for selected fire areas).
- C.10 Last five hot work permits (at power).
- C.11 Last five transient combustible permits (at power).
- C.12 For Fire Brigade Drills, provide the following:
- Last five fire brigade drill critiques;
  - Last drill critique for a drill with off-site fire department support;
  - Last unannounced drill critique;
  - Last back-shift drill critique;
  - Dates, shifts, and locations of unannounced drills for last three years;
  - Summary of any unsatisfactory drill performance items for last three years; and
  - Last unannounced drill critique by a qualified individual independent of the licensee's staff.
- C.13 For fire brigade equipment provide the following:
- Procedure for inventory and inspection; and
  - Most recent inspection and inventory results.
- C.14 Fire Brigade Qualifications, including self-contained breathing apparatus (SCBA) and training lesson plans.
- C.15 COPY of the mutual aid agreement for the “first-due” local fire department that is currently in effect.
- C.16 Flooding analysis for selected fire areas which demonstrates:
- a fire water pipe break in the selected fire areas, won't effect safe shutdown (SSD) capability for equipment in the selected fire areas;
  - a fire water pipe break in an adjacent fire area, won't effect SSD capability for equipment in the selected fire areas;
  - hydrostatic rating of any floor penetration seals installed within the fire areas that are credited with keeping water from leaking into fire areas below.
- C.17 Pre-fire plans for all fire areas.
- C.18 For Emergency Lighting Units (ELU), provide the following:
- LIST of Preventive Maintenance tasks, frequencies, and bases;
  - Most recently performed monthly or quarterly functional test;
  - Most recently performed battery discharge performance test;

- ELU battery loading analysis;
- vendor manual(s) for on-site inspector use;
- results of black-out testing (if performed);
- Maintenance Rule program information related to the ELU; and
- Compensatory measures taken when ELU are out of service.

C.19 Impairment Log (at start of inspection), for fire protection features that are out of service.

C.20 Three Fire Protection screening reviews for recent design changes, modifications, or temporary modifications (e.g., a Generic Letter 86-10 review that screened out).

C.21 LIST of penetration seal work, re-work, or installation activities, in the last three years.

C.22 LIST of fire wrap work, re-work, or installation activities, in the last three years.

C.23 Fire protection system health reports for the two most recent quarters.

C.24 Fire protection program health report for the two most recent quarters.

C.25 Emergency lighting system health reports for the two most recent quarters.

C.26 LIST of fire protection system design changes completed in the last three years (including their associated 10 CFR 50.59 and Generic Letter 86-10 evaluations).

C.27 Licensee evaluation of industry operating experience, such as:  
(specific items to be selected by the inspector)

- NRC IN 2005-03, Inadequate Design and Installation of Seismic-Gap Fire Barriers;
- NRC IN 2006-22, Ultra-Low Sulfur Diesel Fuel Oil Usage, for diesel fire pump;
- NRC IN 2009-02, Bio-Diesel Fuel Oil Usage, for diesel fire pump; and
- NRC IN 2009-29, Fire Pumps Fail to Start due to a Fire.

C.28 COPY of any test, surveillance, or maintenance procedure (current revision), including any associated data forms, for any requested "last performed" test, surveillance, or maintenance.

#### D. ELECTRICAL

D.1 Identify whether the cables in the selected fire areas are predominantly Thermoset or Thermoplastic. Specifically identify any Thermoplastic cable in the selected fire areas.

D.2 Breaker and fuse coordination calculation for post-fire safe shutdown or alternative shutdown equipment (only for selected fire areas).

D.3 Administrative or configuration control procedures that govern fuse replacement (e.g., fuse control procedures).

- D.4 Maintenance procedures that verify breaker over-current trip settings to ensure coordination remains functional, for post-fire safe shutdown or alternative shutdown equipment.
- D.5 Electrical system health reports for the two most recent quarters.
- D.6 Last completed preventive maintenance of those components as tested from the safe shutdown or alternative shutdown panel.
- D.7 Schematic or elementary diagrams for circuits to be reviewed (C-size paper drawings).
- D.8 Cable routing for components and equipment credited for post-fire safe shutdown or alternative shutdown (only for selected fire areas).
- D.9 LIST of post-fire safe shutdown or alternative shutdown design changes completed, in the last three years.

