

July 20, 1989

Docket Nos. 50-272/311

Mr. Steven E. Miltenberger
Vice President and Chief Nuclear
Officer
Public Service Electric & Gas Company
Post Office Box 236
Hancocks Bridge, New Jersey 08038

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Dear Mr. Miltenberger:

SUBJECT: EXEMPTION FROM THE REQUIREMENTS OF 10 CFR 50, APPENDIX R (FIRE PROTECTION) (TAC NOS. 53539/53540)

RE: SALEM GENERATING STATION, UNIT NOS. 1 AND 2

In response to your request by letter dated July 15, 1988, the Commission has issued the enclosed Exemption for the Salem Generating Station, Units 1 and 2, from the requirements of 10 CFR Part 50, Appendix R, Section III.G. It exempts Salem Units 1 and 2 from meeting the technical requirements of 10 CFR Part 50, Appendix R in thirteen fire areas and allows use of non-3-hour fire-rated features in 3-hour fire barriers. A copy of the Safety Evaluation supporting the Exemption is also enclosed.

In the Upper Electrical Penetration Area (Area 1 & 2 FA-EP-100G) the lack of technical specifications to assure the operability of the emergency control air compressor has not been justified and is not in conformance with Generic Letters 81-12 and 88-12. We, therefore, are denying this exemption request. In addition, the adequacy of fire barrier penetration seals and fire dampers remain an open issue pending completion of PSE&G's validation effort.

A copy of the Exemption has been forwarded to the Office of the Federal Register for publication.

Sincerely,

/S/

James C. Stone, Project Manager
Project Directorate I-2
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. Exemption
2. Safety Evaluation

cc w/enclosures:
See next page

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*Previously concurred

PDI-2/LA*	PDI-2/PM*	PDI-2/D*	ECEB*	OGC*	ADRI*	BRP/D
MO'Brien	JStone:mr	WButler	CMcCracken	MYoung	BBoger	SVarga
06/16/89	06/16/89	07/06/89	06/19/89	06/29/89	07/06/89	7/19/89

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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Vice President and Chief Nuclear
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Public Service Electric & Gas Company
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Sincerely,

A handwritten signature in cursive script that reads "James C. Stone".

James C. Stone, Project Manager
Project Directorate I-2
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. Exemption
2. Safety Evaluation

cc w/enclosures:
See next page

Mr. Steven E. Miltenberger
Public Service Electric & Gas Company

Salem Nuclear Generating Station

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of
PUBLIC SERVICE ELECTRIC AND
GAS COMPANY

(SALEM GENERATING STATION,
UNITS 1 AND 2)

Docket Nos. 50-272/311

EXEMPTION

I.

The Public Service Electric & Gas Company (the licensee) is the holder of Facility Operating License Nos. DPR-70 and DPR-75 which authorizes operation of the Salem Generating Station, Units 1 and 2, at a power level not in excess of 3411 megawatts thermal each. The facilities are pressurized water reactors located at the licensee's site in Salem County, New Jersey. The license provides, among other things, that the facilities are 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 Part 50 regarding fire protection features of nuclear power plants (45 FR 76602). The revised 10 CFR 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 particular aspects of the fire protection features at a nuclear power facility. One of the fifteen subsections, III.G, is the subject of this exemption request.

By letter dated July 15, 1988, the licensee requested approval of exemptions from the technical requirements of Section III.G of Appendix R to 10 CFR 50 in fourteen fire areas and a "generic" exemption that relates to conditions in a number of plant locations. This submittal includes information contained in previous letters to the staff dated January 31, 1985 and January 17, 1986.

Section III.G.2 of Appendix R requires that one train 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 containing no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; and
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 conditions are not met, Section III.G.3 requires an alternative shutdown capability independent of the fire area of concern. It also requires that a fixed fire suppression system be installed in the fire area of concern if it contains a large concentration of cables or other combustibles. These alternative requirements are not deemed to be equivalent; however, they provide equivalent protection for those configurations in which they are accepted.

1 EXEMPTION, STATION WIDE (Licensee Exemption 1)

1.1 Exemption Requested

The licensee requested an exemption from Section III.G.2.a. to the extent that 1 1/2-hour fire rated doors and dampers, 1-hour fire-rated ventilation ducts and their penetration seals, and non-rated equipment hatches do not provide 3-hour fire-rated barriers between areas containing redundant shutdown systems, equipment, cables and associated circuits.

1.2 Discussion

In several locations throughout the plant (delineated in the licensee's July 15, 1988 letter, Appendix A) openings exist in 3-hour fire-rated walls and floor/ceiling assemblies. These openings are protected by 1 1/2-hour rated fire doors or dampers, 1-hour rated ventilation ducts and seals, or non-fire-rated steel hatches.

The nature of the fire hazard in the areas adjacent to these openings varies significantly. However, where a significant in-situ combustible loading exists in an area, the licensee has committed to implement certain plant modifications which include:

- Replacing certain doors and dampers with 3-hour fire-rated assemblies;
- Installation of additional fire detectors; or
- Converting existing manually actuated fire suppression systems to automatic actuation.

These modifications supplement existing fire protection which includes automatic fire detection systems, manual fire fighting equipment and fire-rated cable enclosures which protect one safe shutdown division as described in Appendix A to the July 15, 1988 submittal.

1.3 Evaluation

The technical requirements of Section III.G.2.a. have not been met in the subject locations because the 3-hour fire barriers which separate redundant shutdown divisions contain openings which are not protected by equivalent fire-rated doors or fire dampers.

The staff was originally concerned that there may be significant quantities of combustible materials, which if ignited, would produce a fire of sufficient intensity and duration to penetrate the barrier and spread to adjoining plant locations causing damage to redundant safe shutdown systems.

However, the locations where a significant combustible loading exists are either protected by automatic fire detection and suppression systems or the licensee has committed to implement additional modifications as described above. Where this is not the case, the potential fire severity is less than the existing doors, dampers, ventilation ducts and cable enclosures, with conservative margin. Where non-rated steel hatches exist, either the area below is protected by an automatic fire suppression system or potential fire spread up through the hatch will not affect redundant shutdown systems.

With regard to the hatches, the staff expressed a related concern that use of hose streams in one fire area might cause water to flow downward through an unsealed hatch and damage redundant shutdown equipment below. The licensee affirmed that no water sensitive electronic components exist in proximity to the hatches which would be affected under such a scenario. On this basis only, this issue is considered closed.

The fire severity (as determined from the ASTM E-119 time-temperature curve) in the remaining areas varies from 1 minute to 46 minutes. The licensee also justifies the exemption on the basis that in some locations fire spread through the subject barriers would not damage more than one shutdown division.

With regard to the dampers, the staff was also concerned that the fire dampers might not function under air flow conditions (ref. 10 CFR Part 21 notification by Ruskin Manufacturing). However, as confirmed during the September 1987 Appendix R compliance inspection, the licensee is performing operational tests of the dampers under airflow conditions. On this basis, this issue is considered closed.

1.4 Conclusion

Based on our review of the licensee's proposals, we conclude that the licensee's alternative fire protection configuration, including the proposed modifications, provides an equivalent level of safety to that achieved by compliance with Appendix R to 10 CFR Part 50. Therefore, the licensee's exemption request for the lack of 3-hour rated barriers in the locations delineated in Appendix A to the July 15, 1988 letter to the staff should be approved.

2 CONTROL ROOM COMPLEX (AREAS 1 & 2 FA-AB-122A) (Licensee Exemption 2)

2.1 Exemption Requested

The licensee requested an exemption from Section III.G.3 of Appendix R to 10 CFR Part 50 to the extent it requires a fixed fire suppression system for an area where alternate shutdown capability is provided. Specifically, the Salem Units 1 and 2 control room complex does not have a fixed fire suppression system.

2.2 Discussion

The physical configuration of the control room complex, including perimeter construction, fire hazards and existing fire protection features is as described in Enclosure 1 of the licensee's July 15, 1988 letter.

Although the walls separating the two control rooms are not fire walls, the doors leading to the control rooms are rated for 3/4 hour. The doors are marked as fire doors and must remain closed. They are also equipped with automatic door closures. The doors have been included in the fire door list and are governed as a Technical Specification item. The restrictions on these doors are designed to prevent the propagation of smoke from one control room to the other.

The Unit 1 ventilation equipment provides cooling for the Unit 1 control complex, the corridor between the two control rooms and the peripheral rooms that are shared by both units. The Unit 2 ventilation equipment provides cooling for the Unit 2 control complex. The ventilation systems for both units have been balanced to maintain equal pressure in both control rooms. Tests have been performed and it has been confirmed that smoke does not propagate between control rooms when the ventilation systems are balanced. The damper vanes are mechanically locked in position to maintain the pressure balance.

