
INSPECTION PROCEDURE 64100

POSTFIRE SAFE SHUTDOWN, EMERGENCY LIGHTING AND OIL
COLLECTION CAPABILITY AT OPERATING AND NEAR-TERM OPERATING
REACTOR FACILITIES

PROGRAM APPLICABILITY: 2513, 2514, 2515 (BASIC), 2525

64100-01 INSPECTION OBJECTIVES

To obtain sufficient information to determine whether a reactor facility is capable of achieving postfire safe shutdown (per 10 CFR 50, Appendix R) and to determine whether the postfire safe shutdown physical configuration and procedures are sufficiently well documented to permit the licensee to maintain the established capabilities over the plant's operating life. This validated configuration is periodically reverified through the use of Inspection Procedure 64150 "Triennial Postfire Safe Shutdown Capability Reverification."

64100-02 INSPECTION REQUIREMENTS

Since postfire safe shutdown requirements depend on the date of issue of a reactor plant's full-power operating license (see Sections 03.01 a and b below) and since these requirements are very consistent between plants licensed before January 1, 1979, the inspection requirements provided in this section and Appendix A to this procedure are written for pre-79 reactor plants. When this procedure is used to assess the capabilities of a post-79 reactor plant, these requirements should be modified in accordance with that plant's specific licensing requirements. See items 12, 13, and 14 of Section A of Appendix A to this inspection procedure for detailed information on documents which represent approval of plant configurations.

The following requirements refer to sections of Appendix R to 10 CFR 50.

02.01 Section III.G.2, Redundant Train Safe Shutdown Capability

a. Functional Requirements. Verify the following:

1. The reactivity control function shall be capable of achieving and maintaining cold shutdown reactivity conditions.
2. The reactor coolant makeup function shall be capable of maintaining the level within the level indication of the pressurizer (or solid plant) for PWRs. For BWR's, the NRC has approved partial short-term core recovery using the automatic depressurization system (ADS) and low-pressure coolant injection system (LPCIS). Note that this option

eliminates the need for the hot shutdown maintenance capability of Section III.G.1.a. of Appendix R.

3. The reactor heat removal function shall be capable of achieving and maintaining decay heat removal.

4. The process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control the functions in Items a.1., a.2., and a.3. above. Note: Source range neutron indication is not necessarily required for any reactor plant. An alternative method of direct reactivity measurement can be provided. See Interpretation 1 of Enclosure 1 to reference 04.11.

5. The supporting functions shall be capable of providing the process cooling, lubrication, and other services necessary to permit the operation of the equipment used for safe shutdown functions.

b. Verify that plant fire areas are sufficiently bounded to withstand the hazards associated with the area and, as necessary, to protect important equipment within the area from a fire outside the area.(1) Also verify, on a sample basis, that plant fire areas which contain components from both redundant trains of safe shutdown equipment meet one of the following:

1. requirements of Section III.G.2 of Appendix R

2. an alternative or dedicated shutdown capability meeting the requirements of III.G.3 and III.L of Appendix R as described in the safety evaluation report (SER) issued by NRR or licensee documents referenced therein(2)

3. requirements of approved exemption requests

c. Verify that cables (safety-related and non-safety-related) and equipment in selected fire areas have been identified and analyzed by the licensee to show that they would not prevent safe shutdown operation because of hot shorts, open circuits, or shorts to ground. Verify circuit breaker coordination and fuse protection has been analyzed and provided, as necessary.

d. Verify, on a sample basis, that the installation of necessary fire detectors and automatic fire suppression systems required by Section III.G.2 of Appendix R has been accomplished. In addition, review licensee evaluations which verify that the installed automatic suppression systems would adequately suppress fires associated with the hazards of each area.

e. Verify, on a sample basis, that redundant trains of systems required for hot shutdown 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.(3) Determine each of the following:

1. whether a fire in a single location could, indirectly, through the production of smoke, heat, or hot gases, cause activation of potentially damaging fire suppression for all redundant trains

2. whether a fire in a single location (or inadvertent actuation or rupture of a fire suppression system) could, through local fire suppression activity, indirectly cause damage to all redundant trains (e.g., sprinkler caused flooding of other than the locally affected train)

3. whether, in response to a fire in a single location, the utilization of

manually controlled fire suppression systems could cause damage to all redundant trains

f. Verify that systems necessary to achieve and maintain cold shutdown from either the control room or other control station(s) can be repaired within 72 hours.

