

December 18, 1984

Docket No. 50-293

Mr. William D. Harrington
Senior Vice President, Nuclear
Boston Edison Company
800 Boylston Street
Boston, Massachusetts 02199

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Dear Mr. Harrington:

SUBJECT: EXEMPTIONS TO SECTION III.G OF APPENDIX R

Re: Pilgrim Nuclear Power Station

We have completed our review of your submittals dated May 17, 1983 and April 2, 1984 requesting exemptions to Section III.G of Appendix R to 10 CFR Part 50. Based on our evaluation, we have concluded that the existing fire protection in the areas involved, together with the modifications you proposed, provides a level of safety equivalent to compliance with Section III.G. Therefore, we have also concluded that your request for exemptions should be granted for the following areas (fire zones):

- Fire Zones 1.9 & 1.10 - Reactor Building, Elevation 23 feet
- Fire Zones 1.11 & 1.12 - Reactor Building, Elevation 51 feet
- Fire Zone 1.30A - Torus Compartment
- Fire Zone 3.5 - Vital M.G. Set Room

The Commission has issued the enclosed Exemption from technical requirements of Appendix R to 10 CFR Part 50. The bases for these exemptions are contained in the enclosed Safety Evaluation. Your additional request for relief from the scheduler requirements of 10 CFR 50.48 will be addressed separately.

A copy of the Exemption is being forwarded to the Office of the Federal Register for publication.

Sincerely,

Original signed by/

Domenic B. Vassallo, Chief
Operating Reactors Branch #2
Division of Licensing

Enclosures:

- 1. Exemption
- 2. Safety Evaluation

cc w/enclosures:
See next page

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Mr. William D. Harrington
Boston Edison Company
Pilgrim Nuclear Power Station

cc:

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)
BOSTON EDISON COMPANY) Docket No. 50-293
(Pilgrim Nuclear Power Station))

EXEMPTION

I.

The Boston Edison Company (BECO/the licensee) is the holder of Facility Operating License No. DPR-35 which authorizes operation of the Pilgrim Nuclear Power Station. This license provides, among other things, that it is subject to all rules, regulations and Orders of the Commission now or hereafter in effect.

The facility comprises one boiling water reactor at the licensee's site located in Plymouth County, Massachusetts.

II.

On November 19, 1980, the Commission published a revised Section 10 CFR 50.48 and a new Appendix R to 10 CFR 50 regarding fire protection features of nuclear power plants (45 FR 76602). The revised Section 50.48 and Appendix R became effective on February 17, 1981. Section III of Appendix R contains fifteen subsections, lettered A through O, each of which specifies requirements for a particular aspect of the fire protection features at a nuclear power plant. One of these fifteen subsections, III.G., is the subject of the licensee's exemption request.

Subsection III.G.2 of Appendix R requires that one train of cables and equipment necessary to achieve and maintain safe shutdown shall be maintained free of fire damage by specific use of fire barriers, separation or enclosures. If these conditions are not met, Section III.G.3 requires an alternative shutdown capability independent of the fire area of concern.

III.

By letter dated May 17, 1983, the licensee requested the following exemptions from the requirements of Sections III.G.2 and III.G.3 of Appendix R:

1. Exemptions for Fire Zones 1.9 and 1.10 on the 23-foot elevation and Fire Zones 1.11 and 1.12 on the 51-foot elevation of the reactor building were requested to the extent Section III.G.2 requires a total area coverage automatic fire suppression system and 20 feet of separation free of intervening combustibles between redundant trains of safe shutdown equipment and cabling. Exemptions for the same fire zones were also requested from the requirement in Section III.G.3 to have fixed fire suppression systems in areas with alternative shutdown capability.

Fire Zones 1.9 and 1.11 contain the train "A" shutdown components and Fire Zones 1.10 and 1.12 contain the train "B" shutdown components. The horizontal separation between these redundant trains is greater than 20 feet; however, several of the separation areas have intervening low combustible loading (cable insulation). The licensee

proposes to install automatic water curtains where physical barriers do not exist between the fire zones on each elevation. All of these zones have smoke detectors which alarm in the control room and redundant cables have been installed outside the fire zones to provide alternative shutdown capability.

Based on our review of the existing fire protection features and the proposed modifications, we find that there is reasonable assurance that one division of shutdown equipment would remain free of fire damage to achieve and maintain safe shutdown.