In the event that fire were to propagate from one control room to the next the licensee has affirmed that the capability exists to bring both units to a safe shutdown condition.

The licensee justified the exemption on the basis of the existing fire protection and the continuous presence of control room operators.

2.3 Evaluation

The technical requirements of Section III.G.3 are not met in the control room because of the lack of a fixed fire suppression system.

The staff was originally concerned that a fire of significant magnitude could occur within the control room complex. Existing combustible materials are dispersed throughout the area. The automatic fire detection system, coupled with the continuous presence of control room operators, provides reasonable assurance that a fire will be discovered in its initial stages before significant propagation and room temperature rise occurs. At such a point in time, the fire would be expected to be extinguished by plant operators or the fire brigade before much damage occurred to plant safety systems. If rapid fire spread occurred before intervention by plant personnel, the control room could be evacuated and safe plant shutdown achieved using the alternate shutdown capability, which the licensee has affirmed is physically and electronically independent of the control room, and emergency shutdown procedures. Therefore, the absence of a fixed fire suppression system has no safety significance.

2.4 Conclusion

Based on our review of the licensee's proposals, we conclude that the licensee's alternate fire protection configuration provides an equivalent level

of fire protection to that achieved by compliance with the requirements of Appendix R to 10 CFR Part 50. Therefore, the licensee's request for exemption from the requirement for a fixed fire suppression system in the control room complex should be granted.

3 REACTOR PLANT AUXILIARY EQUIPMENT AREA - ELEVATION 100 FT. AND 110 FT.

(AREAS 1 & 2 FA-AB-100C) (Licensee Exemption 3)

UPPER ELECTRICAL PENETRATION AREA (AREAS 1 & 2 FA-EP-100G) (Licensee Exemption 4)

INNER PIPING PENETRATION AREA (AREAS 1 & 2 FA-PP-100H) (Licensee Exemption 4)

REACTOR PLANT AUXILIARY BUILDING - ELEVATION 64 FT. (AREAS 1 & 2 FA-AB-64B) (Licensee Exemption 10)

3.1 Exemptions Requested

The licensee requested exemptions from the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 in the above-referenced areas to the extent that it requires the separation of redundant safe shutdown cables and equipment by 1-hour fire-rated barriers plus automatic fire suppression and detection systems. Specifically, these locations are not protected by automatic fire suppression systems or area-wide fire detection systems.

3.2 Discussion

The physical configuration of the subject fire areas, including perimeter construction, fire hazards and existing fire protection features is as described in Enclosure 1 to the licensee's July 15, 1988 letter.

The staff was initially concerned that although the licensee has been explicit as to the shutdown-related cables located in the areas, not all of the

redundant post-fire safe shutdown components had been identified. The licensee affirmed, however, that the only redundant safe shutdown components present in these locations were those specifically identified in the exemption requests.

The licensee committed in the July 15, 1988 letter to protect cables associated with one safe shutdown path in a 1-hour fire-rated barrier.

In Fire Areas 1 and 2 FA-EP-1006, in lieu of protecting the air supply and chilled water cabling, the non-fire-affected unit's emergency control air compressor will be utilized.

The licensee justifies the exemptions on the bases of the limited fire loading, the existing fire protection and the proposed modifications.

3.3 Evaluation

The technical requirements of Section III.G.2 are not met in the subject locations because of the lack of automatic fire suppression systems. The absence of area-wide fire detection systems is not considered a non-conformance. Generic Letter 86-10 stipulates that where partial coverage automatic fire detection and suppression exist in an area, licensees may perform a fire hazards evaluation to justify the lack of complete coverage. The staff considers the summary analyses contained in the exemption requests as being sufficient to satisfy the guidelines issued in the Generic Letter.

With regard to the absence of an automatic fire suppression system, the staff was originally concerned that a fire could occur in the subject areas and damage cables or components of both shutdown divisions. However, the principal fire hazard in these locations is combustible cable insulation. The remaining combustibles are of a type and quantity that do not represent a significant

hazard. A fire in these areas would be characterized initially by smoldering combustion with limited heat release. The smoke from a fire would be detected automatically by the existing fire detection system or by plant operators. The fire brigade would be dispatched to the area and would extinguish the flames using manual fire fighting equipment. If rapid fire propagation or if significant room temperature rise occurred before the arrival of the brigade, the proposed 1-hour fire barrier would provide a sufficient degree of passive protection to assure that one safe shutdown division would remain free of fire damage.

In the upper electrical penetration area, redundant air supply and chilled water cabling is vulnerable to damage. The licensee has proposed to use the opposite (non-fire-affected) unit's emergency control air compressor in the event of a fire. However, the licensee has not proposed to adopt technical specifications to assure that this capability will be available. The specific concern is that if the opposite unit is in an outage, the emergency control air compressor may not be available. The lack of technical specifications for alternate shutdown capability systems conflict with the guidance issued in Generic Letters 81-12 and 88-12 and will not provide a level of safety equivalent to that achieved by compliance with Appendix R.

3.4 Conclusion

Based on our review of the licensee's proposals, we conclude that, except for the upper electrical penetration area, the licensee's alternate fire protection configuration with the proposed modifications, provides an equivalent level of safety to that achieved by compliance with Appendix R. Therefore, the licensee's request for exemption from the requirement for an automatic fire suppression system in the above-referenced areas should be approved. In the

upper electrical penetration area, the exemption should be denied. The licensee's request for exemption pertaining to the lack of area-wide automatic fire detection in these areas is not needed.

4 MECHANICAL PENETRATION AREAS - ELEVATION 78 FEET AND 100 FEET (FIRE AREAS 1 and 2 FA-MP-781) (LICENSEE EXEMPTION 5)

4.1 Exemption Requested

An exemption was requested from Section III.G.2.C to the extent that it requires an automatic fire suppression system installed in a fire area that contains redundant safe shutdown equipment.

4.2 Discussion

This fire area consists of the mechanical penetration areas on elevations 78 feet and 100 feet of the auxiliary building. It is constructed of reinforced concrete with 3-hour fire rated barriers. Doors, dampers, and HVAC duct penetrations are not 3-hour fire rated; however, these are the subject of a generic exemption previously evaluated to be acceptable. The fire load in this area is low (less than 10,000 Btu per square foot) and there are no fire hazardous equipment or concentrated heavy fire loads in the area. The low fire loads of 10,000 Btu per square foot translates into a fire severity of less than 10 minutes on the ASTM E-119 time-temperature curve.

The redundant equipment located in this area include piping and valves for the following:

- component cooling system (CCS)
- service water system
- residual heat removal system
- safety injection system.

The existing fire protection includes an area-wide fire detection system, fire extinguishers, and hose stations.

4.3 Evaluation

The fire protection in this fire area does not comply with the technical requirements of Section III.G.2.C of Appendix R because an automatic fire suppression system has not been installed in an area containing redundant divisions of shutdown equipment.

There was a concern that a fire in this fire area could cause the loss of normal shutdown capability. However, the fire load in this area is low (less than 10,000 Btu per square foot). Because of the low combustible loading, a fire of significant magnitude or duration is not expected to occur. An area-wide fire detection system is available in this area and in adjacent areas. Therefore, there is reasonable assurance that a fire in this fire area will be detected in its early stages and extinguished by the fire brigade before adjacent safety-related areas are threatened. Also, the expected low fire severity would not be a threat to piping and valves.

4.4 Conclusion

Based on the above evaluation, it is concluded that the existing fire protection features already in place combined with the alternative shutdown capability for the above described fire area provided a level of fire protection equivalent to the technical requirements of Section III.G.2.C of Appendix R. Therefore, the exemption should be approved.

5 460V SWITCHGEAR ROOM (AREAS 1 & 2 FA-AB-84A) (Licensee Exemption 6)

LOWER ELECTRICAL PENETRATION AREA (AREAS 1 & 2 FA-EP-78C) (Licensee Exemption 8)

4160V SWITCHGEAR ROOM (AREAS 1 & 2 FA-AB-64A) (Licensee Exemption 9)

5.1 Exemptions Requested

The licensee requested exemptions from the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 in the above-referenced areas to the extent that it requires the separation of redundant safe shutdown equipment by 1-hour fire-rated barriers plus automatic suppression and detection systems. Specifically, redundant safe shutdown systems are not protected by complete, 1-hour fire barriers. In addition, the fire suppression system in the 4160V switchgear room is manually actuated.