02.02 Sections III.G.3 and III.L, Alternative and Dedicated Shutdown

a. Review the systems and equipment used to meet the alternative or dedicated shutdown requirements. Verify that they meet the following functional requirements:

1. The reactivity control function shall be capable of achieving, monitoring, and maintaining cold shutdown reactivity conditions.
2. The reactor coolant makeup function shall be capable of maintaining the reactor coolant level above the top of the core for BWRs or be within the level indication in the pressurizer (or solid plant) for PWRs.
3. The reactor heat removal function shall be capable of achieving and maintaining decay heat removal.
4. The process monitoring functions shall provide direct reading of the process variables necessary to control the functions in Items a.1., a.2., and a.3., above. (4)
5. The supporting functions shall be capable of providing the process cooling, lubrication, etc., necessary to permit the operation of the equipment used for safe shutdown functions.

b. Verify that alternative or dedicated shutdown capability is in conformance with applicable NRR SERs and their supplements, or other applicable licensing documents.

c. Examine alternative or dedicated shutdown equipment. Verify that it is independent of the fire area, room or zone under consideration and that electrical isolation is provided as described in the applicable NRR SERs, and their supplements or other applicable licensing documents.

d. Review the licensee's surveillance program for testing the reliable operation of alternative or dedicated shutdown equipment. Establish that a controlled postfire safe shutdown has been shown to be achievable from outside of the control room. Furthermore, verify that the transfer of control from the control room to the alternative location for equipment required for safe shutdown is demonstrated. Verify that this transfer ensures that operation of this equipment is not affected by fire-induced spurious operation. Also, verify that upon transfer of control from the control room to the alternative location, required circuits are protected by separate fusing and power supplies.

e. Verify that the licensee's training program for licensed and non-licensed personnel has been expanded to include alternative or dedicated safe shutdown capability.

f. Verify that personnel required to achieve and maintain the plant in hot shutdown following a fire using the alternative shutdown system can be

provided from normal onsite staff, exclusive of the fire brigade.

g. Verify that adequate procedures for use of the alternative shutdown system exist. Verify that the operators can reasonably be expected to perform the procedures within applicable shutdown time requirements. Ensure that adequate communications are available for the personnel performing alternative or dedicated safe shutdown. The licensee can be requested to demonstrate the adequacy of the alternative shutdown procedures by "walking through" the procedural steps.

h. Verify, on a sample basis, that installation of necessary fire detectors and automatic fire suppression systems required by Section III.G.3 of Appendix R is as described in NRR SERs and their supplements or other applicable licensing documents. In addition, verify that the installation of automatic suppression systems would adequately suppress fires associated with the hazards of the areas.

i. Verify that the licensee has dedicated repair procedures, equipment and materials to accomplish repairs of damaged components required for cold shutdown, that these components can be made operable, and that cold shutdown can be achieved within 72 hours.

02.03 Section III.J., Emergency Lighting

a. Verify that the plant emergency lighting capabilities meet the following requirements of Section III.J. of Appendix R.

1. Required Areas for Emergency Lighting

(a) control room (unless specifically excluded as a requirement through exemption or deviation)

(b) other critical area(s) and access routes which require illumination to allow manual safe shutdown equipment operation or the monitoring of safe shutdown indications

2. If the emergency lights are powered from a central battery or batteries, then the distribution system must contain protective devices such that a fire in one area will not cause loss of emergency lighting in any unaffected area needed for safe shutdown operations.