E. SPURIOUS FIRE INDUCED CIRCUIT FAULT

- E.1 LIST of identified fire induced circuit failure configurations (only for selected fire areas).
- E.2 Multiple Spurious Operation (MSO) Expert Panel Report.

F. OPERATIONS

- F.1 LIST of calculations and engineering analyses, studies, or evaluations for the safe shutdown or alternative shutdown methodology.
- F.2 LIST of licensed operator Job Performance Measures (JPMS) for operator manual actions required by post-fire safe shutdown or alternative shutdown.
- F.3 LIST of non-licensed operator training associated with post-fire safe shutdown or alternative shutdown manual actions which would be performed by a non-licensed operator (including JPMS, in-field training walkdowns, simulations, or initial qualification).
- F.4 Lesson plans for post-fire safe shutdown or alternative shutdown training for licensed and non-licensed operators.
- F.5 For operator manual actions (OMAs), provide the following:
  - Manual Action Feasibility Study;
  - Operator Time Critical Action Program;
  - Time lines for time-critical OMAs; and
  - Time line validations.

- F.6 Thermal hydraulic calculation or analysis that determines the time requirements for time-critical manual operator actions.
- F.7 Operating procedures for post-fire safe shutdown from the control room with a postulated fire in the selected fire areas.
- F.8 Operating procedures for post-fire safe shutdown or alternative shutdown from outside the control room.
- F.9 For safe shutdown equipment and tools, provide the following:
- Procedure for inventory and inspection; and
  - Most recent inspection and inventory results.
- F.10 LIST of procedures that implement Cold Shutdown Repairs.
- F.11 For Cold Shutdown Repairs, provide the following:
- Procedure for inventory and inspection (i.e., needed tools, material, etc.); and
  - Most recent inspection and inventory results.
- F.12 Calculation or analysis that demonstrates pressurizer level will remain within the indicating range for a PWR, or reactor water level will remain above the top of active fuel for a BWR, at the safe shutdown or alternative shutdown panel, in accordance with the requirements of 10 CFR 50 Appendix R III.L performance goals.
- F.13 For Radio communications, provide the following:
- Communications Plan for fire fighting and post-fire safe shutdown manual actions;
  - Repeater locations;
  - Cable routing for repeater power supply cables;
  - Radio coverage test results; and
  - Radio Dead Spot locations in the plant.
- F.14 COPY of NRC approved exemption requests for operator manual actions for 10 CFR 50 Appendix R III.G.2 fire areas.
- F.15 COPY of exemption requests submitted but not yet approved, for operator manual actions for 10 CFR 50 Appendix R III.G.2 fire areas.
- F.16 Environmental and habitability evaluations for post-fire operator manual actions (temperature, smoke, humidity, SCBAs, etc.).

G. ADMINISTRATIVE CONTROL, OVERSIGHT, AND CORRECTIVE ACTION PROGRAMS

- G.1 Corrective actions for fire-induced circuit failures (including but not limited to NRC IN 92-18), both single and multiple spurious actuations (only for selected fire areas).

- G.2 Corrective actions associated with post-fire safe shutdown or alternative shutdown operator manual actions.
- G.3 Self assessments, peer assessments, and audits of fire protection activities for the last three years.
- G.4 Self assessments, peer assessments, and audits of post-fire safe shutdown or alternative shutdown capabilities for the last three years.
- G.5 LIST of open and closed condition reports for the fire protection system for the last three years.
- G.6 LIST of open and closed condition reports for emergency lighting units for the last three years.
- G.7 LIST of open and closed condition reports for post-fire safe shutdown (SSD) or alternative shutdown (ASD) issues for the last three years. This includes issues affecting the SSD or ASD analysis, fire hazards analysis, SSD or ASD operating procedures and/or training, timeline evaluations for operator actions, and supporting engineering evaluations, analysis, or calculations.
- G.8 LIST of all Generic Letter 86-10 evaluations.
- G.9 COPY of all Generic Letter 86-10 evaluations performed in the last three years.