5.2 Discussion

The physical configuration of the subject fire areas, including perimeter construction, fire hazards and existing fire protection is as described in Enclosure 1 to the licensee's July 15, 1988 letter.

The staff was initially concerned that not all redundant safe shutdown components had been identified in the licensee's submittal for these areas. The licensee affirmed however that the only redundant safe shutdown components were those specifically identified in Enclosure 1.

The licensee committed to protect one division of safe shutdown cables in a 1-hour fire-rated enclosure as described in the July 15, 1988 letter.

The licensee justified the exemptions on the basis of the existing protection and proposed modifications. Additionally, in the 460V switchgear room, the licensee indicated that an alternate shutdown capability exists for redundant shutdown cables that are not encompassed by the above-referenced modification.

5.3 Evaluation

The technical requirements of Section III.G.2 are not met in the subject locations because certain redundant safe shutdown cables and components are not protected by complete (wall-to-wall, floor-to-ceiling) 1-hour fire barriers. Also, the 4160V switchgear room is protected by a manually actuated fire suppression system. The staff issued an exemption for the lack of an automatic fire suppression system in the 4160V switchgear room by letter dated June 17, 1983.

The principal concern with the level of fire protection in these fire areas was that because of the absence of complete 1-hour fire-rated barriers between redundant trains of safe shutdown equipment and cables, a fire of significant magnitude could develop and damage redundant shutdown systems. However, the fire load in these locations is low. If a fire were to occur, it is expected that it would develop slowly, with initially low heat release and slow room temperature rise. Because of the presence of the early warning fire detection systems in all three areas, any fire would be detected in its incipient stages. Also, each of these areas is protected by an area-wide fire suppression system. The alarms from these detectors and fire suppression systems are annunciated in the control room. The fire brigade would ultimately be dispatched and would extinguish the fire manually using hose lines or portable extinguishers. Until the fire was put out, the existing fire barriers and the 1-hour fire rated cable wrapping between the redundant shutdown systems would provide sufficient passive protection to provide reasonable assurance that one shutdown division would remain free of fire damage. Therefore, the lack of a complete barrier to protect these systems is not considered safety significant.

5.4 Conclusion

Based on our review of the licensee's proposals, we conclude that the licensee's alternate fire protection configuration plus the proposed modifications provides an equivalent level of fire protection to that achieved by compliance with Appendix R. Therefore, the licensee's request for exemption from the requirement for a complete 1-hour fire-rated barrier in the subject areas should be approved. The staff's evaluation of the June 17, 1983 exemption request for the lack of an automatic fire suppression system in the 4160 V switchgear room remains valid.

6 REACTOR PLANT AUXILIARY EQUIPMENT AREA - ELEVATION 84 FT. (AREAS 1 & 2 FA-AB-84B) (Licensee Exemption 7)

6.1 Exemption Requested

The licensee requested an exemption from the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 to the extent that it requires the separation of redundant safe shutdown cables and equipment by 1-hour fire-rated barriers plus automatic fire detection and suppression systems. Specifically, area-wide detection and suppression systems are not provided. Additionally, auxiliary feedwater (AFW) system and chemical and volume control system (CVCS) equipment are not separated by complete fire rated barriers.

6.2 Discussion

The physical configuration of this location, including perimeter construction, fire hazards, existing fire protection features and the inventory of safe shutdown systems is as described in Enclosure 1 to the licensee's July 15, 1988 letter.

To enhance fire protection in the area, the licensee proposed to implement the following modifications:

- Installation of partial 1-hour fire-rated barriers so as to achieve at least 30 feet of spatial separation of shutdown related cables;
- Expand the existing wet-pipe sprinkler system in the charging pump area to provide full coverage around the pump;
- Enhance the sprinkler systems which protect the auxiliary feedwater pumps as described in the July 15, 1988 letter;
- The No. 11 (21) component cooling water (CCW) pump and the No. 11 (21) component cooling heat exchanger will be enclosed in a 3-hour fire-rated cubicle as described in the above-referenced letter.

The licensee justifies the exemption on the bases of the limited fire loading, existing fire protection and proposed modifications.

6.3 Evaluation

The technical requirements of Section III.G.2 are not met in this area because AFW and CVCS equipment are not separated by complete (wall-to-wall, floor-to-ceiling) 1-hour fire-rated barriers. Also, the intervening space between redundant shutdown cables contains a small quantity of combustible materials. The absence of area-wide fire detection and suppression systems is not considered a non-conformance. Generic Letter 86-10 stipulates that where partial coverage automatic fire detection and suppression systems exist in an area, licensees may perform a fire hazards evaluation to justify the lack of complete coverage. The staff considers the summary analyses contained in the exemption request as being sufficient to satisfy the guidelines issued in the Generic Letter.

With regard to the partial fire barriers and intervening combustibles the staff was initially concerned that a fire which originates in this area could achieve a level of intensity and propagate to such an extent as to damage both shutdown divisions. However, the locations where significant fire hazards or vulnerable systems are present are protected by an automatic fire detection system. If a fire occurred the system would detect it in its initial stages and transmit an alarm directly to the control room. The plant fire brigade would be dispatched to the scene and would extinguish the fire using portable fire fighting equipment. These same locations are also protected by an automatic fire suppression system. If rapid fire propagation or room temperature rise occurred the system would actuate to control the fire and to protect vulnerable systems. Pending arrival of the brigade and/or the actuation of the fire suppression system the fire barriers and spatial separation between the redundant cables and components provide a sufficient degree of passive protection to assure that at least one shutdown division will remain free of fire damage.

6.4 Conclusion

Based on our review of the licensee's proposals, we conclude that the licensee's alternate fire protection configuration provides an equivalent level of fire safety to that achieved by compliance with Appendix R. Therefore the licensee's request for exemption from Section III.G.2 should be approved. The licensee's request for exemption from the requirement for area-wide fire detection and suppression systems in this area is not needed.

7 RESIDUAL HEAT REMOVAL PUMP AND HEAT EXCHANGER AREAS (AREAS 1 & 2 FA-AB-45A and B) (Licensee Exemption 13)

7.1 Exemption Requested

The licensee requested approval of an exemption from the technical requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 to the extent that it requires the separation of redundant safe shutdown systems by complete 3-hour fire-rated barriers. Specifically, redundant cables in these areas are separated by 3-hour fire rated walls with open penetrations.

7.2 Discussion

The physical configuration of this location including perimeter construction, fire hazards, existing fire protection features and the inventory of safe shutdown systems is as described in Enclosure 1 to the licensee's July 15, 1988 letter.

To enhance fire protection the licensee proposed to implement the following modifications:

- Extend the fire detection system throughout elevation 55 feet with the exception of the RHR heat exchangers;
- Seal the openings around the ventilation duct which penetrates the fire wall on elevation 45 feet.
- Enclose cables associated with one shutdown division on elevation 55 feet in a 1-hour fire barrier such that 20 feet of spatial separation is achieved to their redundant counterpart.

The licensee justified the exemption on the basis of the existing protection and the proposed modifications.

7.3 Evaluation

The technical requirements of Section III.G.2 are not met in these areas because redundant safe shutdown cables are not separated by a complete (wall-to-wall, floor-to-ceiling) 3-hour fire-rated barrier.

The staff was originally concerned that a fire of significant magnitude could occur which might propagate through the openings in the fire wall and damage both shutdown divisions. However, the fire loading in these areas is minimal. If all of the combustible materials ignited and were consumed, the resulting fire would be of 5 minutes duration as determined by the ASTM E-119 Time Temperature Curve. The combustibles consist of cable insulation and lubricating oil in pumps. A fire involving these materials would be characterized, initially, by slow burning, low heat release and the production of moderate quantities of smoke. The smoke detection system would actuate and alarm automatically in the control room. The fire brigade would be dispatched and would put out the fire before rapid burning occurred. Pending arrival of the brigade, the products of combustion would be largely confined to the area of origin. Because of the openings in the fire wall some smoke and hot gases would spread into the adjoining fire area. It is the staff's judgement, however, that the products of combustion would be sufficiently cooled and dissipated so as not to represent a significant threat to the redundant cables. Also, the cables themselves are not immediately vulnerable to smoke damage. Failure due to heat damage would not occur until well after initial ignition. The staff concludes that sufficient time exists for the fire brigade to intervene to suppress the fire prior to damage to redundant systems. The lack of a complete 3-hour fire barrier is, therefore, not considered safety significant.

