Docket File
DCS MS-016

MAY 1 0 1982

Docket No. 50-335

Dr. Robert E. Uhrig
Vice President
Advanced Systems & Technology
Florida Power and Light Company
P. O. Box 529100
Miami, Florida 33152

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US NUCLEAR REGULATORY COMMISSION
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Dear Dr. Uhrig:

SUBJECT: EXEMPTION REQUEST - FIRE PROTECTION RULE SCHEDULAR REQUIREMENTS OF 10 CFR 50.48(c) - ST. LUCIE UNIT NO. 1

The Fire Protection Rule, (10 CFR 50.48) published on November 19, 1980, became effective on February 17, 1981, and required the results of certain tasks to be submitted to the Nuclear Regulatory Commission (NRC) by March 19, 1981. By letter dated March 19, 1981, you applied for exemption from some of these schedular requirements of 10 CFR 50.48(c). The exemption requested related to the time allowed to complete a reassessment of the fire protection features at your plant for conformance to the specific requirements of Section III.G of Appendix R to 10 CFR 50; to evaluate the difference determined for each area; and to design modifications to meet the requirements or provide a justifiable basis by means of a fire hazards analysis for an exemption from such requirements. For reasons as stated in your exemption request, you requested additional time to complete the above reassessments, evaluations and designs. Additional information was provided by your letters of April 3 and July 10, 1981, and January 20 and March 18, 1982.

The Commission has granted your request as described in the enclosed Exemption (Enclosure 1). The Exemption is conditional upon a requirement that the submittal be complete, as defined in the Exemption. Since the submittal date granted by this Exemption is within 60 days of the date of this Exemption, you are given a grace period of 60 days after your receipt of this Exemption but not later than July 1, 1982, to complete your submittal. If the NRC should determine that after July 1, 1982 your submittal is not complete, you will be found in violation of 10 CFR 50.48(c). Such a violation will be a continuing one from the date granted by the Exemption and a civil penalty may be imposed for each day the violation continues.

A copy of the Exemption is being filed with the Office of the Federal Register for publication.

Enclosure 2 provides a rewording of the request for information included with generic letter 81-12. This rewording is the result of meetings with representative licensees who felt that clarification of the request would help expedite responses. It does not include any new requests and, therefore, will not adversely affect licensees' ability to respond to generic letter 81-12.

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Enclosure 3 provides information regarding our criteria for evaluating exemption requests from the requirements of Section III.G.2 of Appendix R.

Sincerely,

Original Signed by
H. R. Denton

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Enclosures:
1. Exemption
2. Clarification
3. Criteria for Evaluating Exemptions

cc w/enclosures:
See next page

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Florida Power & Light Company

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ENCLOSURE 1

NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
FLORIDA POWER AND LIGHT COMPANY	)	Docket No. 50-335
	)	
(St. Lucie Plant Unit No. 1)	)	
	)	

DESIGNATED ORIGINAL

Certified By Patricia J. Noonan

EXEMPTION

I.

The Florida Power and Light Company (the licensee) is the holder of Facility Operating License No. DPR-67 which authorizes operation of the St. Lucie Plant, Unit No. 1, a pressurized water reactor located in St. Lucie County, Florida. This license provides, among other things, that it is subject to all rules, regulations and Orders of the Commission now or hereafter in effect.

II.

On November 19, 1980, the Commission published a revised Section 10 CFR 50.48 and a new Appendix R to 10 CFR 50 regarding fire protection features of nuclear power plants (45 F.R. 76602). The revised Section 50.48 and Appendix R became effective on February 17, 1981. Section 50.48(c) established the schedules for satisfying the provisions of Appendix R. Section III of Appendix R contains fifteen subsections, lettered A through O, each of which specifies requirements for a particular aspect of the fire protection features at a nuclear power plant. One of these fifteen subsections, III.G., is the subject of this exemption request. III.G. specifies detailed requirements for fire protection of the equipment used for safe shutdown by means of separation and barriers (III.G.2). If the requirements for separation and barriers could not be met in an area, alternative safe shutdown capability, independent of that area and equipment in that area, was required (III.G.3.).

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Section 50.48(c) required completion of all modifications to meet the provisions of Appendix R within a specified time from the effective date of this fire protection rule, February 17, 1981, except for modifications to provide alternative safe shutdown capability. These latter modifications (III.G.3.) require NRC review and approval. Hence, Section 50.48(c) requires their completion within a certain time after NRC approval. The date for submittal of design descriptions of any modifications to provide alternative safe shutdown capability was specified as March 19, 1981.

By letter dated March 19, 1981, as supplemented April 3 and July 10, 1981, and January 20 and March 18, 1982, Florida Power and Light requested exemptions from 10 CFR 50.48(c) with respect to the requirements of Section III.G of Appendix R as follows:

> Should the Commission deny Florida Power and Light's (FPL's) request for an exemption for all areas of the plant that have already been reviewed and approved by the Commission as shown by the NRC's Safety Evaluation Report (SER) for St. Lucie Unit No. 1, extend for a period of twelve months from the date of denial, pursuant to §50.12(a) and 50.48(c), the date for submittal of plans, schedules and/or design descriptions for any modifications necessary to achieve compliance with, and/or request exemptions from Sections III.G.2 and III.G.3 of Appendix R for all items not in compliance with Sections III.G.2 and III.G.3 regardless of whether such items were ever approved in the SER.

By letter dated June 4, 1981 the Commission did deny the exemption requested for those areas of the plant which have already been reviewed and approved by the Commission. Therefore, the twelve month delay requested corresponds to a submittal date of June 4, 1982.

When this Fire Protection Rule was approved by the Commission, it was understood that the time required for each licensee to re-examine those previously-approved configurations at its plant to determine whether they meet the requirements of Section III.G of Appendix R to 10 CFR 50 was not well known and would vary depending upon the degree of conformance. For each item of non-

conformance that was found, a fire hazards analysis had to be performed to determine whether the existing configuration provided sufficient fire protection. If it did, a basis had to be formulated for an exemption request. If it did not, modifications to either meet the requirements of Appendix R or to provide some other acceptable configuration, that could be justified for an exemption, had to be designed. Where fire protection features alone could not ensure protection of safe shutdown capability, alternative safe shutdown capability had to be designed as required by Section III.G.3. of Appendix R. Depending upon the extensiveness and number of the areas involved, the time required for this re-examination, reanalysis and redesign could vary from a few months to a year or more. The Commission decided, however, to require one, short-term date for all licensees in the interest of ensuring a best-effort, expedited completion of compliance with the Fire Protection Rule, recognizing that there would be a number of licensees who could not meet these time restraints but who could then request appropriate relief through the exemption process. Licensees for 44 of the 72 plants to which Appendix R applies (plants with an operating license issued prior to January 1, 1979) have requested such schedular relief.

The licensees for the remaining 28 plants made submittals to meet the schedular requirements of 50.48(c). All of these submittals, however, were deficient in some respects. In general, much of the information requested in a generic letter (81-12) dated February 20, 1981, to the licensees of all 72 plants, was not provided. Therefore, additional time is being used to complete those submittals also.

III.

Prior to the issuance of Appendix R, St. Lucie Unit No. 1 had been reviewed against the criteria of Appendix A to the Branch Technical Position 9.5-1 (BTP 9.5-1). The BTP 9.5-1 was developed to resolve the lessons learned from the fire at Browns Ferry Nuclear Plant. It is broader in scope than Appendix R, formed the nucleus of the criteria developed further in Appendix R and in its present, revised form constitutes the section of the Standard Review Plan used for the review of applications for construction permits and operating licenses of new plants. The review was completed by the NRC staff and its fire protection consultants and a Fire Protection Safety Evaluation (FPSER) was issued. As a result of that review numerous modifications have been made to plant physical features, systems, and administrative controls to meet the criteria of Appendix A to BTP 9.5-1. St. Lucie Unit No. 1 has been upgraded to a high degree of fire protection already and the extensive reassessment involved in this request for additional time is to quantify, in detail, the differences between what was recently approved and the specific requirements of Section III.G of Appendix R to 10 CFR 50.

In its March 19, 1981 exemption request, the licensee stated that "Except to the extent specific exemptions are requested in this document, St. Lucie 1 is in full compliance with the requirements of the rule." A few items addressed in the exemption request and which are not subject to the requirements of Section III.G remain unresolved. These items deal with Section III.A, Water Supplies for Fire Suppression Systems. The licensee has requested until the Spring 1983 reload to reroute fire pump cables; not to replace existing fire pump controllers with U.L. approved controllers meeting all the requirements of NFPA-20; and not to automatically load the fire pumps onto vital buses in the presence of a safeguards actuation.

These exemption requests are being reviewed by the staff. The staff has, with respect to the technical exemptions requested, previously determined that the licensee has provided sound technical bases warranting further staff review. Because the Spring 1983 reload is the first scheduled outage, following receipt of the final design plans, in which to perform the cable rerouting, the current fire pump controllers and switchgear are nuclear class IE and seismic category I, and the fire pumps will auto load onto the vital buses in the event of loss of offsite power and a drop in fire system pressure the staff has determined that the outstanding exemption requests associated with Section III.A do not affect the acceptability of the requested delay in submitting Section III.G information. Furthermore, compliance with the balance of the Fire Protection Rule means that fire protection requirements, other than the identified exemptions from Section III.A and the requested delay in submitting Section III.G information, have been or will be completed on or before the implementation dates required by the Fire Protection Rule.

Based on the above considerations, we find that the licensee has completed a substantial part of the fire protection features at St. Lucie Unit 1 in conformance with the requirements of the Fire Protection Rule and is applying significant effort to complete the reassessment of any remaining modifications which might be necessary for strict conformance with Section III.G. We find that because of the already-completed upgrading of this facility, there is no undue risk to the health and safety of the public involved by delaying the completion of this reassessment until June 4, 1982. Therefore, an exemption should be granted to allow such time for completion. However, because

we have found that most submittals of this reanalysis to date from other licensees have not been complete; that is, not all of the information requested by Generic Letter 81-12 dated February 20, 1981, was provided, we are adding a condition to this Exemption that requires all such information to be submitted by the date granted.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, an exemption is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest and hereby grants the following exemption with respect to the requirements of Section III.G. of Appendix R to 10 CFR 50:

The date, March 19, 1981, for submittal of plans, schedules and/or design descriptions for any modifications necessary to achieve compliance with, and/or request exemption from Sections III.G.2 and III.G.3 of Appendix R is extended to June 4, 1982.

Provided the following conditions are met:

1). Requests for exemption pursuant to §50.48(c)(6) must include:

a) A concise statement of the extent of the exemption;

b) A concise description of the proposed alternative design features related to assuring post-fire shutdown capability; and

c) a sound technical basis that justifies the proposed alternative in terms of protection afforded to post-fire shutdown capability, degree of enhancement in fire safety by full compliance with III.G requirements, or the detriment to plant safety incurred by full compliance with III.G. A simple statement that the feature for which the exemption is requested was previously approved by the staff is not sufficient. A simple assertion that in the licensee's judgment the feature for which the exemption is requested is adequate fire protection is not sufficient.

2). The design descriptions of alternative or dedicated shutdown systems to comply with Section III.G.3., as required by §50.48(c)(5) shall include a point-by-point response to each item in Section 8 of Enclosure 1 to generic letter 81-12 dated February 20, 1981, and to each item in Enclosure 2 to Generic Letter 81-12, dated February 20, 1981.

If the licensee does not meet the above conditions, the licensee will be found in violation of 10 CFR 50.48(c) even though the submittal may be made within the time limit granted by the exemption. If such a violation occurs, imposition of a civil penalty will be considered under Section 234 of the Atomic Energy Act, as amended. Such a violation will be a continuing one beginning with the date set in the exemption for submittal and terminating when all inadequacies are corrected.

A delay in the determination of inadequacy by the staff, caused by the workload associated with reviewing all of the submittals falling due near the same time, will not relieve the licensee of the responsibility for completeness of the submittal, nor will such delay cause any penalty that may be imposed to be mitigated.

The NRC staff has determined that the granting of this Exemption will not result in any significant environmental impact and that pursuant to 10 CFR 51.5(d)(4) an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with this action.

FOR THE NUCLEAR REGULATORY COMMISSION

Harold R. Denton

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland
this 10th day May, 1982.

CLARIFICATION OF GENERIC LETTER

On February 20, 1981, generic letter 81-12 was forwarded to all reactor licensees with plants licensed prior to January 1, 1979. The letter restated the requirement of Section 50.48 to 10 CFR Part 50 that each licensee would be required to reassess areas of the plant where cables or equipment including associated non-safety circuits of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located to determine whether the requirements of Section III.G.2 of Appendix R to 10 CFR 50 were satisfied. Additionally, Enclosure 1 and Enclosure 2 of the generic letter requested additional information concerning those areas of the plant requiring alternative shutdown capability. Section 8 of Enclosure 1 requested information for the systems, equipment and procedures of alternative shutdown capability and Enclosure 2 defined associated circuits and requested information concerning associated circuits for those areas requiring alternative shutdown.

In our review of licensee submittals and meetings with licensees, it has become apparent that the request for information should be clarified since a lack of clarity could result in the submission of either insufficient or excessive information. Thus, the staff has rewritten Section 8 of Enclosure 1 and Enclosure 2 of the February 20, 1981 generic letter. Additionally, further clarification of the definition of associated circuits has been provided to aid in the reassessments to determine compliance with the requirements of Sections III.G.2 and III.G.3 of Appendix R. In developing this rewrite we have considered the comment of the Nuclear Utility Fire Protection Group. The enclosed rewrite of the Enclosures contains no new requirements but merely attempts to clarify the request for additional information.

Licensees who have not responded to the February 20, 1981 generic letter may choose to respond to the enclosed request for information. Since the enclosed request for information is not new, but merely clarification of our previous letter, responding to it should not delay any submittals in progress that are based upon February 20, 1981 letter. Licensees whose response to the February 20, 1981 letter, has been found incomplete resulting in staff identifications of a major unresolved item (i.e., associated circuits), may choose to respond to pertinent sections of the enclosed request for information in order to close open items (i.e., open item for associated circuits, use rewrite of Enclosure 2).

If additional clarification is needed, please contact the staff Project Manager for your plant.

REWRITE OF SECTION 8 REQUEST FOR ADDITIONAL INFORMATION

The following is a rewrite of the staff's request for additional information concerning design modification to meet the requirements of Section III.G.3 of Appendix R. The following contains no new requests but is merely a rewording of Section 8 of Enclosure 1 of the February 20, 1981 generic letter.

1. Identify those areas of the plant that will not meet the requirements of Section III.G.2 of Appendix R and, thus alternative shutdown will be provided or an exemption from the requirements of Section III.G.2 of Appendix R will be provided. Additionally provide a statement that all other areas of the plant are or will be in compliance with Section III.G.2 of Appendix R.

   For each of those fire areas of the plant requiring an alternative shutdown system(s) provide a complete set of responses to the following requests for each fire area:

   a. List the system(s) or portions thereof used to provide the shutdown capability with the loss of offsite power.

   b. For those systems identified in "1a" for which alternative or dedicated shutdown capability must be provided, list the equipment and components of the normal shutdown system in the fire area and identify the functions of the circuits of the normal shutdown system in the fire area (power to what equipment, control of what components and instrumentation). Describe the system(s) or portions thereof used to provide the alternative shutdown capability for the fire area and provide a table that lists the equipment and components of the alternative shutdown system for the fire area.

For each alternative system identify the function of the new circuits being provided. Identify the location (fire zone) of the alternative shutdown equipment and/or circuits that bypass the fire area and verify that the alternative shutdown equipment and/or circuits are separated from the fire area in accordance with Section III.G.2.

c. Provide drawings of the alternative shutdown system(s) which highlight any connections to the normal shutdown systems (P&IDs for piping and components, elementary wiring diagrams of electrical cabling). Show the electrical location of all breakers for power cables, and isolation devices for control and instrumentation circuits for the alternative shutdown systems for that fire area.

d. Verify that changes to safety systems will not degrade safety systems; (e.g., new isolation switches and control switches should meet design criteria and standards in the FSAR for electrical equipment in the system that the switch is to be installed; cabinets that the switches are to be mounted in should also meet the same criteria (FSAR) as other safety related cabinets and panels; to avoid inadvertent isolation from the control room, the isolation switches should be keylocked or alarmed in the control room if in the "local" or "isolated" position; periodic checks should be made to verify that the switch is in the proper position for normal operation; and a single transfer switch or other new device should not be a source of a failure which causes loss of redundant safety systems).

e. Verify that licensee procedures have been or will be developed which describe the tasks to be performed to effect the shutdown method. Provide a summary of these procedures outlining operator actions.

f. Verify that the manpower required to perform the shutdown functions using the procedures of e. as well as to provide fire brigade members to fight the fire is available as required by the fire brigade technical specifications.

g. Provide a commitment to perform adequate acceptance tests of the alternative shutdown capability. These tests should verify that: equipment operates from the local control station when the transfer or isolation switch is placed in the "local" position and that the equipment cannot be operated from the control room; and that equipment operates from the control room but cannot be operated at the local control station when the transfer isolation switch is in the "remote" position.

h. Provide Technical Specifications of the surveillance requirements and limiting conditions for operation for that equipment not already covered by existing Technical Specifications. For example, if new isolation and control switches are added to a shutdown system, the existing Technical Specification surveillance requirements should be supplemented to verify system/equipment functions from the alternate shutdown station at testing intervals consistent with the guidelines of Regulatory Guide 1.22 and IEEE 338. Credit may be taken for other existing tests using group overlap test concepts.

i. For new equipment comprising the alternative shutdown capability, verify that the systems available are adequate to perform the necessary shutdown function. The functions required should be based on previous analyses, if possible (e.g., in the FSAR), such as a loss of normal ac power or shutdown on Group 1 isolation (BWR). The equipment required for the alternative capability should be the same or equivalent to that relied on in the above analysis.

j. Verify that repair procedures for cold shutdown systems are developed and material for repairs is maintained on site. Provide a summary of these procedures and a list of the material needed for repairs.

SAFE SHUTDOWN CAPABILITY

The following discusses the requirements for protecting redundant and/or alternative equipment needed for safe shutdown in the event of a fire. The requirements of Appendix R address hot shutdown equipment which must be free of fire damage. The following requirements also apply to cold shutdown equipment if the licensee elects to demonstrate that the equipment is to be free of fire damage. Appendix R does allow repairable damage to cold shutdown equipment.

Using the requirements of Sections III.G and III.L of Appendix R, the capability to achieve hot shutdown must exist given a fire in any area of the plant in conjunction with a loss of offsite power for 72 hours. Section III.G of Appendix R provides four methods for ensuring that the hot shutdown capability is protected from fires. The first three options as defined in Section III.G.2 provides methods for protection from fires of equipment needed for hot shutdown:

1. Redundant systems including cables, equipment, and associated circuits may be separated by a three-hour fire rated barrier; or,

2. Redundant systems including cables, equipment and associated circuits may be separated by a horizontal distance of more than 20 feet with no intervening combustibles. In addition, fire detection and an automatic fire suppression system are required; or,

3. Redundant systems including cables, equipment and associated circuits may by enclosed by a one-hour fire rated barrier. In addition, fire detectors and an automatic fire suppression system are required.

The last option as defined by Section III.G.3 provides an alternative shutdown capability to the redundant trains damaged by a fire.

4. Alternative shutdown equipment must be independent of the cables, equipment and associated circuits of the redundant systems damaged by the fire.

Associated Circuits of Concern

The following discussion provides A) a definition of associated circuits for Appendix R consideration, B) the guidelines for protecting the safe shutdown capability from the fire-induced failures of associated circuits and C) the information required by the staff to review associated circuits. The definition of associated circuits has not changed from the February 20, 1981 generic letter; but is merely clarified. It is important to note that our interest is only with those circuit (cables) whose fire-induced failure could effect shutdown. The guidelines for protecting the safe shutdown capability from the fire-induced failures of associated circuits are not requirements. These guidelines should be used only as guidance when needed. These guidelines do not limit the alternatives available to the licensee for protecting the shutdown capability. All proposed methods for protection of the shutdown capability from fire-induced failures will be evaluated by the staff for acceptability.

A. Our concern is that circuits within the fire area will receive fire damage which can affect shutdown capability and thereby prevent post-fire safe shutdown. Associated Circuits* of Concern are defined as those cables (safety related, non-safety related, Class 1E, and non-Class 1E) that:

*The definition for associated circuits is not exactly the same as the definition presented in IEEE-384-1977.

1. Have a physical separation less than that required by Section III.G.2 of Appendix R, and;

2. Have one of the following:

   a. a common power source with the shutdown equipment (redundant or alternative) and the power source is not electrically protected from the circuit of concern by coordinated breakers, fuses, or similar devices (see diagram 2a), or

   b. a connection to circuits of equipment whose spurious operation would adversely affect the shutdown capability (e.g., RHR/RCS isolation valves, ADS valves, PORVs, steam generator atmospheric dump valves, instrumentation, steam bypass, etc.) (see diagram 2b), or

   c. a common enclosure (e.g., raceway, panel, junction) with the shutdown cables (redundant and alternative) and,

      (1) are not electrically protected by circuit breakers, fuses or similar devices, or

      (2) will allow propagation of the fire into the common enclosure, (see diagram 2c).

EXAMPLES OF ASSOCIATED CIRCUITS OF CONCERN

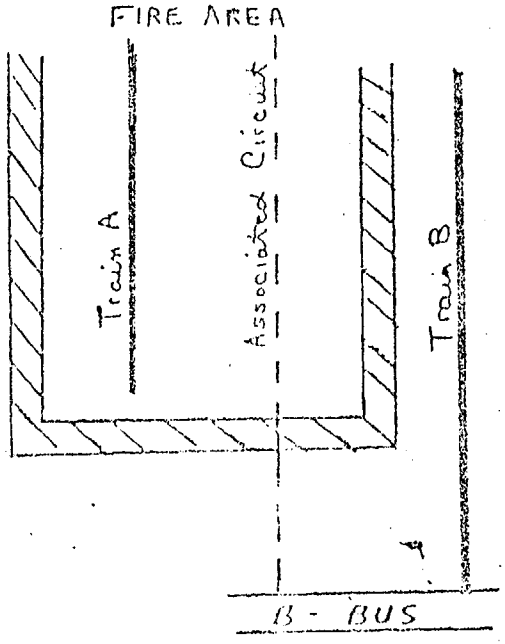
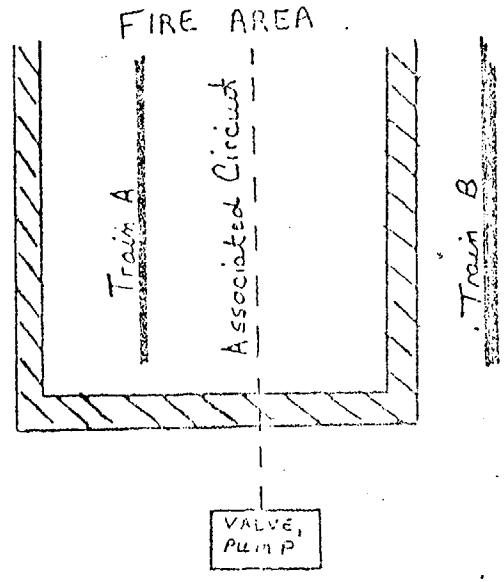
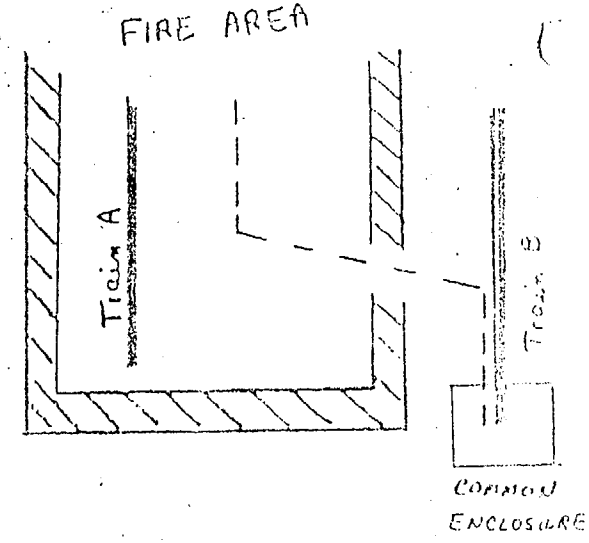


Diagram 2A



Equipment where spurious operations could affect shutdown

Diagram 2B



The area barriers shown above meet the appropriate sub-paragraphs (a-f) of section III.G-2 of Appendix R.

Diagram 2C

8. The following guidelines are for protecting the shutdown capability from fire-induced failures of circuits (cables) in the fire area. The guidance provided below for interrupting devices applies only to new devices installed to provide electrical isolation of associated circuits of concern, or as part of the alternative or dedicated shutdown system. The shutdown capability may be protected from the adverse effect of damage to associated circuits of concern by the following methods:

1. Provide protection between the associated circuits of concern and the shutdown circuits as per Section III.G.2 of Appendix R, or

2. a. For a common power source case of associated circuit:

   Provide load fuse/breaker (interrupting devices) to feeder fuse/breaker coordination to prevent loss of the redundant or alternative shutdown power source. To ensure that the following coordination criteria are met the following should apply:

   (1) The associated circuit of concern interrupting devices (breakers or fuses) time-overcurrent trip characteristic for all circuits faults should cause the interrupting device to interrupt the fault current prior to initiation of a trip of any upstream interrupting device which will cause a loss of the common power source,

   (2) The power source shall supply the necessary fault current for sufficient time to ensure the proper coordination without loss of function of the shutdown loads.

The acceptability of a particular interrupting device is considered demonstrated if the following criteria are met:

(i) The interrupting device design shall be factory tested to verify overcurrent protection as designed in accordance with the applicable UL, ANSI, or NEMA standards.

(ii) For low and medium voltage switchgear (480 V and above) circuit breaker/protective relay periodic testing shall demonstrate that the overall coordination scheme remains within the limits specified in the design criteria. This testing may be performed as a series of overlapping tests.

(iii) Molded case circuit breakers shall peridically be manually exercised and inspected to insure ease of operation. On a rotating refueling outage basis a sample of these breakers shall be tested to determine that breaker drift is within that allowed by the design criteria. Breakers should be tested in accordance with an accepted QC testing methodology such as MIL STD 10 5 D.

(iv) Fuses when used as interrupting devices do not require periodic testing, due to their stability, lack of drift, and high reliability. Administrative controls must insure that replacement fuses with ratings other than those selected for proper coordinating are not accidentally used.

b. For circuits of equipment and/or components whose spurious operation would affect the capability to safely shutdown:

(1) provide a means to isolate the equipment and/or components from the fire area prior to the fire (i.e., remove power cables, open circuit breakers); or

(2) provide electrical isolation that prevents spurious operation. Potential isolation devices include breakers, fuses, amplifiers, control switches, current XFRS, fiber optic couplers, relays and transducers; or

(3) provide a means to detect spurious operations and then procedures to defeat the maloperation of equipment (i.e., closure of the block valve if PORV spuriously operates, opening of the breakers to remove spurious operation of safety injection);

c. For common enclosure cases of associated circuits:

(1) provide appropriate measures to prevent propagation of the fire; and

(2) provide electrical protection (i.e., breakers, fuses or similar devices)

C. We recognize that there are different approaches which may be used to reach the same objective of determining the interaction of associated circuits with shutdown systems. One approach is to start with the fire area, identify what is in the fire area, and determine the interaction between what is in the fire area and the shutdown systems which are outside the fire area. We have entitled this approach, "The Fire Area Approach." A second approach which we have named "The Systems Approach" would be to define the shutdown systems around a fire area and then determine

those circuits that are located in the fire area that are associated with the shutdown system. We have prepared two sets of requests for information, one for each approach. The licensee may choose to respond to either set of requests depending on the approach selected by the licensee.

FIRE AREA APPROACH

1. For each fire area where an alternative or dedicated shutdown method, in accordance with Section III.G.3 of Appendix R is provided, the following information is required to demonstrate that associated circuits will not prevent operation or cause maloperation of the alternative or dedicated shutdown method:

   a. Provide a table that lists all the power cables in the fire area that connect to the same power supply of the alternative or dedicated shutdown method and the function of each power cable listed (i.e., power for RHR pump).

   b. Provide a table that lists all the cables in the fire area that were considered for possible spurious operation which would adversely affect shutdown and the function of each cable listed.

   c. Provide a table that lists all the cables in the fire area that share a common enclosure with circuits of the alternative or dedicated shutdown systems and the function of each cable listed.

   d. Show that fire-induced failures (hot shorts, open circuits or shorts to ground) of each of the cables listed in a, b, and c will not prevent operation or cause maloperation of the alternative or dedicated shutdown method.

e. For each cable listed in a, b and c where new electrical isolation has been provided or modification to existing electrical isolation has been made, provide detailed electrical schematic drawings that show how each cable is isolated from the fire area.

SYSTEMS APPROACH

1. For each area where an alternative or dedicated shutdown method, in accordance with Section III.G.3 of Appendix R is provided, the following information is required to demonstrate that associated circuits will not prevent operation or cause maloperation of the alternative or dedicated shutdown method:

   a. Describe the methodology used to assess the potential of associated circuit adversly affecting the alternative or dedicated shutdown. The description of the methodology should include the methods used to identify the circuits which share a common power supply or a common enclosure with the alternative or dedicated shutdown system and the circuits whose spurious operation would affect shutdown. Additionally, the description should include the methods used to identify if these circuits are associated circuits of concern due to their location in the fire area.

   b. Provide a table that lists all associated circuits of concern located in the fire area.

   c. Show that fire-induced failures (hot shorts, open circuits or shorts to ground) of each of the cables listed in b will not prevent operation or cause maloperation of the alternative or dedicated shutdown method.

d. For each cable listed in b where new electrical isolation has been provided, provide detailed electrical schematic drawings that show how each cable is isolated from the fire area.

e. Provide a location at the site or other offices where all the tables and drawings generated by this methodology approach for the associated circuits review may be audited to verify the information provided above.

HIGH-LOW PRESSURE INTERFACE

For either approach chosen the following concern dealing with high-low pressure interface should be addressed.

2. The residual heat removal system is generally a low pressure system that interfaces with the high pressure primary coolant system. To preclude a LOCA through this interface, we require compliance with the recommendations of Branch Technical Position RSB 5-1. Thus, the interface most likely consists of two redundant and independent motor operated valves. These two motor operated valves and their associated cables may be subject to a single fire hazard. It is our concern that this single fire could cause the two valves to open resulting in a fire initiated LOCA through the high-low pressure system interface. To assure that this interface and other high-low pressure interfaces are adequately protected from the effects of a single fire, we require the following information:

a. Identify each high-low pressure interface that uses redundant electrically controlled devices (such as two series motor operated valves) to isolate or preclude rupture of any primary coolant boundary.

b. For each set of redundant valves identified in a., verify the redundant cabling (power and control) have adequate physical separation as required by Section III.G.2 of Appendix R.

c. For each case where adequate separation is not provided, show that fire induced failures (hot short, open circuits or short to ground) of the cables will not cause maloperation and result in a LOCA.

CRITERIA FOR EVALUATING EXEMPTIONS TO SECTION III G OF APPENDIX R OF 10 CFR PART 50

Paragraph 50.48 Fire Protection of 10 CFR Part 50 requires that all nuclear power plants licensed prior to January 1, 1979 satisfy the requirements of Section III.G of Appendix R to 10 CFR Part 50. It also requires that alternative fire protection configurations, previously approved by an SER be reexamined for compliance with the requirements of Section III.G. Section III.G is related to fire protection features for ensuring that systems and associated circuits used to achieve and maintain safe shutdown are free of fire damage. Fire protection configurations must either meet the specific requirements of Section III.G or an alternative fire protection configuration must be justified by a fire hazard analysis.

The general criteria for accepting an alternative fire protection configurations are the following:

- The alternative assures that one train of equipment necessary to achieve hot shutdown from either the control room or emergency control stations is free of fire damage.
- The alternative assures that fire damage to at least one train of equipment necessary to achieve cold shutdown is limited such that it can be repaired within a reasonable time (minor repairs with components stored on-site).
- Fire retardant coatings are not used as fire barriers.
- Modifications required to meet Section III.G would not enhance fire protection safety above that provided by either existing or proposed alternatives.
- Modifications required to meet Section III.G would be detrimental to overall facility safety.

Because of the broad spectrum of potential configurations for which exemptions may be requested, specific criteria that account for all of the parameters that are important to fire protection and consistent with safety requirements of all plant-unique configurations have not been developed. However, our evaluations of deviations from these requirements in our previous reviews and in the requests for III.G exemptions received to date have identified some recurring configurations for which specific criteria have been developed.

Section III.G.2 accepts three methods of fire protection. A passive 3-hour fire barrier should be used where possible. Where a fixed barrier cannot be installed, an automatic suppression system in combination with a fire barrier or a separation distance free of combustibles is used if the configurations of systems to be protected and in-situ combustibles are such that there is reasonable assurance that the protected systems will survive. If this latter condition is not met, alternative shutdown capability is required and a fixed suppression system installed in the fire area of concern, if it contains a large concentration of cables. It is essential to remember that these alternative requirements are not deemed to be equivalent. However, they provide adequate protection for those configurations in which they are accepted.

When the fire protection features of each fire area are evaluated, the whole system of such features must be kept in perspective. The defense-in-depth principle of fire protection programs is aimed at achieving an adequate balance between the different features. Strengthening any one can compensate in some measure for weaknesses, known or unknown in others. The adequacy of fire protection for any particular plant safety system or area is determined by analysis of the effects of postulated fire relative to maintaining the ability to safely shutdown the plant and minimize radioactive releases to the environment in the event of a fire. During these evaluations it is necessary to consider the two-edged nature of fire protection features recognized in General Design Criterion 3 namely, fire protection should be provided consistent with other safety considerations.

An evaluation must be made for each fire area for which an exemption is requested. During these evaluations, the staff considers the following parameters:

A. Area Description

- walls, floor, and ceiling construction
- ceiling height
- room volume
- ventilation
- congestion

B. Safe Shutdown Capability

- number of redundant systems in area
- whether or not system or equiment is required for hot shutdown
- type of equipment/cables involved
- repair time for cold shutdown equipmnt within this area
- separation between redundant components and in-situ concentration of combustibles
- alternative shutdown capability

C. Fire Hazard Analysis

- type and configuration of combustibles in area
- quantity of combustibles
- ease of ignition and propagation
- heat release rate potential
- transient and installed combustibles
- suppression damage to equipment
- whether the area is continuously manned
- traffic through the area
- accessibility of the area

D. Fire Protection Existing or Committed

- fire detection systems
- fire extinguishing systems
- hose station/extinguisher
- radiant heat shields

A specific description of the fire protection features of the configuration is required to justify the compensating features of the alternative. Low fire loading is not a sufficient basis for granting an exemption in areas where there are cables.

If necessary, a team of experts, including a fire protection engineer, will visit the site to determine the existing circumstances. This visual inspection is also considered in the review process.

The majority of the III.G exemption requests received to date are being denied because they lack specificity. Licensees have not identified the extent of the exemption requested, have not provided a technical basis for the request and/or have not provided a specific description of the alternative. We expect to receive requests for exemption of the following nature:

1. Fixed fire barriers less than 3-hour rating.

2. Fire barrier without an automatic fire suppression system.

3. Less than 20 feet separation of cables with fire propagation retardants (e.g., coatings, blankets, covered trays) and an automatic suppression system.

4. For large open areas with few components to be protected and few in-situ combustibles, no automatic suppression system with separation as in Item 3 above.

5. No fixed suppression in the control room.

6. No fixed suppression in areas without a large concentration of cables for which alternative shutdown capability has been provided.

Our fire research test program is conducting tests to provide information that will be useful to determine the boundary of acceptable conditions for fire protection configurations which do not include a fire rated barrier.

Based on deviations recently approved, specific criteria for certain recurring configurations are as follows:

Fire Barrier Less than Three Hours

This barrier is a wall, floor, ceiling or an enclosure which separates one fire area from another.

Exemptions may be granted for a lower rating (e.g., one hour or two hours) where the fire loading is no more than 1/2 of the barrier rating. The fire rating of the barrier shall be no less than one hour.

Exemptions may be granted for a fixed barrier with a lower fix rating supplemented by a water curtain.

An Automatic Suppression System With Either One Hour Fire Barrier or 20-Foot Separation

This barrier is an enclosure which separates those portions of one division which are within 20 feet of the redundant division. The suppressant may be water or gas.

Exemptions may be granted for configurations of redundant systems which have compensating features. For example:

A. Separation distances less than 20 feet may be deemed acceptable where:

   1. Fire propagation retardants (i.e., cable coatings, covered trays, conduits, or mineral wool blankets) assure that fire propagation through in-situ combustibles will not occur or will be delayed sufficiently to ensure adequate time for detection and suppression.

   2. Distance above a floor level exposure fire and below ceiling assures that redundant systems will not be simultaneously subject to an unacceptable temperature or heat flux.

B. The ommission of an automatic suppression system may be deemed acceptable where:

   1. Distance above a floor level exposure fire and below ceiling assures that redundant systems will not be simultaneously subject to an unacceptable temperature or heat flux.

2. The fire area is required to be manned continuously by the provisions in the Technical Specifications.