



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

August 11, 1994

Docket No. 50-397

Mr. J. V. Parrish (Mail Drop 1023)
Assistant Managing Director, Operations
Washington Public Power Supply System
P. O. Box 968
Richland, Washington 99352-0958

Dear Mr. Parrish:

SUBJECT: FOLLOWUP TO THE REQUEST FOR ADDITIONAL INFORMATION REGARDING GENERIC LETTER 92-08, "THERMO-LAG 330-1 FIRE BARRIERS," ISSUED PURSUANT TO 10 CFR 50.54(f) ON FEBRUARY 11, 1994 - WASHINGTON NUCLEAR PROJECT NO. 2 (WNP-2)(TAC NO. M85624)

This letter acknowledges receipt of your letter dated February 11, 1994, which responded to the U.S. Nuclear Regulatory Commission (NRC) staff's request for additional information (RAI) dated December 21, 1993, (Enclosure 1) regarding Generic Letter 92-08, "Thermo-Lag 330-1 Fire Barriers." Your response indicated that you were awaiting the final results of the industry test program sponsored by the Nuclear Energy Institute (NEI) (formerly NUMARC) in order to determine your final plans and schedules.

NEI has completed the industry Thermo-Lag fire endurance test program and has issued its guidance to industry for evaluating Thermo-Lag fire barriers. Although the NRC staff does not intend to review and approve the NEI application guide, the NEI test results provide a substantial data base to aid in the plant-specific assessment of fire barrier configurations. The NRC staff will review the application of the NEI guide on a plant-specific basis. We request that you submit the information specified in the 50.54(f) letter of December 21, 1993, for those areas in which your response was incomplete or for which you stated that you were relying on the results of the NEI program. Specifically, your responses to the following RAI sections indicated that the information requested could not be provided until NEI had completed its program; therefore, we view them as being incomplete and request the following supplemental information.

RAI Section II. "Important Barrier Parameters"

In your response to Question II.B.1, you indicated that the noted parameters were preliminary in nature due to the ongoing NEI testing. This testing is complete, and NEI has issued its Application Guide. This guide defines parameters that the industry has determined to be important to fire barrier performance. The NRC does not intend to review and approve the NEI application guide. We do, however, intend to review its application on a plant-specific basis.

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In responding to Question II.B.2, you also indicated that the NRC has not yet finalized the requirements for cable functionality evaluations, nor are the NEI test results available that would clearly indicate the scope of these evaluations. On March 25, 1994, the NRC issued Supplement 1 to Generic Letter (GL) 86-10, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Trains Within the Same Fire Area." In the attachment to Enclosure 1 of Supplement 1 to GL 86-10, the NRC provided its guidance with respect to demonstrating functionality of cables protected by raceway fire barrier systems.

In your response to Question II.B.3, you indicated that you would provide a more detailed response upon completion of the NEI fire endurance testing program and their application guide. Since the industry has completed its program and the NRC has issued its guidance on cable functionality, we request that you revise your response and provide us with the information specified in Questions II.B.1, II.B.2, and II.B.3.

RAI Section III. "Thermo-Lag Fire Barriers Outside the Scope of the NUMARC Program"

In responding to Question III.B.1, you indicated that you would provide a supplemental response to this question after taking into consideration the results of any expansion to the NEI test program. In addition, you indicated that a more complete response to questions III.B.2 and III.B.3 would be provided to the NRC in August 1994. Since the NEI program is complete, we request that you revise your response and provide the information specified in Questions III.B.1, III.B.2 and III.B.3.

RAI Section V. "Alternatives"

In your response to the information requested by Question V.B., you stated that there were three undefined factors that need to be considered in determining which of the alternatives would be most cost effective to resolve the Thermo-Lag problems. These factors include: the NRC test and acceptance criteria had not been finalized; NEI Phase 2 testing had not been completed; and the industry application guide had not been issued. Since these actions are now complete, we request that you provide us with the information specified in Question V.B, and that your revised response clearly identify any and all alternatives you plan to use to demonstrate that WNP-2 is in compliance with the fire protection regulations.