7.4 Conclusion

Based on our review of the licensee's proposal, we conclude that the licensee's alternate fire protection configuration, including the proposed

modifications provides an equivalent level of fire safety to that achieved by compliance with Appendix R. Therefore, the licensee's request for exemption from the requirement for a complete 3-hour rated fire barrier between redundant systems in the subject area should be approved.

8 CONTAINMENT (AREAS 1 & 2 FA-RC-78) (Licensee Exemption 12)

8.1 Exemption Requested

The licensee requested approval of an exemption from the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 to the extent that it requires that redundant cables and equipment within containment be separated by at least 20 feet of horizontal distance free of intervening combustibles or be separated by a radiant energy shield.

8.2 Discussion

The physical configuration of redundant systems within containment, the existing fire hazards and available protection are as described in Enclosure 1 to the licensee's July 15, 1988 letter.

To enhance fire safety the licensee has proposed to install a localized fire suppression system to protect Panel 335 which contains redundant channels of pressurizer pressure and level instrumentation.

The licensee justifies the exemption on the bases of the limited fire loading, the existing fire protection and the proposed modification.

8.3 Evaluation

The technical requirements of Section III.G.2 are not met within containment because redundant systems at the pressurizer and at Panel 335 are not separated by at least 20 feet or separated by a radiant energy shield.

The staff was originally concerned that a fire could occur which would damage redundant shutdown divisions. However, the principal fire hazard within containment, the lube oil in the reactor coolant pumps, has been mitigated by the existing oil collection system and the water spray system over the RCP lube oil lift pump and its discharge lines. The remaining combustible materials are dispersed throughout the area. If a fire were to occur, the resulting smoke and hot gases would rise up into the upper areas of the containment and away from vulnerable shutdown systems. The upper area would act as an effective heat sink until the fire self-extinguishes or is put out by the plant fire brigade. Pending fire extinguishment the existing spatial separation between redundant systems, except for the subject locations, would assure that at least one shutdown division would remain free of fire damage.

At Panel 335, the licensee will install an automatic fire suppression system that will provide reasonable assurance that at least one channel of pressurizer pressure and level instrumentation will remain free of damage.

No additional fire protection modifications are feasible at the pressurizer to enhance the existing level of fire safety. It is the staff's judgement that it is not credible to postulate a significant fire in the vicinity of the pressurizer which would prevent safe shutdown from being achieved.

8.4 Conclusion

Based on our review of the licensee's proposal, we conclude that the licensee's alternate fire protection configuration provides an equivalent level of fire safety to that achieved by compliance with Appendix R. Therefore, the licensee's request for exemption from the requirements of Section III.G.2 for

at least 20 feet of separation between redundant shutdown systems at Panel 35 and at the pressurizer within containment should be approved.

9 PIPE TUNNEL - ELEVATION 84 FEET (AREA 12 FA-PT-84) (Licensee Exemption 14)

9.1 Exemption Requested

The licensee requested approval of an exemption from the technical requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 to the extent that it requires that redundant shutdown systems be separated by at least 20 feet free of intervening combustibles and be protected by automatic fire detection and suppression systems. Specifically, redundant systems are separated by less than 20 feet and the tunnel is not protected by an automatic fire suppression system.

9.2 Discussion

The physical description of this area, including perimeter construction, fire hazards, existing fire protection and configuration of safe shutdown systems is as described in Enclosure 1 to the licensee's July 15, 1988 letter.

To enhance fire safety the licensee committed to install a fire detection system throughout the pipe tunnel which will transmit an alarm automatically to the control room.

The licensee justified the exemption on the bases of the limited fire loading, the unaccessibility of the tunnel and the proposed modification.

9.3 Evaluation

The technical requirements of Section III.G.2 are not met in this area because redundant shutdown divisions are separated by less than 20 feet horizontal distance and the tunnel is not protected by an automatic fire suppression system.

The fire loading in the tunnel is minimal. If all of the combustibles ignited and were consumed the resulting fire would be about 7 minutes in duration as determined from the ASTM E-119 Time Temperature Curve. Because access to the area is limited to three hatchways the potential for accumulation of significant quantities of transient combustibles or ignition sources is considered remote. Nevertheless, the staff was concerned that if a fire did occur, it would not be detected in sufficient time for the fire brigade to intervene to limit damage. The licensee's commitment to install a smoke detection system in the area has eliminated that concern. The staff concludes that with the addition of the detection system, the limited fire hazard in the area and the restricted access, there is reasonable assurance that at least one shutdown division can be maintained free of fire damage.

9.4 Conclusion

Based on our review of the licensee's proposals, we conclude that the licensee's alternate fire protection configuration provides an equivalent level of safety to that achieved by compliance with Appendix R. Therefore the licensee's request for exemption from the requirement of Section III.G.2 for 20 feet of separation between redundant shutdown systems and an automatic fire suppression system in the pipe tunnel should be approved.

10 CO₂ EQUIPMENT ROOM - ELEVATION 84 FEET (AREAS 1 & 2 FA - DG - 84F)

(Licensee Exemption 15)

10.1 Exemption Requested

The licensee requested approval of an exemption from the technical requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 to the extent that it requires separation of redundant shutdown systems by 1-hour fire

barriers and protection by automatic fire detection and suppression systems. Specifically, redundant shutdown cables are not protected by an automatic fire suppression system.

10.2 Discussion

The physical description of this area, including perimeter construction, fire hazards, existing fire protection and configuration of safe shutdown cables is as described in Enclosure 1 to the licensee's July 15, 1988 letter.

To enhance fire safety the the licensee committed to install an area-wide automatic fire detection system and to protect cables for one safe shutdown division in a 1-hour fire-rated barrier.

The licensee justified the exemption on the basis of the low fire loading, the existing protection and the proposed modifications.

10.3 Evaluation

The technical requirements of Section III.G.2 are not met because of the lack of an automatic fire suppression system.

The staff was concerned that because of the absence of an area-wide fire suppression system a fire of significant magnitude could develop and damage redundant shutdown systems. However, the fire loading in the location is low. If all of the combustibles were totally consumed in fire, it would result in an equivalent fire severity of about 20 minutes as determined by the ASTM E-119 Time Temperature Curve. Because of installation of the fire detection system the staff expects that a fire, if one should occur, would be detected in its incipient stages, before significant room temperature rise occurs. The alarm from the detector would be transmitted automatically to the control room. The fire brigade would be dispatched and would extinguish the fire using portable

fire fighting equipment. Pending arrival of the brigade, the 1-hour fire barrier would provide sufficient protection to assure that at least one division of safe shutdown systems would remain free of fire damage. Therefore, the absence of an automatic fire suppression system is not safety significant.

10.4 Conclusion

Based on our review of the licensee's proposals, we conclude that the licensee's alternate fire protection configuration provides an equivalent level of fire safety to that achieved by compliance with Appendix R. Therefore, the licensee's request for exemption from the requirements of Section III.G.2 for an automatic fire suppression system in the subject area should be approved.

III.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), these exemptions as described in Section II are authorized by law and will not present an undue risk to the public health and safety, and are consistent with the common defense and security. The Commission further determines that special circumstances, as provided in 50.12(a)(2)(ii), are present for the exemptions in that application of the regulation in these particular circumstances is not necessary to achieve the underlying purposes of Appendix R to 10 CFR Part 50 because the licensees alternate fire protection configuration, including the modifications where proposed, provide a level safety equivalent to that provided by compliance with Appendix R. Therefore, the Commission hereby grants the following exemptions from the requirements of Section III.G of Appendix R to 10 CFR Part 50:

1. Generic exemption pertaining to non-3-hour fire-rated features in 3-hour fire barriers (License Exemption 1);
2. Lack of a fixed fire suppression system in the control room complex (Areas 1&2 FA-AB-122A) (License Exemption 2);

3. Lack of an automatic fire suppression system in the reactor plant auxiliary equipment area, elevations 100 and 110 feet (Areas 1&2 FA-AB-100C) (Licensee Exemption 3);
4. Lack of an automatic fire suppression system in the inner piping penetration area (Areas 1&2 FA-PP-100H) (Licensee Exemption 4);
5. Lack of an automatic fire suppression system in the reactor plant auxiliary building, elevation 64 feet (Areas 1&2 FA-AB-64B) (Licensee Exemption 10);
6. Lack of an automatic fire suppression system in the mechanical penetration areas, elevations 78 and 100 feet (Fire Areas 1 & 2 FA-MP-781) (Licensee Exemption 5);
7. Lack of complete 1-hour fire rated barriers between redundant shutdown systems and a manually actuated fire suppression system in lieu of an automatic system in the 460V switchgear room. (Areas 1&2 FA-AB-84A) (Licensee Exemption 6);
8. Lack of complete 1-hour fire rated barriers between redundant shutdown systems in the lower electrical penetration area (Areas 1&2 FA-EP-78C) (Licensee Exemption 8);
9. Lack of complete 1-hour fire rated barriers between redundant shutdown systems in the 4160 V switchgear room (Areas 1&2 FA-AB-64A) (Licensee Exemption 9);
10. Lack of complete 1-hour fire-rated barriers or 20 feet free of intervening combustibles between redundant systems in the reactor plant auxiliary equipment area, elevation 84 feet (Areas 1&2 FA-AB-84B) (Licensee Exemption 7);