2. An exemption for Fire Zone 1.30A (the torus compartment) was requested from the Section III.G.2 requirement to install fire detection and automatic fire suppression systems. The licensee justifies the exemption on the following bases: (1) the in-situ fuel loading is very low; (2) the area has limited access during normal operation; (3) the redundant trains of shutdown equipment are horizontally separated by 30 feet free of intervening combustibles; and (4) one train of redundant cables is enclosed in a one-hour fire rated barrier.

Considering the bases stated above, we concluded that fires involving combustibles in the torus compartment would be so limited in size and duration that the proposed one-hour fire rated barrier would provide adequate protection for one train of safe shutdown cables. Furthermore, because of the torus configuration, full area fire detection and automatic suppression would not provide a significant increase in fire safety.

3. An exemption was requested for Fire Zone 3.5 (the Vital M.G. set room) from Section III.G.3 to the extent it requires a fixed fire suppression system in an area for which alternate shutdown capability is provided. This fire zone is separated from other areas by three-hour rated fire barriers and its combustible loading is moderate. A fire detection system and manual suppression equipment are available in the area. We find that there is reasonable assurance that fire in this area would be promptly detected and extinguished. Thus, the installation of a fixed fire suppression system would not significantly increase the level of fire protection in this area.

As a result of our review, we concluded that the existing fire protection, together with the proposed modifications, in Fire Zones 1.9, 1.10, 1.11, 1.12, 1.30A and 3.5 provides a level of fire protection equivalent to compliance with the technical requirements of Sections III.G.2 and III.G.3. Therefore, the requested exemptions should be granted.

IV.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the requested exemptions are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest. Therefore, the Commission hereby grants the following exemptions from the requirements of Sections III.G. of Appendix R to 10 CFR Part 50:

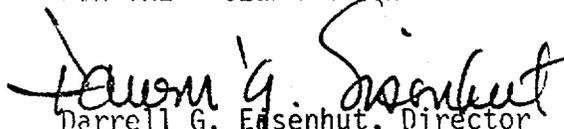
1. Fire Zones 1.9, 1.10, 1.11, and 1.12 to the extent they require total area coverage automatic fire suppression systems and 20 feet of separation free of intervening combustibles between redundant trains of safe shutdown equipment and cabling.
2. Fire Zone 1.30A to the extent it requires the installation of fire detection and automatic fire suppression systems.
3. Fire Zones 1.9, 1.10, 1.11, 1.12, and 3.5 to the extent they require fixed fire suppression systems in areas with alternative shutdown capability.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of these exemptions will have no significant impact on the environment (49 FR 47342).

A copy of the Safety Evaluation dated December 18, 1984, related to this action is available for public inspection at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C. and at the local public document room located at the Plymouth Public Library, North Street, Plymouth, Massachusetts. A copy may be obtained upon request addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Licensing.

This Exemption is effective upon issuance.

FOR THE NUCLEAR REGULATORY COMMISSION


Darrell G. Eisenhut, Director
Division of Licensing
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland,
this 18th day of December, 1984.



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

ENCLOSURE 2

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATIVE TO APPENDIX R EXEMPTIONS REQUESTED FOR

PILGRIM NUCLEAR POWER STATION

DOCKET NO. 50-293

1.0 INTRODUCTION

By letter dated May 17, 1983, as amended by letter dated April 2, 1984, the Boston Edison Company (BECO/the licensee) requested exemptions from Section III.G of Appendix R to 10 CFR Part 50.

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 nonsafety 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 nonsafety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area.
3. Enclosure of cable and equipment and associated nonsafety 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 the above conditions are not met, Section III.G.3 requires that there be an alternative shutdown capability independent of the fire area of concern. It also requires that a fixed 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.

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Because it is not possible to predict the specific conditions under which fires may occur and propagate, the design-basis protective features rather than the design-basis fire are specified in the rule. Plant-specific features may require protection different from the measures specified in Section III.G. In such a case, the licensee must demonstrate, by means of a detailed fire hazards analysis, that existing protection or existing protection in conjunction with proposed modifications will provide a level of safety equivalent to the technical requirements of Section III.G of Appendix R.