RAI Section VI. "Schedules"

In your response to Question VI.B., you indicated that you would have a corrective action plan developed and a schedule for this plan completed by August 1994. In addition, you indicated that this schedule would consider compilation of as-built performance parameters, identification of qualified installation and potential upgrades, identification of

options, plant-specific fire testing, design change packages for NEI-bounded configurations, design change packages resulting from plant-specific fire testing, design changes for upgrades beyond the scope of the NEI program, alternative design change packages, and field work. In this response, you advise the NRC that, in a supplemental response, you would provide this schedule by September 30, 1994. This schedule is acceptable to the staff.

RAI Section VII. "Sources and Correctness of Information"

In response to the information requested by this section, you indicated that you were going to perform a configuration walkdown in early 1994 to verify and document the details on how these fire barriers were constructed. We request that your revised response include a description of this walkdown, including how the accuracy and validity of the information was verified.

You are required, pursuant to Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f), to submit a written report that contains the required information within 90 days from the date of this letter. Your response must be submitted under oath or affirmation. Please submit your response to the undersigned, and send a copy to the Regional Administrator, Region IV. Please retain all information and documentation used to prepare your response on site for future NRC audits or inspections.

In addition to the above open issues, there are unresolved technical issues regarding ampacity derating. However, it is the staff view that these issues can be resolved independent of the fire endurance issues.

The following information is provided as background to guide your future actions to restore your plant to compliance with your current licensing basis. In SECY-94-127 dated May 12, 1994, the staff informed the Commission of four options it was considering for resolving the Thermo-Lag fire barrier technical issues. On May 20, 1994, the staff briefed the Commission on the options. The staff recommended continuation of NRC staff and industry efforts to return the plants with Thermo-Lag barriers to compliance with existing NRC fire protection requirements consistent with the staff's Thermo-Lag Action Plan. The staff stated that if the Commission approved this option, the staff would consider plant-specific exemptions from certain technical requirements of Appendix R to 10 CFR Part 50 on a case-by-case basis if the licensee submits a technical basis that demonstrates that the in-plant condition provides an adequate level of fire safety. In a Staff Requirements Memorandum (SRM) of June 27, 1994, "Options for Resolving the Thermo-Lag Fire Barrier Issues," the Commission (with all Commissioners agreeing) approved the staff recommendation to return plants to compliance with existing NRC requirements and to permit plant-specific exemptions where technically justified.

Enclosure 2 presents information regarding plant-specific conditions that may preclude compliance with one or more of the provisions specified in Section III.G of Appendix R to 10 CFR Part 50, which, based on your



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commitments and license conditions, form the licensing basis for your compliance with 10 CFR Part 48. Enclosure 2 also presents an overview of the technical information needed to support requests for exemptions and license amendments.

The information collection contained in this request are covered by the Office of Management and Budget clearance number 3150-0011, which expires July 31, 1997. The public reporting burden for this collection of information is covered by the original estimate and previous increase, which totaled 420 person-hours for each addressee's response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Information and Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0011), Office of Management and Budget, Washington DC 20503.

If you have any questions about this matter, please contact Jim Clifford at 301-504-1352.

Sincerely,
Original signed by

Roy P. Zimmerman
Associate Director for Projects
Office of Nuclear Reactor Regulation

Enclosures:

1. Original Request for Additional Information
2. Fire Protection Exemptions, Deviations, and License Amendments

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Mr. J. V. Parrish

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ENCLOSURE 1

REQUEST FOR ADDITIONAL INFORMATION
REGARDING GENERIC LETTER 92-08
"THERMO-LAG 330-1 FIRE BARRIERS"
PURSUANT TO 10 CFR 50.54(f)

I. Thermo-Lag Fire Barrier Configurations and Amounts

A. Discussion

Generic Letter (GL) 92-08, "Thermo-Lag 330-1 Fire Barriers," applied to all 1-hour and all 3-hour Thermo-Lag 330-1 materials and barrier systems constructed by any assembly method, such as by joining preformed panels and conduit preshapes, and trowel, spray, and brush-on applications. This includes all fire barriers, all barriers to achieve physical independence of electrical systems, radiant energy heat shields, and barriers installed to enclose intervening combustibles.

B. Required Information

1. Describe the Thermo-Lag 330-1 barriers installed in the plant to
 - a. meet 10 CFR 50.48 or Appendix R to 10 CFR Part 50,
 - b. support an exemption from Appendix R,
 - c. achieve physical independence of electrical systems,
 - d. meet a condition of the plant operating license,
 - e. satisfy licensing commitments.

