

JUN 4 1984

Docket No.: 50-267

Mr. O.R. Lee, Vice President  
Electric Production  
Public service Company of Colorado  
P.O. Box 840  
Denver, Colorado 80201

Dear Mr. Lee:

During a meeting in the Region IV Offices on April 27, 1984, between members of your staff and the staff from various NRC Offices, we agreed to provide you some information concerning the fire protection requirements for the Fort St. Vrain Station (FSV). Specifically, the question of compliance with the provisions of Section III.G. of Appendix R to 10 CFR Part 50 required further clarification. Enclosure 1 provides the criteria for the Alternate Shutdown Capability for FSV and Enclosure 2 provides the basis for these criteria. We request that you evaluate these criteria so that we can discuss any interpretation problems or possible alternative approaches during our forthcoming meeting.

During the April 27, 1984 meeting we also made some specific comments on the request for exemption to the various requirements of Appendix R, which you submitted by letter dated March 2, 1984. Your sole reliance on the previous fire protection review to the criteria of Appendix A to BTP 9.5-1 was inappropriate given the backfit requirements of 10 CFR 50.48(b). Our letter transmitting the fire protection rule to you informed you of this position.

Section III.G. applies to FSV and you must reassess your plant for conformance and modify the plant to conform or justify specific deviations and request exemptions for those deviations. Enclosure 3 contains our guidance on the information that is needed to evaluate an exemption application.

We agree that Section III.L. does not apply to FSV, however, Section III.G. does apply and Enclosure 1 presents an acceptable method of providing compliance. Section III.O. also does not apply to FSV since the plant does not have reactor coolant pumps or a lubricating oil system for the helium circulators. Therefore, no exemptions are needed for Sections III.L. and III.O.

The exemption request for Section III.J. does not provide sufficient information. Where central batteries with hardwired distribution systems are used for emergency lighting, the licensee must analyze the routing of all of the lighting distribution circuits to show that a fire in the area under consideration cannot disable the emergency lighting in

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Mr. O.R. Lee

-2-

any areas needed for safe shutdown following that fire including emergency lighting for access or egress to those areas.

In summary, your March 2, 1984 requests for exemption from Sections III.G. and III.J. require additional analysis and justification and no exemption is required for Sections III.L. and III.O. Conformance to Section II.G.3 should be evaluated against Enclosure 1 to this letter.

If you have any questions on this subject, please contact me at (817) 860-8127.

Sincerely,

Philip C. Wagner,  
Senior Project Manager  
Reactor Projects Branch 1

Enclosures: As Stated

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Alternative Shutdown Capability for Ft. St. Vrain

1. The alternative shutdown capability provided for a specific location (area, room, or zone) shall be able to achieve and maintain sub-critical reactivity conditions in the reactor.

During the post-fire shutdown for a fire in congested cable areas at the G and J walls and the three room control complex, the Alternate Cooling Method (ACM) shall ensure that plant conditions and public health and safety consequences previously analyzed and approved for Design Basis Accident Number 1 as defined in the FSAR Appendix D (Revision 1) are not exceeded. To assure that a fire at the G and J walls will not result in the loss of normal cooling systems and the ACM, the existing manually activated sprinkler systems in these areas shall be converted to an automatic ("pre-action" or "wet pipe") sprinkler system that complies with the guidelines contained in Nation Fire Protection Association (NFPA) Standard No. 13.

During the post-fire shutdown for fires in other locations of the plant, the reactor coolant system process variables shall be maintained within those limits predicted for a loss of normal a.c. power

2. The performance goals for the shutdown functions shall be:
  - a. The reactivity control function shall be capable of achieving and maintaining a subcritical reactivity condition.
  - b. The pressure control function should be capable of achieving depressurization through the helium purification system.
  - c. The PCRV liner cooling function should be capable of achieving and maintaining the PCRV integrity.
  - d. The process monitoring function shall be capable of providing direct readings of the process variables necessary to perform and control the above functions.
  - e. The supporting functions should be capable of providing the process cooling, lubrication, etc. necessary to permit operation of the equipment used for safe shutdown functions.
3. The shutdown capability for specific locations may be unique for each such area, or it may be one unique combination of systems for all such locations. In either case, the alternate shutdown capability shall be physically and electrically independent of the specific location and shall accommodate post-fire conditions where offsite power is available and where offsite power is not available for 72 hours. Procedures shall be in effect to implement this capability.

4. The number of operating shift personnel, exclusive of fire brigade members, required to operate the safe shutdown equipment and systems shall be onsite at all times the reactor is not in cold shutdown.
5. Shutdown systems installed to ensure post fire shutdown capability need not be designed to meet seismic Category I criteria, single failure criteria, or other design basis accident criteria, except where required for other reasons, e.g., because of interface with or impact on existing safety systems, or because of adverse valve actions due to fire damage.
6. The safe shutdown equipment and systems for each location shall be known to be isolated from associated circuits in that location so that hot shorts, open circuits, or shorts to ground in the associated circuits will not prevent operation of the safe shutdown equipment. The separation and barriers between trays and conduits containing associated circuits or safe shutdown cables from the redundant division, or the isolation of these associated circuits from the safe shutdown equipment, shall be such that a postulated fire involving associated circuits will not prevent safe shutdown.

Basis for Alternative Shutdown Capability for Ft. St. Vrain

Section III.L of Appendix R to 10 CFR 50 provides the performance criteria for Alternative and Dedicated Shutdown Capability for light water reactors. Because of the unique design features of Ft. St. Vrain, a gas-cooled reactor, all criteria of Section III.L are not applicable and revised acceptance criteria have been developed. These criteria parallel the criteria for light water reactors except for a fire in the three room control complex or in congested cable areas at the G and J walls. For fires in these areas, the worst case consequences include the loss of forced coolant circulation which is Design Basis Accident Number 1 (DBA-1) as defined in the Ft. St. Vrain FSAR Appendix D. The criteria in III.L include the requirement to have the capability to achieve and maintain cold shutdown conditions within 72 hours and to maintain the reactor coolant system process variables within those limits predicted for a loss of normal a.c. power. The potential consequences of DBA-1 for Ft. St. Vrain exceed this envelope.

The staff has considered the consequences of accepting a postulated fire scenario that could proceed to the severity of DBA-1, which includes core damage. The doses at the low population zone boundary for DBA-1 calculated by the licensee and reported in Appendix D to the FSAR are: 0.37 mrem whole body, 36 mrem thyroid, and 1.0 mrem bone. The NRC SER dated June 21, 1969 concludes that these doses are insignificant and acceptable. Based on these consequences of DBA-1, the staff concludes that for a postulated fire in the three room control complex or in congested cable areas at the G and J walls, the substitution of acceptance criteria of DBA-1 in place of the criteria in III.L relating to cold shutdown and limits on reactor coolant system process variables is acceptable, provided that the fire protection features in these areas are enhanced over the minimum requirements of Section III.G.3 of Appendix R.

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 equipment is required for hot shutdown
- type of equipment/cables involved
- repair time for cold shutdown equipment 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 fire 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 omission 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.