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## ENCLOSURE 2

### Mitigating Strategies Supporting Documentation

#### H. 10 CFR 50.54(hh)(2) MITIGATING STRATEGIES DOCUMENTS

- H.1 LIST of all changes to regulatory commitments made to meet the requirements of Title 10 of the Code of Federal Regulations (10 CFR) 50.54(hh)(2).
- H.2 LIST of procedures and guidelines that were revised or generated to implement the mitigating strategies. These could be extensive damage mitigation guidelines (EDMGs), severe accident management guidelines (SAMGs), emergency operating procedures (EOPs), abnormal operating procedures (AOPs), etc.
- H.3 A matrix that shows the correlation between the mitigation strategies identified in Nuclear Energy Institute 06-12, Revision 2, "B.5.b Phase 2 & 3 Submittal Guideline," issued December 2006, and the site-specific procedures or guidelines that are used to implement each strategy.
- H.4 LIST of engineering evaluations or calculations that were used to verify the engineering bases for the mitigating strategies.
- H.5 Piping and instrumentation diagrams (P&ID) and legend list or simplified flow diagrams for systems relied upon in the mitigating strategies. These could be the type used for training. (C-size paper drawings)
- H.6 LIST of modification packages or summary descriptions of modifications with simplified drawings, for necessary facility changes to implement the mitigating strategies.
- H.7 LIST of routine tests, surveillances, and preventive maintenance for equipment and tools needed to implement 10 CFR 50.54(hh)(2) strategies.
- H.8 For equipment and tools needed to implement 10 CFR 50.54(hh)(2) strategies, provide the following:
- Procedures for inventory and inspection; and
  - Most recent inspection and inventory results.
- H.9 LIST of 10 CFR 50.54(hh)(2) strategies, if any, which have implementing details that differ from that documented in the submittals or the safety evaluation report.
- H.10 Site general arrangement drawings that show the majority of buildings and areas referenced in 10 CFR 50.54(hh)(2) documents (C-size paper drawings).

H.11 Training records, training matrix, and lesson plans related to 10 CFR 50.54(hh)(2).

H.12 Copies of memoranda of understanding (MOU) (e.g., with local fire departments) required to implement any mitigating strategies.

## ENCLOSURE 3

### FIRE PROTECTION PROGRAM CHANGES

#### BACKGROUND

10 CFR 50.48 requires each holder of an operating license under 10 CFR Part 50 to have a fire protection program (FPP) which satisfies Criterion 3 of 10 CFR Part 50 Appendix A. The NRC defined several programs which satisfy this criterion. The program called for in Criterion 3 of Appendix A minimizes the effects of fires and explosions on systems, structures, and components (SSCs) important to safety. Appendix R to 10 CFR Part 50 is one example of an acceptable program that satisfies Criterion 3. NUREG 0800, Section 9.5.1.1, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," (formerly known as Branch Technical Position 9.5-1) provides a second example of a program which satisfies the regulatory requirements.

The approved FPP has three primary tiers that constitute defense in depth. These include preventing and minimizing the effects of fires, detecting and suppressing fires, and safe shutdown. Each of these tiers have regulatory requirements needed for compliance with General Design Criterion 3.

The standard fire protection operating license condition, adopted by operating nuclear power plants in the United States, allows a licensee to make changes to their approved FPP without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire (from Generic Letter 86-10):

#### Fire Protection

(Name of Licensee) shall implement and maintain in effect all provisions of the approved FPP as described in the Final Safety Analysis Report for the facility (or as described in submittals dated -----) and as approved in the SER dated ----- (and supplements dated -----) subject to the following provision:

The licensee may make changes to the approved FPP without prior approval of the Commission only if those changes would not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire.

#### ADVERSE AFFECT

Guidance explaining the meaning of "adverse affect" is provided in Regulatory Guide 1.189, Revision 2, which states:



The phrase “not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire,” means to maintain sufficient safety margins. An acceptable set of guidelines for making that assessment is summarized below. Other equivalent acceptance guidelines may also be used. With sufficient safety margins:

- a. Codes and standards or their alternatives approved for use by the NRC are met.
- b. Safety analysis acceptance criteria in the licensing basis are met or proposed revisions provide sufficient margin to account for analysis and data uncertainty.

### PROBABILITY AND EFFECT OF FIRES AND EXPLOSIONS

The impact to safe shutdown capability is not the only consideration when evaluating a plant change. The change must still satisfy the regulatory requirement of 10 CFR 50.48(a) by having a program satisfying Criterion 3 of 10 CFR 50 Appendix A. Criterion 3 specifies a program such that structures, systems, and components important to safety shall be designed and located to minimize, consistent with other safety requirements, the probability and effect of fires and explosions.