3. Review the manufacturer's information to verify that battery power supplies are rated with at least an 8-hour capacity.

b. In addition to the regulatory requirements of III.J, the following areas should be reviewed:

1. Tour the plant and inspect the emergency lights installed in areas required for postfire shutdown and in the access routes to those areas. By requesting the licensee to perform an emergency lighting test for selected plant areas, verify the following:

(a) the lamps are properly aimed

(b) the batteries are being properly maintained including:

- charge rate indication (lamp or meter)

- specific gravity indication is within specification

(c) sufficient illumination is provided to permit access for the monitoring of safe shutdown indications and/or the proper operation of safe shutdown equipment

2. Review the preventive maintenance surveillance procedure used for periodic checks of the emergency lights and verify that the maintenance frequencies and procedures are as specified by the manufacturer.

02.04 Section III.O, Oil Collection Systems for Reactor Coolant Pumps

a. Review the drawings and calculations for the oil collection system to verify that all potential leakage points in the reactor coolant pump oil system have been contained and the drain line(s) have been sized to accommodate the maximum leak rate.

b. Verify that the oil collection system components have been designed so that there is reasonable assurance that they would withstand the safe shutdown earthquake (see Section III.O of Appendix R) or that the RCP lube oil system and associated appurtenances are seismically designed to withstand the safe shutdown earthquake and that the licensee has submitted and NRR has approved an exemption for a non-seismically designed oil collection system. See GL 86-10 (reference 04.11), Enclosure 2, Question 6.1.

c. Verify that either the oil has a sufficient high flash point to prevent ignition of the oil by any equipment in the area or the tank vent has a flame arrestor installed.

d. Verify that the licensee has a surveillance procedure for the oil collection system and has implemented the procedure. The following should be included in the procedure:

1. periodic testing of the remote level indication (if installed)

2. periodic visual examination of the oil collection system piping and tank

e. Verify that the collection tank is a closed, vented tank and has sufficient capacity to simultaneously collect all the oil from all reactor coolant pumps (upper and lower lube oil system), or sufficient capacity to collect the oil from one reactor coolant pump and such design as to direct overflow to a location which does not present a fire hazard. For the latter case, refer to applicable SERs for the specific configuration required.

f. Inspect the reactor coolant pump oil collection system to verify that it was installed as indicated by the drawings. If seismically designed, verify all piping is seismically supported.

64100-03 INSPECTION GUIDANCE

03.01 General Guidance

a. Requirements for Reactor Plants Licensed Before January 1, 1979. Effective February 17, 1981, the NRC amended its regulations by adding Part 50.48 and Appendix R to 10 CFR 50 to require certain provisions for fire

protection in nuclear power plants licensed to operate before January 1, 1979. This action was taken to resolve certain contested generic issues in fire protection SERs and to require all applicable licensees to upgrade their plants to a level of protection equivalent to the technical requirements of Sections III.G., J., L., and O. of 10 CFR 50, Appendix R. 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 request an exemption in accordance with 10 CFR 50.48. Alternative or dedicated safe shutdown capabilities (which did not pre-date 10 CFR 50.48 and Appendix R) were required in 10 CFR 50.48(c)(5) to be submitted to NRR for review. NRR approvals are documented in SERs.

b. Requirements for Reactor Plants Licensed after January 1, 1979. Plants licensed after January 1, 1979 are subject to requirements similar to 10 CFR 50, Appendix R, as specified in the conditions of their Facility Operating License, commitments made to the NRC, or deviations granted by the NRC. These "post-79" reactor plants are subject to the requirements of 10 CFR 50.48 (a) and (e) only.