The descriptions should include the following information: the intended purpose and fire rating of the barrier (for example, 3-hour fire barrier, 1-hour fire barrier, radiant energy heat shield), and the type and dimension of the barrier (for example, 8-ft by 10-ft wall, 4-ft by 3-ft by 2-ft equipment enclosure, 36-inch-wide cable tray, or 3-inch-diameter conduit).

2. For the total population of Thermo-Lag fire barriers described under Item I.B.1, submit an approximation of:
 - a. For cable tray barriers: the total linear feet and square feet of 1-hour barriers and the total linear feet and square feet of 3-hour barriers.
 - b. For conduit barriers: the total linear feet of 1-hour barriers and the total linear feet of 3-hour barriers.
 - c. For all other fire barriers: the total square feet of 1-hour barriers and the total square feet of 3-hour barriers.

- d. For all other barriers and radiant energy heat shields: the total linear or square feet of 1-hour barriers and the total linear or square feet of 3-hour barriers, as appropriate for the barrier configuration or type.

II. Important Barrier Parameters

A. Discussion

In a letter of July 29, 1993, from A. Marion, NUMARC, to C. McCracken, NRC, NUMARC stated: "Relative to bounded configurations, ... [i]t will be the utilities' responsibility to verify their baseline installations are bounded." Furthermore, NUMARC stated that the parameters of importance for utility use of data from the industry Thermo-Lag fire barrier test program are:

1. Raceway orientation (horizontal, vertical, radial bends)
2. Conduit
3. Junction boxes and lateral bends
4. Ladder-back cable tray with single layer cable fill
5. Cable tray with T-Section
6. Raceway material (aluminum, steel)
7. Support protection, thermal shorts (penetrating elements)
8. Air drops
9. Baseline fire barrier panel thickness
10. Preformed conduit panels
11. Panel rib orientation (parallel or perpendicular to the raceway)
12. Unsupported spans
13. Stress skin orientation (inside or outside)
14. Stress skin over joints or no stress skin over joints
15. Stress skin ties or no stress skin ties
16. Dry-fit, post-buttered joints or prebuttered joints
17. Joint gap width
18. Butt joints or grooved and scored joints
19. Steel bands or tie wires
20. Band/wire spacing
21. Band/wire distance to joints
22. No internal bands in trays
23. No additional trowel material over sections and joints or additional trowel material applied
24. No edge guards or edge guards

Each NUMARC cable tray fire test specimen includes 15 percent cable fills (i.e., a single layer of cables uniformly distributed across the bottom of the cable tray). This approach requires consideration of plant-specific cable information during the assessments of tested configurations and test results in relation to plant-specific Thermo-Lag configurations; for example, cable trays with less thermal mass (cable fill) than the NUMARC test specimens, different cable

types, and the proximity of the cables to the Thermo-Lag (e.g., cables may be installed in contact with the unexposed surface of the Thermo-Lag or may come into contact during a fire if the Thermo-Lag material sags). In its letter of July 29, 1993, NUMARC stated: "Utilities using the results of the NUMARC testing will need to evaluate their installed cable fill and ensure that it is bounded by the tested cable fill." NUMARC is not conducting any cable functionality tests or evaluations and stated that cable functionality evaluations will be performed by utilities using data from the generic program.

The parameters of importance concerning cables protected by fire barriers are:

1. Cable size and type (power, control, or instrumentation).
2. Cable jacket type (thermoplastic, thermoset) and materials.
3. Cable conductor insulation type (thermoplastic, thermoset plastic) and materials.
4. Cable fill and distribution of cables within the protected conduit or cable tray.
5. Proximity of cables to the unexposed (inside) surfaces of the fire barrier.
6. Presence of materials between the cables and the unexposed side of the fire barrier material (for example, Sealtemp cloth, which is used in the NUMARC test specimens).
7. Cable operating temperature.
8. Temperatures at which the cables can no longer perform their intended function when energized at rated voltage and current.

Other parameters that are unique to particular barriers, such as interfaces between Thermo-Lag materials and other fire barrier materials or building features (walls, etc.) and internal supports, are also important. In addition, because of questions about the uniformity of the Thermo-Lag fire barrier materials produced over time, NUMARC stated in its letter of July 29, 1993, that "[c]hemical analysis of Thermo-lag materials provided for the program, as well as samples from utility stock, will be performed, and a test report prepared comparing the chemical composition of the respective samples." The results of the chemical analyses may indicate that variations in the chemical properties of Thermo-Lag are significant and may require additional plant-specific information in the future.

B. Required Information

1. State whether or not you have obtained and verified each of the aforementioned parameters for each Thermo-Lag barrier installed in the plant. If not, discuss the parameters you have not obtained or verified. Retain detailed information on site for NRC audit where the aforementioned parameters are known.

2. For any parameter that is not known or has not been verified, describe how you will evaluate the in-plant barrier for acceptability.
3. To evaluate NUMARC's application guidance, an understanding of the types and extent of the unknown parameters is needed. Describe the type and extent of the unknown parameters at your plant in this context.

III. Thermo-Lag Fire Barriers Outside the Scope of the NUMARC Program

A. Discussion

In your response of to GL 92-08, you indicated that actions necessary to restore the operability of these barriers would be based on the results of the NUMARC test program. During recent meetings with the NRC staff, the Executive Director for Operations and the Commission, NUMARC described the scope of its Thermo-Lag fire barrier program, the results of the Phase 1 fire tests, and planned Phase 2 tests. The program is limited to certain 1-hour and 3-hour conduit and cable tray fire barrier configurations and the development of guidance for applying the test results to plant-specific fire barrier configurations. However, NUMARC's program is not intended to bound all in-plant Thermo-Lag fire barrier configurations. In view of the scope of the NUMARC program and the limited success of the Phase 1 tests, it is clear that the NUMARC program will not be sufficient to resolve all Thermo-Lag fire barrier issues identified in GL 92-08. Therefore, licensees may need to take additional actions to address fire endurance and ampacity derating concerns with in-plant Thermo-Lag barriers.

B. Required information

1. Describe the barriers discussed under Item I.B.1 that you have determined will not be bounded by the NUMARC test program.
2. Describe the plant-specific corrective action program or plan you expect to use to evaluate the fire barrier configurations particular to the plant. This description should include a discussion of the evaluations and tests being considered to resolve the fire barrier issues identified in GL 92-08 and to demonstrate the adequacy of existing in-plant barriers.
3. If a plant-specific fire endurance test program is anticipated, describe the following:
 - a. Anticipated test specimens.
 - b. Test methodology and acceptance criteria including cable functionality.



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IV. Ampacity Derating

A. Discussion

NUMARC has informed the staff that it intends to use the Texas Utilities (TU) Electric Company and Tennessee Valley Authority (TVA) ampacity derating test results to develop an electrical raceway component model for the industry. Additional information is needed to determine whether or not your Thermo-Lag barrier configurations (to protect the safe-shutdown capability from fire or to achieve physical independence of electrical systems) are within the scope of the NUMARC program and, if not, how the in-plant barriers will be evaluated for the ampacity derating concerns identified in GL 92-08.

B. Required Information

1. For the barriers described under Item I.B.1, describe those that you have determined will fall within the scope of the NUMARC program for ampacity derating, those that will not be bounded by the NUMARC program, and those for which ampacity derating does not apply.
2. For the barriers you have determined fall within the scope of the NUMARC program, describe what additional testing or evaluation you will need to perform to derive valid ampacity derating factors.
3. For the barrier configurations that you have determined will not be bounded by the NUMARC test program, describe your plan for evaluating whether or not the ampacity derating tests relied upon for the ampacity derating factors used for those electrical components protected by Thermo-Lag 330-1 (for protecting the safe-shutdown capability from fire or to achieve physical independence of electrical systems) are correct and applicable to the plant design. Describe all corrective actions needed and submit the schedule for completing such actions.
4. In the event that the NUMARC fire barrier tests indicate the need to upgrade existing in-plant barriers or to replace existing Thermo-Lag barriers with another fire barrier system, describe the alternative actions you will take (and the schedule for performing those actions) to confirm that the ampacity derating factors were derived by valid tests and are applicable to the modified plant design.

Your response to Section IV.B may depend on unknown specifics of the NUMARC ampacity derating test program (for example, the final barrier upgrades). However, your response should be as complete as possible. In addition, your response should be updated as additional information becomes available on the NUMARC program.

V. Alternatives

A. Discussion

On the basis of testing of Thermo-Lag fire barriers to date, it is not clear that generic upgrades (using additional Thermo-Lag materials) can be developed for many 3-hour barrier configurations or for some 1-hour barriers (for example, 1-hour barriers on wide cable trays, with post-buttered joints and no internal supports). Moreover, some upgrades that rely on additional thicknesses of Thermo-Lag material (or other fire barrier materials) may not be practical due to the effects of ampacity derating or clearance problems.

B. Required Information

Describe the specific alternatives available to you for achieving compliance with NRC fire protection requirements in plant areas that contain Thermo-Lag fire barriers. Examples of possible alternatives to Thermo-Lag-based upgrades include the following:

1. Upgrade existing in-plant barriers using other materials.
2. Replace Thermo-Lag barriers with other fire barrier materials or systems.
3. Reroute cables or relocate other protected components.
4. Qualify 3-hour barriers as 1-hour barriers and install detection and suppression systems to satisfy NRC fire protection requirements.

VI. Schedules

A. Discussion

The staff expects the licensees to resolve the Thermo-Lag fire barrier issues identified in GL 92-08 or to propose alternative fire protection measures to be implemented to bring plants into compliance with NRC fire protection requirements. Specifically, as test data becomes available, licensees should begin upgrades for Thermo-Lag barrier configurations bounded by the test results.

B. Required Information

Submit an integrated schedule that addresses the overall corrective action schedule for the plant. At a minimum, the schedule should address the following aspects for the plant:

1. implementation and completion of corrective actions and fire barrier upgrades for fire barrier configurations within the scope of the NUMARC program,

2. implementation and completion of plant-specific analyses, testing, or alternative actions for fire barriers outside the scope of the NUMARC program.

VII. Sources and Correctness of Information

Describe the sources of the information provided in response to this request for information (for example, from plant drawings, quality assurance documentation, walk downs or inspections) and how the accuracy and validity of the information was verified.

FIRE PROTECTION EXEMPTIONS, DEVIATIONS, AND LICENSE AMENDMENTS

1.0 Introduction

The U.S. Nuclear Regulatory Commission (NRC) adheres to the application of a defense-in-depth concept of echelons of safety systems to achieve the high degree of safety required for nuclear power plants. This concept is also applicable to nuclear power plant fire safety. The defense-in-depth approach applied to the fire protection program is designed to achieve an adequate balance in: (1) preventing fires from starting; (2) detecting quickly, controlling, and extinguishing promptly those fires that occur; and (3) protecting structures, systems, and components so that a fire that is not promptly extinguished will not prevent the safe shutdown of the plant. NRC fire protection requirements and guidance implement this defense-in-depth approach and specify a level of fire protection which considers the potential consequences that a fire may have on the safe shutdown of the reactor.

The NRC fire protection regulation is Title 10 of the *U.S. Code of Federal Regulations*, Part 50, Section 50.48, "Fire protection," (10 CFR 50.48). Section 50.48 states that each operating reactor must have a fire protection program that satisfies General Design Criterion (GDC) 3, "Fire protection," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50. The objective of the fire protection program is to minimize both the probability and consequences of fires. Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," to 10 CFR Part 50 establishes fire protection features required to satisfy GDC 3. The Appendix R requirements of interest here are specified in Section III.G, "Fire protection of safe shutdown capability."

Guidance for implementing NRC fire protection requirements is contained in (1) Branch Technical Position (BTP) Auxiliary and Power Conversion Systems Branch (APCSB) 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants," May 1976, (2) Appendix A to BTP APCS 9.5-1, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976," August 23, 1976, and (3) Standard Review Plan (NUREG 0800), Section 9.5-1, "Guidelines for Fire Protection For Nuclear Power Plants," July 1981. These documents provide information, staff recommendations, and guidance which may be used by the licensees to meet the requirements of 10 CFR 50.48, Appendix R, and GDC 3. These documents also refer the licensees to such national consensus standards as American Society for Testing and Materials (ASTM) and National Fire Protection Association (NFPA) standards, for detailed guidance on implementing typical industrial fire protection features such as fire detectors, sprinkler systems, and fire barriers.

2.0 Exemption Bases

Section III.G of Appendix R to 10 CFR Part 50 specifies the fire protection features needed to ensure that at least one means of achieving and maintaining safe shutdown conditions will remain available during and after any postulated fire in the plant. Appendix R specifies the design-basis protective features rather than the design-basis fire.

Section III.G.2 of Appendix R requires that one train of redundant trains of cables and equipment necessary to achieve and maintain safe shutdown be maintained free of fire damage by one of the following means:

- (1) Separation of cables and equipment and associated non-safety circuits of redundant trains by a fire barrier having a 3-hour rating. Structural steel forming a part of or supporting such fire barriers shall be protected to provide fire resistance equivalent to that required of the barrier.
- (2) Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.
- (3) Enclosure of cables and equipment and associated non-safety circuits of one redundant train in a fire barrier having a 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.

If these provisions are not met, Section III.G.3 of Appendix R requires that an alternative shutdown capability independent of the fire area of concern be provided. Section III.G.3 also requires that fire detectors and a fixed fire suppression system be installed in the area of concern. These alternative requirements are not deemed to be equivalent; however, they provide adequate fire protection for those configurations in which they are accepted.

Plant-specific conditions may preclude compliance with one or more of the provisions specified in Section III.G. In such a case, the licensee must demonstrate, by means of a detailed fire hazards analysis, that existing protection or existing protection in conjunction with proposed modifications will provide a level of safety equivalent to the technical requirements of Section III.G of Appendix R. Exemptions from fire protection requirements may be requested under 10 CFR 50.12. Generally, the staff will accept an alternate fire protection configuration on the basis of a detailed fire hazards analysis if:

- (1) the alternative ensures that one train of equipment necessary to achieve hot shutdown from either the control room or emergency control stations is free of fire damage; and
- (2) the alternative ensures that fire damage to equipment necessary to achieve cold shutdown is limited so that it can be repaired within a reasonable time (minor repair using components stored on the site); and
- (3) fire-retardant coatings are not used as fire barriers; and
- (4) modifications required to meet Section III.G would not enhance fire protection safety levels above that provided by either existing or proposed alternatives.



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The staff will also accept an alternative fire protection configuration on the basis of a detailed fire hazards analysis when the licensee can demonstrate that modifications required to meet Section III.G would be detrimental to overall facility safety, the alternative configuration satisfies the four aforementioned criteria, and the alternative configuration provides an adequate level of fire safety.

3.0 Exemption Development and Review

Using the NRC guidance and applying the defense-in-depth concept, the licensees determine the fire protection features for plant safety systems and fire areas by analyzing the effects of the postulated fire relative to maintaining the ability to safely shut down the plant. A full fire hazards analysis is performed by the licensee to demonstrate that the plant will maintain the ability to perform safe shutdown functions in the event of a fire. In the fire hazards analysis the licensee must address, as a minimum, the following variables and attributes:

- The NRC fire protection requirements and guidance that apply.
- Amounts, types, configurations, and locations of cable insulation and other combustible materials.
- Fire loading and calculated fire severities.
- In-situ fire hazards.
- Automatic fire detection and suppression capability.
- Layout and configurations of safety trains.
- Reliance on and qualifications of fire barriers, including fire test results, the quality of the materials and system, and the quality of the installation.
- Fire area construction (walls, floor, ceiling, dimensions, volume, ventilation, and congestion).
- Location and type of manual fire fighting equipment and accessibility for manual fire fighting.
- Potential disabling effects of fire suppression systems on shutdown capability.
- Availability of oxygen (for example, inerted containment).
- Alternative or dedicated shutdown capability.

When the fire hazards analysis shows that adequate fire safety can be provided by an alternative approach (i.e., an approach different from the specified requirement such as the use of a 1-hour fire rated barrier where a 3-hour barrier is specified), licensees that are required to meet Appendix R to



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10 CFR Part 50 may request NRC approval of an exemption from the technical requirements of Appendix R to 10 CFR Part 50. Any exemption request must include a sound technical basis that clearly demonstrates that the fire protection defense-in-depth is appropriately maintained and that the exemption is technically justified. As part of its evaluation, the licensee should provide sound technical justification if it does not propose to install or improve the automatic suppression and/or detection capabilities in the area of concern and or to implement other more restrictive fire prevention, detection, or suppression measures.

Similarly, licensees that are not required to comply with Appendix R may need a license amendment or NRC staff approval of a deviation from a specific NRC guideline. The licensee must submit a technical justification for the alternative approach for NRC review and approval with its license amendment or deviation request.

As part of its safety evaluation of the exemption request, deviation, or license amendment, the NRC staff evaluates the fire hazards analysis and the aforementioned variables to ensure that the licensee demonstrated that an alternative approach provides an adequate level of fire protection.