As noted above, the staff has defined several acceptable programs to meet this requirement. A licensee may implement one of these programs or implement an equivalent approach using the licensing change process defined by their operating license condition. A licensee may not, however, decide to delete defense-in-depth features, required in their license to satisfy Criterion 3, solely on the condition that they could demonstrate that safe shutdown would not be adversely affected. The first two tiers of defense-in-depth (prevention and suppression) directly support safe shutdown by preventing and suppressing fires that challenge safe shutdown. Examples include:

- a. A CO<sub>2</sub> system that is part of the approved FPP could be replaced with a code compliant water sprinkler system because it is a code approved for use by the NRC. However, removal of the CO<sub>2</sub> system (without replacement by an appropriate alternative) would most likely require prior NRC approval since this could constitute an adverse affect on safe shutdown capability.
- b. A licensee may increase the size of a fire brigade above the required five members and would not require prior staff approval. A decrease below five members would require prior staff approval as it does not meet an approved code or standard and the decrease in staffing may be an adverse affect on the ability to achieve safe shutdown as the capability for manual suppression is reduced.

- c. A change removing a level of defense-in-depth would require prior staff approval since performing this action alone this would be considered an adverse affect. Enhancements to the other two levels of defense in depth are usually considered to be an acceptable compensatory measure for impairments, but not an acceptable replacement.
- d. A safe shutdown strategy compliance change from a fully compliant Appendix R, Section III.G.2 safe shutdown strategy to a fully compliant Section III.G.3 compliance strategy would not require prior approval as the alternative is approved for use by the NRC. Note that the change must be to full compliance, which would require fire detection and a fixed fire suppression system to satisfy Section III.G.3.
- e. If a fire protection feature is part of the approved FPP (i.e., it is needed to meet NRC regulations, or it is the basis for a licensee exemption or deviation), then the licensee needs prior staff approval before making a change that impacts that feature.
- f. Appendix R, Section III.L

Most post-1979 licensee approved FPPs incorporated the requirements of 10 CFR 50, Appendix R, Section III.L. Section III.L states that the reactor coolant system process variables shall be maintained within those predicted for a loss of normal a.c. power. A program change which does not meet the requirements of Appendix R, Section III.L (i.e., a change that allows the **reactor** coolant system process variables to exceed those for a loss of normal a.c. power) would be considered to have an adverse affect on the ability to achieve and maintain safe shutdown and would require staff approval prior to implementing the change.

The changes to the requirements of III.L.1, such as not exceeding process variables for a loss of normal **a.c.** power, would usually be considered an adverse affect on the ability to safely shutdown. Licensees have more flexibility regarding changes that impact the performance goals described in III.L.2. Where (a) the licensee has performed an analysis demonstrating that the deviation is infrequent (b) the analysis shows that the performance requirements in III.L.1 are met at all times during the deviation, and (c) that analysis is documented , the changes may not represent an adverse affect, and may be done by the licensees without prior NRC approval. Documentation of the analysis should be available for inspection.

Appendix A to 10 CFR Part 50 defines structures, systems and components important to safety as structures, systems, and components that provide reasonable assurance that the facility can be operated without undue risk to the health and safety of the public. Generic Letter 84-01, "NRC Use of Terms 'Important to Safety' and 'Safety Related,'" provides additional clarification that this definition encompasses the broad scope of equipment called for by Appendix A. 10 CFR Part 50.2 defines safety related as meaning those structures, systems, components that are relied upon to remain functional during and following a design basis event.

## CONCLUSION

In conclusion, a change to a licensee's approved FPP must not adversely affect the ability to achieve and maintain safe shutdown (the operating license condition), and must also meet the regulatory requirements of 10 CFR 50.48(a) and 10 CFR 50 Appendix A, Criterion 3 to minimize the effects of fires and explosions on systems, structures, and components important to safety. If a proposed change does not meet the above requirements, prior staff approval is required.

In meeting the requirement to ensure that changes do not have unacceptable impacts to the FPP, the licensee has responsibility to ensure that changes intended for purposes other than fire protection do not adversely impact the FPP as described above. Inspectors should look for examples where plant equipment, procedures, or programs were changed and the impact on the FPP may not have been evaluated or recognized. FPP

END

## ATTACHMENT 2

### Revision History for Inspection Procedure IP 71111.05T

| Commitment Tracking Number | Accession Number<br>Issue Date<br>Change Notice | Description of Change                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Description of Training Required and Completion Date | Comment and Feedback Resolution<br>Accession Number |
|----------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------|
| N/A                        | 04/21/06                                        | Previous History Review                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | N/A                                                  | N/A                                                 |
| N/A                        | 03/06/03<br>CN 03-007                           | Provide inspection guidance to evaluate licensee manual actions which have been incorporated into the procedure as an Enclosure                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A                                                  | N/A                                                 |
| N/A                        | 12/01/04<br>CN 04-027                           | This revised triennial fire protection inspection procedure includes inspection guidance for identifying circuits that could prevent the plant from achieving and maintaining hot shutdown condition after a fire. Inspection of these circuits was suspended in 2000, pending the conduct of fire tests and the assessment of the results in order to gain risk insights into the phenomena of fire-induced electrical cable failures. The inspection guidance is designed to help the inspectors identify categories of circuit configurations most likely to be impacted by fire potentially affecting the capability of the operators to bring the plant to a safe shutdown condition. | Yes 11/04                                            | N/A                                                 |

| Commitment Tracking Number | Accession Number<br>Issue Date<br>Change Notice | Description of Change                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Description of Training Required and Completion Date | Comment and Feedback Resolution<br>Accession Number |
|----------------------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------|
| N/A                        | 04/21/06                                        | This revision reflects the withdrawal of the Manual Action rule. Manual actions will not be acceptable as alternatives to the existing requirements of 10 CFR Part 50.48(b) unless the licensee submits an exemption/deviation request. However, the use of manual actions will continue to be acceptable as compensatory measures. To that effect this procedure continues to provide guidance to the inspectors to assess the viability of manual actions as compensatory measures.                                                                                                                                                                                                        | N/A                                                  | N/A                                                 |
| N/A                        | 12/24/09<br>CN 09-032                           | This revision incorporates the B.5.b inspection attributes (previously inspected via TI 2515/171) to this procedure so that the inspection will be performed by specifically trained DRS staff on a triennial basis consistent with the relative risk and safety significance of this issue. Additional resource estimate for revised procedure is 18 hours (triennially) based on experience with the B.5.b TIs. This revision also includes incorporation of ROP Feedback Form 1344 (inspector knowledge requirements), 1345 (duplication of guidance) and 1383 (staffing and scope of information gathering trip). The format has also been revised to meet the requirements of IMC 0040. | N/A                                                  | ML093410056                                         |

| Commitment Tracking Number | Accession Number<br>Issue Date<br>Change Notice | Description of Change                                                                                                                                                                                                                                                                                                                                                                                               | Description of Training Required and Completion Date | Comment and Feedback Resolution<br>Accession Number |
|----------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------|
| N/A                        | 09/30/10<br>CN 10-020                           | This revision changes the scope to focus on fire-induced circuit failures and operator manual actions associated with assuring safe shutdown capability. Additional guidance was also added on reviews of manuals actions and fire protection program changes.                                                                                                                                                      | N/A                                                  | ML102640146                                         |
| N/A                        | ML110190671<br>04/19/11<br>CN 11-006            | This revision combines IP 71111.05T, "Fire Protection (Triennial)" and IP 71111.05TTP, "Fire Protection – NFPA 805 Transition Period (Triennial)" to provide guidance for inspecting fire-induced circuit failures at all plants except those actively engaged in transitioning to NFPA 805. In addition, this revision incorporates enhancements to various sections to provide additional clarity for inspectors. | N/A                                                  | ML11087A057                                         |
| NA                         | ML11201A170<br>10/28/11<br>CN 11-025            | This revision modifies the resource estimate to reflect the 2011 ROP Realignment.                                                                                                                                                                                                                                                                                                                                   | NA                                                   | NA                                                  |
| NA                         | ML12328A158<br>01/31/13<br>CN 13-004            | Revised to incorporate feedback associated with Feedback Form No. 1111-05T-1746. For historical reference, ADAMS Accession number for previous revision is ML11201A170.                                                                                                                                                                                                                                             | NA                                                   | XXX                                                 |