The Fire Hazards Analysis (FHA) (Fire Protection Review, Fire Protection Evaluation) document of the post-79 reactor plants may have been reviewed under Appendix A to Branch Technical Position APCS 9.5-1 "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976" of August 23, 1976 (in which case, the licensee conducted an Appendix R comparison and justified FSAR or FHA differences from specific provisions of Appendix R). It is possible also that post-79 licensee submittals were reviewed under Standard Review Plan, NUREG-0800, and Branch Technical Position CMEB 9.5-1 (formerly BTP ASB 9.5-1), "Guidelines for Fire Protection for Nuclear Power Plants," Rev. 2 of July 1981 (in which case, licensee submittals were reviewed against requirements which closely paralleled the provisions of Appendix R).

The actual fire protection requirements applicable to a given reactor plant licensed after January 1, 1979 arise from the specific license conditions in the Facility Operating License. These license conditions possibly referred to SERs and their supplements. Section 9.5 of such an SER delineates which licensee submittals were reviewed (e.g., a Fire Hazards Analysis would be such a submittal). The plant configurations and procedures described in these submittals are "requirements of the license." Answers to questions raised in the SER review process would be termed "licensing commitments." These "licensing commitments" are "requirements of the license" if referenced by or appended to SERs which are, in turn, referenced within the Facility Operating License. Note that GL 86-10 (reference 04.11) requested each licensee to incorporate its fire protection program into its FSAR and to apply for a license amendment that substitutes a standard license condition in lieu of existing fire protection license conditions.

c. Types of Postfire Safe Shutdown Inspections

1. Initial Validation. Postfire safe shutdown capability is typically (first) verified during an initial validation inspection of a reactor plant's procedures, physical configuration, and supporting documentation. It should be noted that for near-term operating licenses, the inspection is normally conducted before granting a full-power operating license.

2. Revisit. It is not always possible to fully verify a reactor plant's postfire safe shutdown capabilities during the initial validation inspection. Additional, more narrowly focused inspections may be required. At these later times, outstanding technical issues may be resolved or more complete information may become available. The final determination of the reactor plant's postfire safe shutdown capability would then be possible.

3. Interim Compensatory Measures. To ensure adequate levels of safety during long periods of postfire safe shutdown design, procurement, and implementation activity, it may be appropriate to determine (before the implementation of IP 64100) whether interim compensatory measures prescribed by NRR are adequately implemented. The end product of an interim compensatory measures inspection would be a determination that the reactor plant can be safely shutdown, although permanent postfire safe shutdown procedures and physical barriers are not in place.

4. Conceptual Review. It is NRC policy that regions are to inspect reactor plants, using IP 64100 as a guide, where postfire safe shutdown implementation problems are believed to exist. Another reason for inspecting a reactor plant "in process", may be a request by the licensee for a review of its design or implementation decisions. In both cases, costly design or implementation errors and associated delays in achieving permanent postfire safe shutdown capability may be avoided.

5. Full Reinspection. Subsequent to an initial validation inspection or a revisit under IP 64100, the region may determine that a licensee has essentially failed to provide the capability to conduct a controlled, successful postfire safe shutdown. Such failed inspections will be followed by a full reinspection when the licensee has conducted the necessary postinspection re-analyses, design, procurement, and implementation activities. Power operation before the full reinspection would be conducted with appropriate interim compensatory measures in effect.

6. Periodic Reverification. A reactor plant's or station's mechanical and electrical configuration and operating procedures are to be periodically reviewed to verify that the licensee has maintained established post-fire safe shutdown capabilities. This periodic reverification is conducted under Inspection Procedure 64150.

d. Inspection Team Structure

1. A minimum inspection team consists of the following members:

(a) Team Leader - leads discussion with licensee at entrance and exit interview. Should be a regionally based inspector. Also participates in inspection effort.

(b) Mechanical Safe Shutdown Specialist - identifies and examines equipment and cabling necessary to achieve postfire safe shutdown.(5)

(c) Electrical Safe Shutdown Specialist - identifies and examines cabling and circuitry necessary to achieve postfire safe shutdown and identifies associated circuits of concern, the adequacy of these circuits' electrical separation, isolation, and protective features, and circuit breaker coordination and fuse protection.5

(d) Fire Protection Specialist - inspects fire protection of the safe

shutdown systems, equipment, and circuits.5

2. Inspection experience to date has shown the effectiveness of adding one team member to review the licensee's alternative safe shutdown systems and procedures.

e. Inspection Plan Preparation and Onsite Inspection Activities

1. This is a technically complex inspection. Because there are many variations in the technical details by which a facility can meet safe shutdown criteria, a site-specific inspection plan must be prepared. See Appendix A for detailed direction on the preparation of inspection plans.