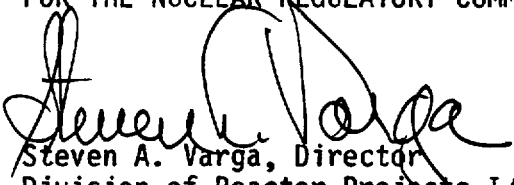
11. Lack of complete 3-hour fire barriers between redundant shutdown systems in the RHR pump and heat exchanger areas (Areas 1&2 FA-AB-45A) (Licensee Exemption 13);
12. Lack of 20 feet of separation free of intervening combustibles between redundant shutdown systems in containment (Areas 1&2 FA-RC-78) (Licensee Exemption 12);
13. Lack of an automatic fire suppression system and the absence of 20 feet of spatial separation between redundant systems in the pipe tunnel, elevation 84 feet (Area 12FA-PT-84) (Licensee Exemption 14); and
14. Lack of an automatic fire suppression system in the CO₂ equipment room, elevation 84 feet (Areas 1&2 FA-DG-84F) (Licensee Exemption 15).

Based on its evaluation, the staff denies the licensee's request for exemption in the upper electric penetration area (Areas 1&2 FA-EP-100G) (Part of Licensee Exemption 4).

Pursuant to 10 CFR 51.32 the Commission has determined that the granting of these exemptions will have no significant impact on the environment (54 FR30484).

This exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION


Steven A. Varga, Director
Division of Reactor Projects I/II
Office of Nuclear Reactor Regulation

Dated at Rockville, Maryland
this 20th day of July , 1989.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION REPORT
EXEMPTIONS FROM 10 CFR 50, APPENDIX R
SALEM GENERATING STATION, UNITS 1 AND 2
DOCKET NOS. 50-272/311

1 INTRODUCTION

By letter dated July 15, 1988, Public Service Electric and Gas Company, the licensee, requested approval of exemptions from the technical requirements of Section III.G of Appendix R to 10 CFR 50 in fourteen fire areas and a "generic" exemption that relates to conditions in a number of plant locations. This submittal supplements and amends information contained in previous letters to the staff including those dated January 31, 1985 and January 17, 1986.

The most recent letter includes information pertaining to exemptions which had previously been approved by the staff. However, the staff has concluded that sufficient new information exists to issue a revised safety evaluation pertaining to those exemptions.

Section III.G.2 of Appendix R requires that one train 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 containing no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; and
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 conditions are not met, Section III.G.3 requires an alternative shutdown capability independent of the fire area of concern. It also requires that a fixed fire suppression system be installed in the fire area of concern if it contains a large concentration of cables or other combustibles. These alternative requirements are not deemed to be equivalent; however, they provide equivalent protection for those configurations in which they are accepted.

Because it is not possible to predict the specific conditions under which fires may occur and propagate, the design basis protective features are specified in the rule rather than a design basis fire. Plant specific features may require protection different from the measures specified in Section III.G. In such a case, the licensee must demonstrate, by fire hazards analysis, that 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.

In summary, 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 staff's general criteria for accepting an alternative fire protection configuration 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 will be limited such that it can be repaired within a reasonable time (minor repairs with components stored onsite).
- 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.

2 EXEMPTION, STATION WIDE

2.1 Exemption Requested

An exemption was requested from Section III.G.2.a. to the extent that 1 1/2-hour fire rated doors and dampers, 1-hour fire-rated ventilation ducts and their penetration seals, and non-rated equipment hatches do not provide 3-hour fire-rated barriers between areas containing redundant shutdown systems, equipment, cables and associated circuits.

2.2 Discussion

In several locations throughout the plant (delineated in the licensee's July 15, 1988 letter) openings exist in 3-hour fire-rated walls and floor/ceiling assemblies. These openings are protected by 1 1/2-hour rated fire doors or dampers, 1-hour rated ventilation ducts and seals, or non-fire-rated steel hatches.

The nature of the fire hazard in the areas adjacent to these openings varies significantly. However, where a significant in-situ combustible loading exists in an area, the licensee has committed to implement certain plant modifications which include:

- Replacing certain doors and dampers with 3-hour fire-rated assemblies;
- Installation of additional fire detectors; or
- Converting existing manually actuated fire suppression systems to automatic actuation.

These modifications supplement existing fire protection which includes automatic fire detection systems, manual fire fighting equipment and fire-rated cable enclosures which protect one safe shutdown division as described in Appendix A to the July 15, 1988 submittal.

The fire severity (as determined from the ASTM E-119 time-temperature curve) in the remaining areas varies from 1 minute to 46 minutes. The licensee also justifies the exemption on the basis that in some locations fire spread through the subject barriers would not damage more than one shutdown division.

2.3 Evaluation

The technical requirements of Section III.G.2.a. have not been met in the subject locations because the 3-hour fire barriers which separate redundant shutdown divisions contain openings which are not protected by equivalently fire-rated doors or fire dampers.

The staff was originally concerned that there may be significant quantities of combustibile materials, which if ignited, would produce a fire of sufficient intensity and duration to penetrate the barrier and spread to adjoining plant locations causing damage to redundant safe shutdown systems.

However, the locations where a significant combustibile loading exists are either protected by automatic fire detection and suppression systems or the licensee has committed to implement additional modifications as described above. Where this is not the case, the potential fire severity is less than the existing

doors, dampers, ventilation ducts and cable enclosures, with conservative margin. Where non-rated steel hatches exist either the area below is protected by an automatic fire suppression system or potential fire spread up through the hatch will not affect redundant shutdown systems.

With regard to the hatches, the staff expressed a related concern that use of hose streams in one fire area might cause water to flow downward through an unsealed hatch and damage redundant shutdown equipment below. The licensee affirmed that no water sensitive electronic components exist in proximity to the hatches which would be affected under such a scenario. On this basis only, this issue is considered closed.

With regard to the dampers, the staff was also concerned that the fire dampers might not function under air flow conditions (ref. 10 CFR Part 21 notification by Ruskin Manufacturing). However, as confirmed during the September 1987 Appendix R compliance inspection, the licensee is performing operational tests of the dampers under airflow conditions. On this basis, this issue is considered closed.

2.4 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternative fire protection configuration, including the proposed modifications, provides an equivalent level of safety to that achieved by compliance with Appendix R to 10 CFR 50. Therefore, the licensee's exemption request for the lack of 3-hour rated barriers in the locations delineated in Appendix A to the July 15, 1988 letter to the staff is granted.

3 CONTROL ROOM COMPLEX (AREA 1 & 2 FA-AB-122A)

3.1 Exemption Requested

The licensee requested an exemption from Section III.G.3 of Appendix R to 10 CFR 50 to the extent it requires a fixed fire suppression system for an area where alternate shutdown capability is provided. Specifically, the Salem Unit 1 & 2 control room complex does not have a fixed fire suppression system.

3.2 Discussion

The physical configuration of the control room complex, including perimeter construction, fire hazards and existing fire protection features is as described in Enclosure 1 of the licensee's July 15, 1988 letter.

Although the walls separating the two control rooms are not fire walls, the doors leading to the control rooms are rated for 3/4 hour. The doors are marked as fire doors and must remain closed. They are also equipped with automatic door closures. The doors have been included in the fire door list and are governed as a Technical Specification item. The restrictions on these doors are designed to prevent the propagation of smoke from one control room to the other.

The Unit 1 ventilation equipment provides cooling for the Unit 1 control complex, the corridor between the two control rooms and the peripheral rooms that are shared by both units. The Unit 2 ventilation equipment provides cooling for the Unit 2 control complex. The ventilation systems for both units have been balanced to maintain equal pressure in both control rooms. Tests have been performed and it has been confirmed that smoke does not propagate between control rooms when the ventilation systems are balanced. The damper vanes are mechanically locked in position to maintain the pressure balance.

In the event that fire were to propagate from one control room to the next the licensee has affirmed that the capability exists to bring both units to a safe shutdown condition.