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 damage. Either fire protection configurations must meet the specific requirements of Section III.G or an alternative fire protection configuration must be justified by a fire hazard analysis. Generally, the staff will accept an alternative fire protection configuration if:

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

2.0 REACTOR BUILDING ELEVATION 23'-0" AND ELEVATION 51'-0" (FIRE ZONES 1.9, 1.10, 1.11 AND 1.12)

2.1 Exemptions Requested

The licensee requested exemptions from Sections III.G.2 and III.G.3 of Appendix R to the extent they require the installation of a total area coverage automatic fire suppression system on Elevations 23'-0" and 51'-0" of the Reactor Building, 20 feet of separation (free of intervening combustibles) between redundant trains of safe shutdown equipment and cabling, and fixed fire suppression systems in areas having alternative shutdown capability.

2.2 Discussion

Elevations 23'-0" and 51'-0" of the Reactor Building constitute a single fire area because of the unprotected openings in the floor/ceiling assembly separating the elevations (i.e., open hatch and open stairwell). Each elevation has been divided into two fire zones as follows:

- Fire Zone 1.9 - East Side Reactor Building Elevation 23'-0"
- Fire Zone 1.10 - West Side Reactor Building Elevation 23'-0"
- Fire Zone 1.11 - East Side Reactor Building Elevation 51'-0"
- Fire Zone 1.12 - West Side Reactor Building Elevation 51'-0"

a. Elevation 23'-0" (Fire Zones 1.9 and 1.10)

Specific safe shutdown equipment and cabling associated with the automatic depressurization system, core spray system, residual heat removal system and instrumentation are located on Elevation 23'-0". Fire Zone 1.9 contains Division A, and Fire Zone 1.10 contains Division B equipment and cables. Fire Zone 1.9 is separated from Fire Zone 1.10 by a 3-hour fire rated wall along their common boundary except for an area approximately 30 feet wide on the north side of the Reactor Building. Alternative shutdown capability has been provided for certain redundant cables installed in these fire zones.

The in-situ combustibles on Elevation 23'-0" are cable insulation. The insulation is either IEEE Standard 383 qualified cable or the cables have been coated with an approved fire retardant material.

Existing fire protection includes early warning fire detection which alarms in the control room, standpipe hose stations and portable fire extinguishers.

The licensee proposes to install a "water curtain" system at the interface area of Fire Zones 1.9 and 1.10. The system will be designed to discharge water in a "curtain" pattern completely across the open portion of the common zone boundary.

b. Elevation 51'-0" (Fire Zones 1.11 and 1.12)

Specific safe shutdown equipment and cabling associated with the residual heat removal system and instrumentation are located on Elevation 51'-0". Fire Zone 1.11 contains Division A, and Fire Zone 1.12 contains Division B equipment and cables. Fire Zone 1.11 is separated from Fire Zone 1.12 by a 3-hour fire rated wall along their common boundary except in the following areas: (a) an area approximately 40 feet wide along the common boundary on the north side, and (b) an area approximately 11 feet wide along the common boundary on the south side. Alternative shutdown capability has been provided for certain redundant cables installed in these fire zones.

The in-situ combustibles on Elevation 51'-0" are cable insulation. The insulation is either IEEE Standard 383 qualified cable or the cables have been coated with an approved fire retardant material.

Existing fire protection includes early warning fire detection which alarms in the control room, standpipe hose stations, and portable fire extinguishers.

The licensee proposes to install "water curtain" systems at each of the two open interface areas of Fire Zones 1.11 and 1.12 described above. The systems will be designed to discharge water in a "curtain" pattern completely across open portions of the common zone boundary.

2.3 Evaluation

The fire protection in fire zones 1.9, 1.10, 1.11 and 1.12 does not comply with the technical requirements of Section III.G of Appendix R because an automatic fire suppression system is not installed in the area and the redundant trains are not separated by 20 feet free of intervening combustibles.

We were concerned that, because each half of the reactor building was open to the other, a fire occurring on one side could spread to the other and damage systems associated with the redundant shutdown division.

The licensee has proposed to install a water curtain system which consists of automatic sprinkler systems at the common boundary between the fire zones on elevations 23'-0" and 51'-0" of the reactor building where no physical barrier exists. The sprinkler systems, consisting of close-spaced, thermally activated sprinkler heads, are expected to discharge water in a "curtain" fashion to prevent significant horizontal fire propagation. Such systems have been used successfully to protect conveyor openings in fire walls and escalator openings in buildings. Because there are water barriers rather than continuous masonry walls, we expect a small quantity of smoke and heat to pass through the water curtain. However, the smoke and hot gases would be cooled and dispersed throughout the large open areas of the reactor building so as to pose no credible threat to the redundant shutdown division.

The existing fire detection systems and the proposed "water curtain" systems will assure that a fire would be detected in its initial stages before significant damage occurs. The fire would then be suppressed manually by the plant fire brigade before it represents a serious threat to shutdown systems. The water curtains in the large open areas of the reactor building, and the existing spatial separation between redundant divisions provide reasonable assurance that one division will remain free of fire damage to achieve and maintain safe shutdown conditions.

2.4 Conclusion

Based on our evaluation, we conclude that the existing fire protection with the proposed modifications will achieve an acceptable level of safety equivalent to that provided by complying with Sections III.G.2 and III.G.3. Therefore, the licensee's request for exemptions in Fire Zones 1.9, 1.10, 1.11 and 1.12 should be granted.

3.0 TORUS COMPARTMENT (FIRE ZONE 1.30A)

3.1 Exemption Requested

The licensee requested an exemption from Section III.G.2 of Appendix R to the extent it requires the installation of a total area coverage automatic fire detection and suppression system.

3.2 Discussion

The area is located at the -17'-6" elevation of the Reactor Building. The area is separated from other plant areas by fire barriers reviewed and approved by the Safety Evaluation (Section 4.13) for Pilgrim License Amendment Number 35. The ceiling height is approximately 35 feet. Fire protection for the area consists of manual hose stations and portable fire extinguishers located on Elevation 23'-0".

The safe shutdown equipment in the area consists of instrumentation for measuring the water temperature and level in the torus. The redundant trains are separated by 30 feet free of intervening combustibles. By letter dated April 2, 1984, the licensee committed to enclose one train of redundant cables in a 1-hour fire rated barrier.

The in-situ fuel load in the area is very low, consisting of one horizontal cable tray.

3.3 Evaluation

The fire protection in this area does not comply with the technical requirements of Section III.G.2 of Appendix R because an automatic suppression and detection system is not installed in the area.

The licensee justifies the exemption based on the following:

- (a) The in-situ fuel load is very low.
- (b) The area has limited access during normal operation.
- (c) The redundant trains of shutdown equipment are horizontally separated by 30 feet free of intervening combustibles.
- (d) One train of redundant cables is enclosed in a 1-hour rated barrier.

Because of the negligible in-situ fuel load in the Torus Area, and because of the limited access to the area, the anticipated fires involving transient and in-situ combustibles would be limited in size and duration. The proposed 1-hour fire rated barrier would provide adequate protection for one train of safe shutdown cables. Because of the configuration, full area fire detection and automatic suppression would not provide a significant increase in fire safety.

3.4 Conclusion

Based on our evaluation, we conclude that the existing fire protection with the proposed modification in the Torus Compartment (Fire Zone 1.30A) provides a level of protection equivalent to Section III.G.2. Therefore, the exemption should be granted.

4.0 VITAL M.G. SET ROOM (FIRE ZONE 3.5)

4.1 Exemption Requested

An exemption was requested from Section III.G.3 to the extent it requires a fixed fire suppression system in an area for which alternate shutdown capability is provided.

4.2 Discussion

The Vital M.G. Set Room is located on Elevation 23'-0" of the Reactor Building. It is separated from other areas of the plant by 3-hour rated fire barriers. The combustible loading in the area is moderate. A fire detection system and manual suppression equipment are provided in the area. There is alternate shutdown capability, independent of this area.

4.3 Evaluation

The fire protection in this area does not comply with the technical requirements of Section III.G.3 of Appendix R because a fixed fire suppression system has not been installed in the area.

There is reasonable assurance that a fire in this area would be promptly detected and extinguished. The moderate combustible loading in this area ensures that safety related equipment in adjacent areas will not be threatened. The installation of a fixed fire suppression system would not significantly increase the level of fire protection in this area.

4.4 Conclusion

Based on our evaluation, we find that the existing fire protection in conjunction with alternate shutdown capability for the Vital M.G. Set Room provides a level of fire protection equivalent to the technical

requirements of Section III.G.3 of Appendix R. Therefore, the exemption should be granted.

5.0 SUMMARY

Based on our evaluation, we conclude that the existing fire protection, with the proposed modifications, provides a level of safety in Fire Zones 1.9, 1.10, 1.11, 1.12, 1.30A and 3.5 equivalent to compliance with Section III.G of Appendix R. Therefore, the licensee's request for exemptions should be granted.

Principal Contributor: J. Stang

Dated: December 18, 1984