2. Certain documents approved and issued during the spring of 1986 have a direct effect on inspection plan preparation and onsite inspection activities: SECY-85-306; SECY-85-306B; and a March 7, 1986 memorandum from Samuel J. Chilk, Secretary to the Commission, to Victor Stello, Jr., Acting EDO. SECY 85-306 directed the issuance of GL 86-10. These documents were discussed in detail with regional postfire safe shutdown inspectors during a May 7, 1986 meeting called by the Director, Division of Inspection Programs, IE. Minutes at that meeting are contained in an August 11, 1986 memorandum from Leon E. Whitney, Lead Contact for Fire Protection, DI, IE to Regional Division Directors. This minutes memorandum provides answers to questions raised by inspectors during the May 7, 1986 meeting.

Selected inspection related matters arising from GL 86-10 are discussed below. However, all the documents listed above should be read and understood by all inspectors and/or contractors assigned to postfire safe shutdown inspection teams.

(a) To minimize confusion associated with license conditions (see Sections 03.01a and b above) GL 86-10 states that each licensee should place its fire protection program and major commitments (including Fire Hazard Analysis and technical specification requirements) in its FSAR. The fire protection program would then be subject to changes under 10 CFR 50.59 without prior NRC approval (as long as the licensee established that the changes would not adversely affect the ability to achieve and maintain postfire safe shutdown).

(b) The six "Interpretations of Appendix R," and the "Appendix R Questions and Answers" of GL 86-10 provide guidance as to acceptable methods of satisfying Commission regulatory requirements. Other methods proposed by licensees for complying with Commission regulations also may be satisfactory, and inspectors will consider them on their own merits. The guidance of "Interpretations of Appendix R" and "Appendix R Questions and Answers" differs from prior guidance (including GL 83-33). It is intended that GL 86-10 take precedence. Questions on this matter should be addressed to the NRC project manager for the facility to be inspected.

(c) Interpretations 4 and 5 of Appendix R refer to postfire safe shutdown analyses for fire area boundaries and fire suppression and detection systems. Section C of GL 86-10 provides the necessary features of such analyses. These analyses are not required to be submitted as exemption requests, but must be retained for review during NRC audits. However, inspectors should note that in fire areas for which neither the alternative safe shutdown features of Section III.G.3 of Appendix R nor the redundant train separation features of Section III.G.2 of Appendix R are provided, an

exemption for Section III.G.2 is required. This is implied in the wording of Interpretation 3 ("Licensees seeking exemptions from Section III.G.2...") and reiterated in the May 7, 1986 meeting minutes memorandum (reference 04.12).

(d) Interpretation 6 of Appendix R states that alternative shutdown equipment may be located in the same fire area as the normal shutdown equipment for which it is required, as long as the independent room or zone concept utilized is justified by a detailed fire hazards analysis.

(e) Appendix R Question and Answer 3.1.1 states that fire barriers established under the BTP process need not necessarily be reanalyzed to meet Appendix R requirements.

(f) The three assumptions of Appendix R Question and Answer 5.3.10 are meant for independent use (that is, only one assumption applies for any given configuration in a reactor plant). These assumptions are therefore consistent with the established NRR review practice of requiring licensees to analyze for any and all spurious actuations or failures where no such spurious actuations or failures occur simultaneously.

f. Inspection Credit. Credit for Inspection Procedure 64704, "Fire Protection/Prevention Program," may possibly be taken. To avoid double accounting, inspection hours credited to IP 64704 should be subtracted from the hours credited to IP 64100 or IP 64150.