The licensee justified the exemption on the basis of the existing fire protection and the continuous presence of control room operators.

3.3 Evaluation

The technical requirements of Section III.G.3 are not met in the control room because of the lack of a fixed fire suppression system.

The staff was originally concerned that a fire of significant magnitude could occur within the control room complex. However, the existing combustible materials are dispersed throughout the area. The automatic fire detection system, coupled with the continuous presence of control room operators, provides reasonable assurance that a fire will be discovered in its initial stages before significant propagation and room temperature rise occurs. At such a point in time, the fire would be expected to be extinguished by plant operators or the fire brigade before much damage occurred to plant safety systems. If rapid fire spread occurred before intervention by plant personnel, the control room could be evacuated and safe plant shutdown achieved using the alternate shutdown capability, which the licensee has affirmed is physically and electronically

independent of the control room, and emergency shutdown procedures. Therefore, the absence of a fixed fire suppression system has no safety significance.

3.4 Conclusion

Based on its evaluation, the staff concludes that the licensee's alternate fire protection configuration provides an equivalent level of fire protection to that achieved by compliance with the requirements of Appendix R to 10 CFR 50. Therefore, the licensee's request for exemption from the requirement for a fixed fire suppression system in the control room complex is granted.

4 MECHANICAL PENETRATION AREAS - ELEVATION 78 FEET AND 100 FEET (FIRE AREA 1 & 2 FA-MP-781)

4.1 Exemption Requested

An exemption was requested from Section III.G.2.C to the extent that it requires an automatic fire suppression system installed in a fire area that contains redundant safe shutdown equipment.

4.2 Discussion

This fire area consists of the mechanical penetration areas on elevations 78 feet and 100 feet of the auxiliary building. It is constructed of reinforced concrete with 3-hour fire rated barriers. Doors, dampers, and HVAC duct penetrations are not 3-hour fire rated; however, these are the subject of a generic exemption previously evaluated to be acceptable. The fire load in this area is low (less than 10,000 Btu per square foot) and there are no fire hazardous equipment or concentrated heavy fire loads in the area. The low fire loads of 10,000 Btu per square foot translates into a fire severity of less than 10 minutes on the ASTM E-119 time-temperature curve.

The redundant equipment located in this area include piping and valves for the following:

- component cooling system (CCS)
- service water system
- residual heat removal system
- safety injection system.

The existing fire protection includes an area-wide fire detection system, fire extinguishers, and hose stations.

4.3 Evaluation

The fire protection in this fire area does not comply with the technical requirements of Section III.G.2.C of Appendix R because an automatic fire suppression has not been installed in an area containing redundant divisions of shutdown equipment.

There was a concern that a fire in this fire area could cause the loss of normal shutdown capability. However, the fire load in this area is low (less than 10,000 Btu per square foot). Because of the low combustible loading, a fire of significant magnitude or duration is not expected to occur. An area-wide fire detection system is available in this area and in adjacent areas. Therefore, there is reasonable assurance that a fire in this fire area will be detected in its early stages and extinguished by the fire brigade before adjacent safety-related areas are threatened. Also, the expected low fire severity would not be a threat to piping and valves.

4.4 Conclusion

Based on the above evaluation, it is concluded that the existing fire protection features already in place combined with the alternative shutdown

capability for the above described fire area provided a level of fire protection equivalent to the technical requirements of Section III.G.2.C of Appendix R. Therefore, the exemption is granted.

- 5 REACTOR PLANT AUXILIARY EQUIPMENT AREA - ELEVATION 100 FT. AND 110 FT.
(AREAS 1 & 2 FA-AB-100C)
UPPER ELECTRICAL PENETRATION AREA (AREAS 1 & 2 FA-EP-100G)
INNER PIPING PENETRATION AREA (AREAS 1 & 2 FA-PP-100H)
REACTOR PLANT AUXILIARY BUILDING - ELEVATION 64 FT. (AREAS 1 & 2 FA-AB-64B)

5.1 Exemptions Requested

The licensee requested exemptions from the requirements of Section III.G.2 of Appendix R to 10 CFR 50 in the above-referenced areas to the extent that it requires the separation of redundant safe shutdown cables and equipment by 1-hour fire-rated barriers plus automatic fire suppression and detection systems. Specifically, these locations are not protected by automatic fire suppression systems or area-wide fire detection systems.

5.2 Discussion

The physical configuration of the subject fire areas, including perimeter construction, fire hazards and existing fire protection features is as described in Enclosure 1 to the licensee's July 15, 1988 letter.

The staff was initially concerned that although the licensee has been explicit as to the shutdown-related cables located in the areas, not all of the redundant post-fire safe shutdown components had been identified. The licensee affirmed, however, that the only redundant safe shutdown components present in these locations were those specifically identified in the exemption requests.

The licensee committed in the July 15, 1988 letter to protect cables associated with one safe shutdown path in a 1-hour fire-rated barrier.

In Fire Areas 1 & 2 FA-EP-1006, in lieu of protecting the air supply and chilled water cabling, the non-fire-affected unit's emergency control air compressor will be utilized.

The licensee justifies the exemptions on the bases of the limited fire loading, the existing fire protection and the proposed modifications.

5.3 Evaluation

The technical requirements of Section III.G.2 are not met in the subject locations because of the lack of automatic fire suppression systems. The absence of area-wide fire detection systems is not considered a non-conformance. Generic Letter 86-10 stipulates that where partial coverage automatic fire detection and suppression exist in an area, licensees may perform a fire hazards evaluation to justify the lack of complete coverage. The staff considers the summary analyses contained in the exemption requests as being sufficient to satisfy the guidelines issued in the Generic Letter.

With regard to the absence of an automatic fire suppression system, the staff was originally concerned that a fire could occur in the subject areas and damage cables or components of both shutdown divisions. However, the principal fire hazard in these locations is combustible cable insulation. The remaining combustibles are of a type and quantity that do not represent a significant hazard. A fire in these areas would be characterized initially by smoldering combustion with limited heat release. The smoke from a fire would be detected automatically by the existing fire detection system or by plant operators. The fire

brigade would be dispatched to the area and would extinguish the flames using manual fire fighting equipment. If rapid fire propagation or if significant room temperature rise occurred before the arrival of the brigade, the proposed 1-hour fire barrier would provide a sufficient degree of passive protection to assure that one safe shutdown division would remain free of fire damage.

In the upper electrical penetration area redundant air supply and chilled water cabling is vulnerable to damage. The licensee has proposed to use the opposite (non-fire-affected) unit's emergency control air compressor in the event of a fire. However, the licensee has not proposed to adopt technical specifications to assure that this capability will be available. The specific concern is that if the opposite unit is in an outage, the emergency control air compressor may not be available. The lack of technical specifications for alternate shutdown capability systems conflict with the guidance issued in Generic Letters 81-12 and 88-12.

5.4 Conclusion

Based on this evaluation the staff concludes that, except for the upper electrical penetration area, the licensee's alternate fire protection configuration with the proposed modifications, provides an equivalent level of safety to that achieved by compliance with Appendix R. Therefore, the licensee's request for exemption from the requirement for an automatic fire suppression system in the above-referenced areas is granted. In the upper electrical penetration area, the exemption is denied. The licensee's request for exemption pertaining to the lack of area-wide automatic fire detection in these areas is not needed.

- 6 460V SWITCHGEAR ROOM (AREAS 1 & 2 FA-AB-84A)
LOWER ELECTRICAL PENETRATION AREA (AREAS 1 & 2 FA-EP-78C)
4160V SWITCHGEAR ROOM (AREAS 1 & 2 FA-AB-64A)

6.1 Exemptions Requested

The licensee requested exemptions from the requirements of Section III.G.2 of Appendix R to 10 CFR 50 in the above-referenced areas to the extent that it requires the separation of redundant safe shutdown equipment by 1-hour fire-rated barriers plus automatic suppression and detection systems. Specifically, redundant safe shutdown systems are not protected by complete, 1-hour fire barriers. In addition, the fire suppression system in the 4160V switchgear room is manually actuated.

6.1 Discussion

The physical configuration of the subject fire areas, including perimeter construction, fire hazards and existing fire protection is as described in Enclosure 1 to the licensee's July 15, 1988 letter.

The staff was initially concerned that not all redundant safe shutdown components had been identified in the licensee's submittal for these areas. The licensee affirmed however that the only redundant safe shutdown components were those specifically identified in Enclosure 1.

The licensee committed to protect one division of safe shutdown cables in a 1-hour fire-rated enclosure as described in the July 15, 1988 letter.