64100-04 REFERENCES

04.01 Fire Hazard Analysis and related documents prepared by the licensee.

04.02 NRR Fire Protection Safety Evaluation Reports and supplements, and licensee documents referenced therein that constitute the NRR review and approval of the Fire Hazards Analysis of Section 04.01 above, (6) and, if applicable, portions of the Facility Operating License relating to postfire safe shutdown. Note that for pre-79 licenses, the redundant train capability of Section III.G.2 of Appendix R is not required to be reviewed.

04.03 NRR Fire Protection Safety Evaluation Reports and licensee documents referenced therein that constitute the NRR review and approval of modifications required to satisfy the alternative or dedicated shutdown requirement of Section III.G.3 of Appendix R to 10 CFR 50.6 Note that alternative or dedicated safe shutdown equipment provided before the issuance of 10 CFR 50.48 and Appendix R need not necessarily be resubmitted to NRR for review (as long as the licensee determines that the equipment meets the criteria of Sections III.G.3. and III.L. of Appendix R). However, any plant modification required to upgrade previously provided systems to meet Sections III.G.3. and III.L. of Appendix R would require submittal to NRR.

04.04 Licensee's assessment of the plant to Sections III.G., III.J., and III.O. of Appendix R that identifies redundant safe shutdown systems and components, defines fire areas, and analyzes the separation of the identified safe shutdown equipment and their power, control and instrumentation cables by fire area. Note: some of this information is likely to be included within the Fire Hazards Analysis of Section 04.01 above).

04.05 Licensee and NRR correspondence constituting approved exemption requests.

04.06 Generic Letter 81-12 dated February 20, 1981, "Fire Protection Rule (45 FR 76602, November 19, 1980)."

04.07 Memorandum from R. J. Mattson to D. G. Eisenhut, March 22, 1982, "Fire Protection Rule-Appendix R," containing clarifications of Generic Letter 81-12.

04.08 IE Information Notice 83-41, "Actuation of Fire Suppression System Causing Inoperability of Safety Related Equipment," dated June 22, 1983 and licensee analyses conducted in response to this document.

04.09 IE Information Notice 85-85, "Systems Interaction Event Resulting in Reactor System Safety Relief Valve Opening Following a Fire-Protection Deluge System Malfunction," dated October 31, 1985.

04.10 SECY-85-306 dated September 17, 1985; SECY-85-306B dated December 19, 1985; memorandum from Samuel Chilk, Secretary to the Nuclear Regulatory Commission to Victor Stello Jr., Acting Executive Director for Operations dated March 7, 1986.

04.11 Generic Letter 86-10 "Implementation of Fire Protection Requirements" dated April 24, 1986.

04.12 Memorandum from Leon E. Whitney, Lead Contact for Fire Protection, DI, IE to Regional Division Directors, August 11, 1986, Minutes of May 7, 1986 Meeting to Discuss the Effect of SECY-85-306, Appendix R, Post-Fire Safe Shutdown."

04.13 Licensee-Prepared Documents

- a. Emergency operating procedures for achieving and maintaining postfire hot shutdown.
- b. Emergency operating procedures for achieving postfire cold shutdown.
- c. Fire pre-plans for critical areas, if developed.
- d. Results of any tests conducted to verify the capabilities and operability of postfire safe shutdown equipment.
- e. Results of qualification and/or acceptance tests for special features provided for postfire safe shutdown.

END

Appendix A

APPENDIX A

INSPECTION PLAN PREPARATION

A. Pre Audit Materials. The region should request that the licensee provide the following information to the inspection team at least 2 weeks before the inspection to permit the inspection team to properly prepare for this

comprehensive and complex inspection:

1. Piping and instrumentation (flow) diagrams for hot shutdown and cold shutdown systems, alternative or dedicated shutdown systems, and the reactor coolant pump oil collection system.
 2. Plant layout and equipment location drawings which identify the physical plant locations of hot shutdown and cold shutdown equipment.
 3. Color-coded, marked-up electrical raceway drawings which identify the cable routing of power, control and indication circuits for those plant systems necessary to achieve and maintain hot shutdown.
 4. Single line ac and dc electrical power and control cable distribution diagrams.
 5. Plant layout drawings which identify fire area boundaries and fire protection equipment locations.
 6. Marked-up plant layout drawings which identify the locations of emergency lighting units.
 7. Associated circuit analyses.
 8. Drawings which depict the physical and seismic design of reactor coolant pump oil collection system.
 9. Plant operating procedures which describe normal hot and cold shutdown from inside the control room, emergency hot and cold shutdown from emergency control stations outside and independent of the control room, and shutdown operations which utilize alternative or dedicated shutdown capability and, if applicable, natural circulation.
 10. Fire damage control and repair procedures for cold shutdown systems.
 11. Analyses and evaluations of the adequacy of automatic suppression systems.
 12. All Branch Technical Position (BTP) ASB 9.5-1 Appendix A SER's.
 13. All approved exemption requests and related SERs plus supporting documentation developed by the licensee.
 14. All ASB or Plant Systems Branch SERs on alternative or dedicated safe shutdown plus supporting documentation developed by the licensee.
- B. Equipment Identification. Develop the following information from the licensee-developed and other plant-specific documents of Section 04:
1. The equipment, controls and instrumentation required for hot shutdown.
 2. The equipment, controls and instrumentation required for cold shutdown.
 3. Locations within the plant for which an alternative safe shutdown capability has been provided, and a listing of the alternative equipment provided for these locations.

4. Fire areas that contain power, control or instrumentation cables and/or equipment for both redundant safe shutdown trains.

5. Listings of associated circuits of concern and methods identified for dealing with spurious signals resulting from postulated fires.

6. Provisions for circuit breaker coordination and fuse protection.

C. Redundant Hot Shutdown Equipment Selection. From the information developed in Section B.1 above, select specific hot shutdown equipment, instrumentation and cabling for review. Selection of one or two components in each functional area should be an adequate sample size. For example:

1. reactivity control - boration pumping or injection equipment

2. reactor coolant makeup - charging pumps

3. reactor pressure control - pressurizer heaters

4. decay heat removal - auxiliary feedwater pumps

5. process monitoring instrumentation - reactor temperature and steam generator level indications

6. support systems - onsite ac power and its distribution system

D. Inspection of Selected Redundant Hot Shutdown Equipment. To the extent possible through documentation review:

1. Determine the routing of redundant hot shutdown equipment and power, control and instrumentation cables. Normal and emergency power sources should be considered.

2. Review the completeness and actual fire rating of barriers provided in accordance with Section III.G.2. of Appendix R. 10 CFR 50.59 analyses conducted by the licensee in the process of erecting barriers may be reviewed in this effort. Ensure that redundant hot shutdown equipment within the same fire area are provided with barriers which meet the separation requirements of Section III.G.2, or that alternative or dedicated postfire safe shutdown capability has been provided, or that appropriate exemptions have been approved by NRR.

3. Review the possible effects of spurious signals from associated circuits of concern and the necessity for circuit breaker coordination and fuse protection. Review procedures and features designed to prevent spurious operations arising from associated circuits of concern.

E. Inspection of Alternative or Dedicated Hot Shutdown Equipment. To the extent possible through documentation review:

1. Determine that the required NRR review and approval of alternative and dedicated hot shutdown equipment and procedures has occurred. SERs documenting these reviews and approvals should be compared to the actual configurations established by the licensee.

2. Select a sample of systems controlled from backup control panels or by local operations for areas provided with alternative or dedicated hot

shutdown capability.

3. Ensure that selected backup control systems and/or locally controlled hot shutdown systems or equipment are independent of the effects of the postulated fires for which they were provided. Review power, control and instrumentation cables, potential spurious signals from associated circuits of concern and circuit breaker coordination and fuse protection. Review procedures to detect and correct spurious operations arising from associated circuits of concern.