The licensee justified the exemptions on the basis of the existing protection and proposed modifications. Additionally, in the 460V switchgear room, the licensee indicated that an alternate shutdown capability exists for redundant shutdown cables that are not encompassed by the above-referenced modification.

6.3 Evaluation

The technical requirements of Section III.G.2 are not met in the subject locations because certain redundant safe shutdown cables and components are not protected by complete (wall-to-wall, floor-to-ceiling) 1-hour fire barriers. Also, the 4160V switchgear room is protected by a manually actuated fire suppression system. The staff issued an exemption for the lack of an automatic fire suppression system in the 4160V switchgear room by letter dated June 17, 1983.

The principal concern with the level of fire protection in these fire areas was that because of the absence of complete 1-hour fire-rated barriers between redundant trains of safe shutdown equipment and cables, a fire of significant magnitude could develop and damage redundant shutdown systems. However, the fire load in these locations is low. If a fire were to occur, it is expected that it would develop slowly, with initially low heat release and slow room temperature rise. Because of the presence of the early warning fire detection systems in all three areas, any fire would be detected in its incipient stages. Also, each of these areas is protected by an area-wide fire suppression system. The alarms from these detectors and fire suppression systems are annunciated in the control room. The fire brigade would ultimately be dispatched and would extinguish the fire manually using hose lines or portable extinguishers. Until the fire was put out, the existing fire barriers and the 1-hour fire rated cable wrapping between the redundant shutdown systems would provide sufficient passive

protection to provide reasonable assurance that one shutdown division would remain free of fire damage. Therefore, the lack of a complete barrier to protect these systems is not considered safety significant.

6.4 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternate fire protection configuration plus the proposed modifications provides an equivalent level of fire protection to that achieved by compliance with Appendix R. Therefore, the licensee's request for exemption from the requirement for a complete 1-hour fire-rated barrier in the subject areas is granted. The staff's evaluation of the June 17, 1983 exemption request for the lack of an automatic fire suppression system in the 4160 V switchgear room remains valid.

7 REACTOR PLANT AUXILIARY EQUIPMENT AREA - ELEVATION 84 FT. (AREAS 1 & 2 FA-AB-84B)

7.1 Exemption Requested

The licensee requested an exemption from the requirements of Section III.G.2 of Appendix R to 10 CFR 50 to the extent that it requires the separation of redundant safe shutdown cables and equipment by 1-hour fire-rated barriers plus automatic fire detection and suppression systems. Specifically, area-wide detection and suppression systems are not provided. Additionally, auxiliary feedwater (AFW) system and chemical and volume control system (CVCS) equipment are not separated by complete fire rated barriers.

7.2 Discussion

The physical configuration of this location, including perimeter construction, fire hazards, existing fire protection features and the inventory of safe shutdown systems is as described in Enclosure 1 to the licensee's July 15, 1988 letter.

To enhance fire protection in the area, the licensee proposed to implement the following modifications:

- Installation of partial 1-hour fire-rated barriers so as to achieve at least 30 feet of spatial separation of shutdown related cables;
- Expand the existing wet-pipe sprinkler system in the charging pump area to provide full coverage around the pump;
- Enhance the sprinkler systems which protect the auxiliary feedwater pumps as described in the July 15, 1988 letter;
- The No. 11 (21) component cooling water (CCW) pump and the No. 11 (21) component cooling heat exchanger will be enclosed in a 3-hour fire-rated cubicle as described in the above-referenced letter.

The licensee justifies the exemption on the bases of the limited fire loading, existing fire protection and proposed modifications.

7.3 Evaluation

The technical requirements of Section III.G.2 are not met in this area because AFW and CVCS equipment are not separated by complete (wall-to-wall, floor-to-ceiling) 1-hour fire-rated barriers. Also, the intervening space between redundant shutdown cables contains a small quantity of combustible materials. The absence of area-wide fire detection and suppression systems is not considered a non-conformance. Generic Letter 86-10 stipulates that where partial coverage automatic fire detection and suppression systems exist in an area, licensees may perform a fire hazards evaluation to justify the lack of complete coverage. The staff considers the summary analyses contained in the exemption request as being sufficient to satisfy the guidelines issued in the Generic Letter.

With regard to the partial fire barriers and intervening combustibles the staff was initially concerned that a fire which originates in this area could achieve a level of intensity and propagate to such an extent as to damage both

shutdown divisions. However, the locations where significant fire hazards or vulnerable systems are present are protected by an automatic fire detection system. If a fire occurred the system would detect it in its initial stages and transmit an alarm directly to the control room. The plant fire brigade would be dispatched to the scene and would extinguish the fire using portable fire fighting equipment. These same locations are also protected by an automatic fire suppression system. If rapid fire propagation or room temperature rise occurred the system would actuate to control the fire and to protect vulnerable systems. Pending arrival of the brigade and/or the actuation of the fire suppression system the fire barriers and spatial separation between the redundant cables and components provide a sufficient degree of passive protection to assure that at least one shutdown division will remain free of fire damage.

7.4 Conclusion

Based on its evaluation the staff concludes that the licensee's alternate fire protection configuration provides an equivalent level of fire safety to that achieved by compliance with Appendix R. Therefore the licensee's request for exemption from Section III.G.2 is granted. The licensee's request for exemption from the requirement for area-wide fire detection and suppression systems in this area is not needed.

8 RESIDUAL HEAT REMOVAL PUMP AND HEAT EXCHANGER AREAS (AREAS 1 & 2 FA-AB-45A and B)

8.1 Exemption Requested

The licensee requested approval of an exemption from the technical requirements of Section III.G.2 of Appendix R to 10 CFR 50 to the extent that it requires the separation of redundant safe shutdown systems by complete 3-hour fire-rated barriers. Specifically, redundant cables in these areas are separated by 3-hour fire rated walls with open penetrations.

8.2 Discussion

The physical configuration of this location including perimeter construction, fire hazards, existing fire protection features and the inventory of safe shutdown systems is as described in Enclosure 1 to the licensee's July 15, 1988 letter.

To enhance fire protection the licensee proposed to implement the following modifications:

- Extend the fire detection system throughout elevation 55 feet with the exception of the RHR heat exchangers;
- Seal the openings around the ventilation duct which penetrates the fire wall on elevation 45 feet.
- Enclose cables associated with one shutdown division on elevation 55 feet in a 1-hour fire barrier such that 20 feet of spatial separation is achieved to their redundant counterpart.

The licensee justified the exemption on the basis of the existing protection and the proposed modifications.

8.3 Evaluation

The technical requirements of Section III.G.2 are not met in these areas because redundant safe shutdown cables are not separated by a complete (wall-to wall, floor-to-ceiling) 3-hour fire-rated barrier.

The staff was originally concerned that a fire of significant magnitude could occur which might propagate through the openings in the fire wall and damage both shutdown divisions. However, the fire loading in these areas is minimal. If all of the combustible materials ignited and were consumed, the resulting fire would be of 5 minutes duration as determined by the ASTM E-119 Time Temperature Curve. The combustibles consist of cable insulation and lubricating oil in pumps. A fire involving these materials would be characterized, initially, by slow burning, low heat release and the production of moderate quantities of smoke. The smoke detection system would actuate and alarm automatically in the control room. The fire brigade would be dispatched and would put out the fire before rapid burning occurred. Pending arrival of the brigade, the products of combustion would be largely confined to the area of origin. Because of the openings in the fire wall some smoke and hot gases would spread into the adjoining fire area. It is the staff's judgement, however, that the products of combustion would be sufficiently cooled and dissipated so as not to represent a significant threat to the

redundant cables. Also, the cables themselves are not immediately vulnerable to smoke damage. Failure due to heat damage would not occur until well after initial ignition. The staff concludes that sufficient time exists for the fire brigade to intervene to suppress the fire prior to damage to redundant systems. The lack of a complete 3-hour fire barrier is, therefore, not considered safety significant.

8.4 Conclusion

Based on its evaluation the staff concludes that the licensee's alternate fire protection configuration, including the proposed modifications provides an equivalent level of fire safety to that achieved by compliance with Appendix R. Therefore, the licensee's request for exemption from the requirement for a complete 3-hour rated fire barrier between redundant systems in the subject area is granted.

9 CONTAINMENT (AREA 1 & 2 FA-RC-78)

9.1 Exemption Requested

The licensee requested approval of an exemption from the requirements of Section III.G.2 of Appendix R to 10 CFR 50 to the extent that it requires that redundant cables and equipment within containment be separated by at least 20 feet of horizontal distance free of intervening combustibles or be separated by a radiant energy shield.