4. Verify that selected areas for which alternative or dedicated hot shutdown equipment has been provided are protected by fire detection sensors and a fixed fire suppression system.

5. Review selected 10 CFR 50.59 analyses conducted by the licensee in establishing the alternative or dedicated shutdown systems and procedures.

6. Request that appropriate plant operators conduct a walkthrough of the alternative or dedicated safe hot and cold shutdown procedures for fires in the control room(7), cable spreading room and/or other locations within the plant.

(a) Determine whether the procedures would be feasible during an actual fire.

(b) Determine whether modifications such as the lifting of leads or pulling of fuses are required. If so, determine whether this portion of the procedure is conducted in a safe and reasonable manner considering the effects of a postulated fire.

(c) Determine whether enough qualified personnel, exclusive of the fire brigade, would be available on shift to perform the necessary shutdown operations.

(d) Determine whether communications capability is adequate to conduct the procedure in a controlled manner.

(e) Determine whether the licensees training program includes periodic training in the use of postfire safe shutdown procedures and operations.

(f) Determine, through interviews with a sample of plant operators, whether their knowledge of alternative or dedicated postfire safe shutdown procedures is adequate.

7. The inspector should note that Section III.L.5. of Appendix R requires that alternative or dedicated cold shutdown equipment shall not be damaged by fire or the fire damage shall be limited so that cold shutdown can be achieved within 72 hours.

8. The inspector should note that Section III.G.3.b. of Appendix R requires that alternative or dedicated safe shutdown capability is required "where redundant trains of systems required for hot shutdown....may be subject to damage from fire suppression activities or from the rupture or inadvertent operation of fire suppression systems."

9. The inspector should note that Section III.L.3. of Appendix R requires that alternative shutdown capability "shall accommodate postfire conditions

where offsite power is available and where offsite power is not available for 72 hours." To simplify postfire shutdown procedures, some licensees may purposely open the offsite supply breaker(s), thereby placing the plant electrical and mechanical system in a known configuration. Other licensees may possess procedures which utilize offsite power, if available. At these facilities, credit taken for the failed position of some equipment and breakers on loss of offsite power may not be appropriate when offsite power is not lost.

F. Cold Shutdown Equipment Selection. From the information developed in Section B.2 above, select specific cold shutdown equipment, instrumentation, and cabling for review. Selection of one or two components in each functional area should be an adequate sample size. These items, in addition to the equipment required for hot shutdown, are those necessary to achieve cold shutdown. For example, for a PWR:

1. reactor coolant system pressure reduction - auxiliary spray line valve controls
2. decay heat removal - RHR pump
3. support systems - onsite power

G. Inspection of Selected Cold Shutdown Equipment Repair Capability

1. The inspector should note that Section III.G.1.b. of Appendix R requires that fire damage to cold shutdown equipment be capable of repair within 72 hours.
2. The licensees analyses and/or submittals should clearly identify which cold shutdown equipment could be damaged in a postulated fire in each fire area.
3. For postulated fires in selected fire areas, assess the accuracy of the licensees listing of cold shutdown equipment damage.
4. Material required for cold shutdown equipment repair should be demonstrated to be available onsite.
5. The cold shutdown equipment repair procedures should be clearly achievable within the 72-hour limitation of Section F.1 above.

END

1. 0 Refer to Interpretation 4 and Section 3.1 of the Questions and Answers of Generic Letter (GL) 86-10 (reference 04.11).
2. 0 See Section 02.02 below for inspection requirements if alternative or dedicated postfire safe shutdown capability is provided.
3. 0 See references 04.08 and 04.09.
4. 0 See reference 04.04.
5. 0 Regions may use inspectors who have the necessary expertise, request assistance from NRR, or use available IE contractors who have the necessary expertise.

6. 0 The dates of these items may be obtained from the NRR project manager.

7. 0 Credit is given for manual scram from the control room prior to control room evacuation.