9.2 Discussion

The physical configuration of redundant systems within containment, the existing fire hazards and available protection are as described in Enclosure 1 to the licensee's July 15, 1988 letter.

To enhance fire safety the licensee has proposed to install a localized fire suppression system to protect Panel 335 which contains redundant channels of pressurizer pressure and level instrumentation.

The licensee justifies the exemption on the bases of the limited fire loading, the existing fire protection and the proposed modification.

9.3 Evaluation

The technical requirements of Section III.G.2 are not met within containment because redundant systems at the pressurizer and at Panel 335 are not separated by at least 20 feet or separated by a radiant energy shield.

The staff was originally concerned that a fire could occur which would damage redundant shutdown divisions. However, the principal fire hazard within containment, the lube oil in the reactor coolant pumps, has been mitigated by the existing oil collection system and the water spray system over the RCP lube oil lift pump and its discharge lines. The remaining combustible materials are dispersed throughout the area. If a fire were to occur, the resulting smoke and hot gases would rise up into the upper areas of the containment and away from vulnerable shutdown systems. The upper area would act as an effective heat sink until the fire self-extinguishes or is put out by the plant fire brigade. Pending fire extinguishment the existing spatial separation between redundant systems, except for the subject locations, would assure that at least one shutdown division would remain free of fire damage.

At Panel 335, the licensee will install an automatic fire suppression system that will provide reasonable assurance that at least one channel of pressurizer pressure and level instrumentation will remain free of damage.

No additional fire protection modifications are feasible at the pressurizer to enhance the existing level of fire safety. It is the staff's judgement that it is not credible to postulate a significant fire in the vicinity of the pressurizer which would prevent safe shutdown from being achieved.

9.4 Conclusion

Based on its evaluation, the staff concludes that the licensee's alternate fire protection configuration provides an equivalent level of fire safety to that

achieved by compliance with Appendix R. Therefore, the licensee's request for exemption from the requirements of Section III.G.2 for at least 20 feet of separation between redundant shutdown systems at Panel 35 and at the pressurizer within containment is granted.

10 PIPE TUNNEL - ELEVATION 84 FEET (AREA 12 FA-PT-84)

10.1 Exemption Requested

The licensee requested approval of an exemption from the technical requirements of Section III.G.2 of Appendix R to 10 CFR 50 to the extent that it requires that redundant shutdown systems be separated by at least 20 feet free of intervening combustibles and be protected by automatic fire detection and suppression systems. Specifically, redundant systems are separated by less than 20 feet and the tunnel is not protected by an automatic fire suppression system.

10.2 Discussion

The physical description of this area, including perimeter construction, fire hazards, existing fire protection and configuration of safe shutdown systems is as described in Enclosure 1 to the licensee's July 15, 1988 letter.

To enhance fire safety the licensee committed to install a fire detection system throughout the pipe tunnel which will transmit an alarm automatically to the control room.

The licensee justified the exemption on the bases of the limited fire loading, the unaccessibility of the tunnel and the proposed modification.

10.3 Evaluation

The technical requirements of Section III.G.2 are not met in this area because redundant shutdown divisions are separated by less than 20 feet horizontal distance and the tunnel is not protected by an automatic fire suppression system.

The fire loading in the tunnel is minimal. If all of the combustibles ignited and were consumed the resulting fire would be about 7 minutes in duration as determined from the ASTM E-119 Time Temperature Curve. Because access to the area is limited to three hatchways the potential for accumulation of significant quantities of transient combustibles or ignition sources is considered remote. Nevertheless, the staff was concerned that if a fire did occur, it would not be detected in sufficient time for the fire brigade to intervene to limit damage. The licensee's commitment to install a smoke detection system in the area has eliminated that concern. The staff concludes that with the addition of the detection system, the limited fire hazard in the area and the restricted access, there is reasonable assurance that at least one shutdown division can be maintained free of fire damage.

10.4 Conclusion

Based on its evaluation, the staff concludes that the licensee's alternate fire protection configuration provides an equivalent level of safety to that achieved by compliance with Appendix R. Therefore the licensee's request for exemption from the requirement of Section III.G.2 for 20 feet of separation between redundant shutdown systems and an automatic fire suppression system in the pipe tunnel is granted.

11 CO₂ EQUIPMENT ROOM - ELEVATION 84 FEET (AREAS 1 & 2 FA - DG - 84F)

11.1 Exemption Requested

The licensee requested approval of an exemption from the technical requirements of Section III.G.2 of Appendix R to 10 CFR 50 to the extent that it requires separation of redundant shutdown systems by 1-hour fire barriers and protection by automatic fire detection and suppression systems. Specifically, redundant shutdown cables are not protected by an automatic fire suppression system.

11.2 Discussion

The physical description of this area, including perimeter construction, fire hazards, existing fire protection and configuration of safe shutdown cables is as described in Enclosure 1 to the licensee's July 15, 1988 letter.

To enhance fire safety the licensee committed to install an area-wide automatic fire detection system and to protect cables for one safe shutdown division in a 1-hour fire-rated barrier.

The licensee justified the exemption on the basis of the low fire loading, the existing protection and the proposed modifications.

11.3 Evaluation

The technical requirements of Section III.G.2 are not met because of the lack of an automatic fire suppression system.

The staff was concerned that because of the absence of an area-wide fire suppression system a fire of significant magnitude could develop and damage redundant shutdown systems. However, the fire loading in the location is low. If all of the combustibles were totally consumed in fire it would result in an equivalent fire severity of about 20 minutes as determined by the ASTM E-119 Time Temperature Curve. Because of installation of the fire detection system the staff expects that a fire, if one should occur, would be detected in its incipient stages, before significant room temperature rise occurs. The alarm from the detector would be transmitted automatically to the control room. The fire brigade would be dispatched and would extinguish the fire using portable fire fighting equipment. Pending arrival of the brigade, the 1-hour fire barrier would provide sufficient protection to assure that at least one division of safe shutdown systems would remain free of fire damage. Therefore, the absence of an automatic fire suppression system is not safety significant.

11.4 Conclusion

Based on its evaluation, the staff concludes that the licensee's alternate fire protection configuration provides an equivalent level of fire safety to that achieved by compliance with Appendix R. Therefore, the licensee's request for exemption from the requirements of Section III.G.2 for an automatic fire suppression system in the subject area is granted.

12 FIRE BARRIER PENETRATIONS

In the July 15, 1988 letter the licensee indicated that the adequacy of fire barrier penetration seals and fire dampers has not been completely validated. The licensee committed to ensure that all penetration seals and fire dampers in required fire barriers will be either qualified to the design rating of the penetrated fire barrier by fire test documentation or determined adequate to withstand the fire hazard associated with the area. Pending completion of the licensee's validation effort, this issue will remain open.

13 SUMMARY

Based on its evaluation, the staff finds that the following exemptions should be granted:

- Generic exemption pertaining to non-3-hour fire-rated features in 3-hour fire barriers;
- Lack of a fixed fire suppression system in the control room;
- Lack of an automatic fire suppression system in the reactor plant auxiliary equipment area, elevations 100 and 110 feet;
- Lack of an automatic fire suppression system in the inner piping penetration area;
- Lack of an automatic fire suppression system in the reactor plant auxiliary building, elevation 64 feet;
- Lack of an automatic fire suppression system in the mechanical penetration areas, elevations 78 and 100 feet;
- The lack of complete 1-hour fire rated barriers between redundant shutdown systems in the 460V switchgear room. Also, this area is protected by a manually actuated fire suppression system in lieu of an automatic system;
- The lack of complete 1-hour fire rated barriers between redundant shutdown systems in the lower electrical penetration area;
- The lack of complete 1-hour fire rated barriers between redundant shutdown systems in the 4160 V switchgear room.
- The lack of complete 1-hour fire-rated barriers or 20 feet free of intervening combustibles between redundant systems in the reactor plant auxiliary equipment area, elevation 84 feet;
- The lack of complete 3-hour fire barriers between redundant shutdown systems in the RHR pump and heat exchanger areas;
- The lack of 20 feet of separation free of intervening combustibles between redundant shutdown systems in containment;
- The lack of an automatic fire suppression system and the absence of 20 feet of spatial separation between redundant systems in the pipe tunnel, elevation 84 feet;
- The lack of an automatic fire suppression system in the CO₂ equipment room, elevation 84 feet.

Based on its evaluation in Section 5 above, the staff denies the licensee's request for exemption in the upper electric penetration area.

Principal Contributor: D. Kubicki

Dated: