

December 19, 1983

Docket No. 50-331

Mr. Lee Liu
Chairman of the Board and
Chief Executive Officer
Iowa Electric Light and Power Company
Post Office Box 351
Cedar Rapids, Iowa 52406

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Dear Mr. Liu:

SUBJECT: EXEMPTION REQUESTS - 10 CFR 50.48 FIRE PROTECTION
AND APPENDIX R TO 10 CFR PART 50

Re: Duane Arnold Energy Center

The Commission has issued the enclosed Exemption from certain requirements of Section 50.48 and Appendix R to 10 CFR Part 50 for the Duane Arnold Energy Center. This action is in response to your request submitted by letters dated June 22, 1982, January 10 and February 15, 1983.

In your letters you requested exemptions from the requirements of Section III.G of Appendix R for the Reactor Building Southwest Corner, Turbine Building Water Treatment Condensate Pump Area, Partial Suppression Systems (for CRD Module Areas, RHR Valve Room, Laydown Area, HVAC Heat Exchange Area, and Pumphouse), Fire Area Boundaries (Fire Zones 1-C and 2-A/2-B, 1-D and 2-A/2-B, 3-A/3-B and 2-A/2-B, and 4-A and 3-A/3-B), and Vertical Equipment Hatch at Elevation 786'-0".

Based on our evaluation we find that the level of protection currently provided in these areas is equivalent to the level of fire protection required by Section III.G and, therefore, exemption from the requirements of Section III.G is granted.

A copy of the Exemption is being filed with the Office of the Federal Register for publication. The bases of our findings and disposition of your exemption requests are stated in the enclosed Safety Evaluation.

Sincerely,

Original signed by/

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

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Enclosures:

- 1. Exemption
- 2. Safety Evaluation

cc w/enclosures:

See next page

*Please see previous concurrence page.

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Mr. Lee Liu
Iowa Electric Light and Power Company
Duane Arnold Energy Center

cc:

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)	Docket No. 50-331
)	
IOWA ELECTRIC LIGHT AND POWER)	
COMPANY, CENTRAL IOWA POWER)	
COOPERATIVE, AND CORN BELT)	
POWER COOPERATIVE)	
(Duane Arnold Energy Center))	

EXEMPTION

I.

Iowa Electric Light and Power Company, et al. (the licensee) is the holder of Facility Operating License No. DPR-49 which authorizes the operation of the Duane Arnold Energy Center at steady state reactor power levels not in excess of 1658 megawatts thermal. The facility consists of a boiling water reactor located at the licensee's site near Palo in Linn County, Iowa. The license provides, among other things, that it is subject to all rules, regulations and Orders of the Commission now or hereafter in effect.

II.

Section 50.48 of 10 CFR Part 50 requires that licensed operating reactors be subject to the requirements of Appendix R of 10 CFR Part 50. Appendix R contains the general and some of the specific requirements for fire protection programs at licensed nuclear facilities. On February 17, 1981, the fire protection rule for nuclear power plants, 10 CFR 50.48 and Appendix R, became effective. This rule required all licensees of plants licensed prior to January 1, 1979, to submit by March 19, 1981: (1) plans and schedules for meeting the applicable requirements of Appendix R, (2) a design description of

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any modifications proposed to provide alternative safe shutdown capability pursuant to Paragraph III.G.3 of Appendix R, and (3) exemption requests for which the tolling provision of Section 50.48(c)(6) was to be invoked.

The licensee responded to these requirements by a letter dated March 19, 1981, and supplemented its response by information transmitted by letters dated July 3, 1981, June 22, 1982, and January 10 and February 15, 1983.

In these submittals, the licensee requested certain exemptions from the requirements of Section III.G of Appendix R to 10 CFR Part 50, which 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 conditions:

- a. 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;
- b. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or
- c. Enclosure of cables and equipment and associated non-safety circuits of one redundant train in a fire barrier having a one-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 alternative shutdown capability independent of the fire area of concern.

By a letter dated April 26, 1983, the Commission issued Exemption from certain requirements of section 50.48 and Appendix R to 10 CFR 50 for Reactor Building Torus Area, North and South Control Rod Drive (CRD) Module Areas, Reactor Building Residual Heat Removal (RHR) Valve Room, Lower Switchgear Room, Battery Rooms, and Essential Switchgear Rooms. The licensee has requested additional exemptions from Section III.G of Appendix R by letters dated June 22, 1982, January 10, 1983, and February 15, 1983. Exemptions were requested for two specific fire areas, specific fire suppression systems, specific fire area boundaries, and a vertical equipment hatch between the CRD Module Areas and the Laydown Areas. The Commission's evaluation and findings regarding the additional exemption requests follow:

1. The licensee requested an exemption from the provisions of Section III.G of Appendix R for the Reactor Building Southwest Corner (Fire Zone 1-G) to the extent that it requires automatic suppression and a one-hour fire barrier for protection of redundant cables and equipment.

The licensee justified the exemption request by stating that, due to a limited quantity of combustibile material in the fire area, a fire of sufficient intensity to bridge redundant cable trays or damage the redundant cables in conduit protected by a one-hour barrier is not probable. Furthermore, the licensee will provide a one-hour barrier for the protection of all Division I cables and equipment. Because of the low combustibile loading and existing early warning detection system, there is a reasonable assurance that

the proposed one-hour barrier will maintain one train free of fire damage in the time interval needed for a fire brigade to respond and manually extinguish the fire.

Our evaluation shows that the proposed modifications along with the level of safety provided in the Reactor Building Southwest Corner Room (Fire Zone 1-G) will be equivalent to the technical requirements of Section III.G of the Appendix R. The licensee's request for this exemption should therefore, be granted.

2. By letters dated June 22, 1982, and January 10, 1983 the licensee requested an exemption from Section III.G, for the Duane Arnold Energy Center Turbine Building Water Treatment Condensate Pump Area (Fire Zone 7-E) to the extent that it requires automatic suppression and one-hour rated fire barriers for the protection of redundant cables and equipment.

The licensee has justified this request for exemption from suppression capability for this zone by stating that the protection is adequate by virtue of horizontal distances involved and the extremely low combustible loading of the zone. Subsequently, by a letter dated February 15, 1983, the licensee committed to provide a one-hour fire barrier for the protection of all Division I cables in this zone, and provided further justification for not providing automatic suppression.

We have reviewed the licensee's submittals, and find that the combustibles stored in the separation areas are not located directly beneath the redundant safety-related cables. Additionally, curbing and floor drains are provided to prevent any spills from

spreading to areas close to safe shutdown cables. The licensee has committed to enclose all Division I cables in this zone in a one-hour rated fire barrier. This protection in conjunction with the configuration of the area, ceiling height, and installed early warning detection system provide reasonable assurance that one train will be maintained free of fire damage in the interval needed for the fire brigade to respond and manually extinguish the fire.

Therefore, we conclude that the existing protection in the Turbine Building Water Treatment Condensate Pump Area, combined with the proposed one-hour barriers for Division I cables, provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R and that the licensee's request for this exemption should be granted.

3. By letter dated June 22, 1982 the licensee submitted proposed modifications to several plant areas to comply with Appendix R. By letters dated January 10 and February 15, 1983 the licensee submitted additional information and requested exemption from Section III.G for six areas protected by partial suppression systems. The licensee based this exemption request on the following bases:
 - (1) In Zone 2-A there is adequate distance of the cable trays above the floor and below the ceiling, and automatic suppression capability in the vicinity of those trays enclosed in one-hour fire barriers;
 - (2) Zone 2-B will have low combustible loadings in the vicinity of the protected cables, and automatic suppression in the vicinity of those conduits protected by one-hour fire barrier;

- (3) Zone 2-D will have low fire loading (0.01 hour), horizontal separation, automatic suppression in the vicinity of the conduits, and trays enclosed in a one-hour fire barrier;
- (4) Zone 3-A will have redundant trays horizontally separated by a minimum of eight feet, low fire loading in the area, and automatic suppression in the vicinity of the conduits and trays enclosed in one-hour fire barrier;
- (5) Zone 4-A will have low fire loading in the area, and adequate separation of redundant trays; and
- (6) Zone 16-F will have low fire loading in the area, separation of redundant trains, and automatic suppression in the vicinity of the conduits and trays enclosed in one-hour fire barriers.

We have reviewed the licensee's request for this exemption. The licensee prefers not to install a complete suppression system due to the possibility of damaging sensitive electrical equipment in adjacent areas. Our evaluation shows that, in these six areas, the amount of in-situ and anticipated combustible materials could not cause a fire of sufficient magnitude to overwhelm the system. However, if this were to occur, the one-hour fire barriers will provide additional assurance that one train will be maintained free of fire damage in the time interval required for the fire brigade to respond and manually extinguish the fire. Therefore, we conclude that the level of protection provided for the North and South CRD Module areas (2-A and 2-B), the RHR Valve Room (2-D) area, the Laydown (3-A) area, HVAC heat exchanger and Chiller (4-A) area, and the Pumphouse (16-F) area is equivalent to

the technical requirements of Section III.G of Appendix R. The requested exemption should therefore, be granted.

4. By a letter dated June 7, 1979 the licensee submitted a fire hazards analysis (FHA) which detailed the fire protection features for each fire area in the plant. We accepted the licensee's FHA as meeting our guidelines, and the divisional boundaries of less than 3-hours were accepted on the basis of combustible loading to which the barrier was exposed. The new fire protection rule, 10 CFR 50 Appendix R, was issued subsequent to FHA acceptance. The new rule requires that (1) previously approved configurations of fire protection for safe shutdown capability be verified as providing a level of safety equivalent to that envisaged in Appendix R, and (2) an exemption from Appendix R requirements be granted, if the staff's conclusion were favorable. The licensee, in January 10 and February 15, 1983 letters, indicated that 15 boundaries will be modified to meet the Appendix R requirement, and 37 penetrations between the zones comply with Section III.G of Appendix R. The licensee has requested exemptions for the following 14 remaining boundaries which will not meet the requirements of Section III.G of Appendix R. The boundary zones are listed along with their fire rating and the associated fire loading which could be expected.

<u>Interfacing Zones</u>	<u>Fire Rating</u>	<u>Expected Fire Load (HR)</u>	
1C	2A/2B	1-1/2 hr rated upper stairwell door	0.16
1D	2A/2B	1-1/2 hr rated lower stairwell door	0.13
1D	2A/2B	1-1/2 hr rated stairwell door	0.13
1D	2A/2B	1-1/2 hr rated damper	0.13
2A/2B	1C	1-1/2 hr rated stairwell door	0.38/0.21
2A/2B	1D	1-1/2 hr rated lower stairwell door	0.38/0.21
2A/2B	1D	1-1/2 hr rated stairwell door	0.38/0.21
2A/2B	1D	1-1/2 hr rated damper	0.38/0.21
2A/2B	3A/3B	1-1/2 hr rated stairwell door	0.38/0.21
2A/2B	3A/3B	2 hr rated elevator door	0.38/0.21
3A/3B	2A/2B	1-1/2 hr rated stairwell door	0.39/0.26
3A/3B	4A	1-1/2 hr rated stairwell door	0.39/0.26
3A/3B	2A/2B	2 hr rated elevator door	0.39/0.26
4A	3A/3B	2 hr rated stairwell door	0.09

We have reviewed the licensee's request for the exemption for the above 14 boundaries. Because the combustible loading in these areas is appreciably lower than one-half the rating of the fire barriers, a fire in any of these areas would be of sufficiently short duration to assure that the existing barriers will provide adequate protection. We conclude that the existing fire protection in these fire areas provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R to 10 CFR 50. The requested exemption should, therefore, be granted.

5. By a letter dated January 10, 1983, the licensee requested an exemption from Section III.G for a 360 square foot vertical equipment hatch opening in the floor between the CRD Module Areas (Fire Areas 2-A/2-B) and laydown areas (Fire Zones 3-A/3-B). In Zone 2-B, three Division I trays are routed horizontally below the edge of open equipment hatch, approximately 6 inches from the edge and 21-24 feet above the floors. In Zone 3-B, four Division II trays are routed

horizontally above the hatch's edge, approximately 6 feet from the edge and 16-20 feet above the zone 3-B floor.

These cables are separated from the Division I cables by the concrete floor which acts as a considerable heat sink for any fire involving the cables in Zone 2-B located below.

Subsequently, by a letter dated February 15, 1983, the licensee proposed to provide a fixed fire suppression system in the vicinity of the Division I cables routed near the equipment hatch. The proposed suppression system is designed to prevent propagation of a fire through the equipment hatch from fire Zone 2-B to cables in the vicinity of the hatch in the fire Zone 3-B. The fire loading in both the areas is low.

We have reviewed the licensee's request for this exemption from complete automatic suppression requirements of Section III.G. Based on the low combustible loading, the separation and configuration of redundant cables, and the intervening concrete floor and partial suppression system, we believe that one train of cables needed for safe shutdown will be maintained free of fire damage for the time period needed for the fire brigade to respond and manually extinguish the fire. Therefore, we conclude that such a protection is equivalent to the technical requirements of Section III.G of Appendix R, and that this exemption should be granted.

The exemptions are contingent upon the licensee's maintenance of administrative control of transient combustibles which are equivalent to those specified in Section III.K.1 through III.K.8 of Appendix R to 10 CFR 50

and any characterization of transient combustibles or design features relating thereto which are specifically discussed in our SER.

III.

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12, an exemption is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest.

Therefore, the Commission hereby approves (to the extent indicated) the following exemptions from the requirements of Section III.G of Appendix R of 10 CFR 50:

1. Reactor Building Southwest Corner, identified as Fire Zone 1-G to the extent that it requires automatic suppression and a one-hour fire barrier for protection of redundant cables and equipment.
2. Turbine Building Water Treatment Condensate Pump Area, identified as Fire Zone 7-E-to the extent that it requires an automatic suppression system.
3. Fire Zones 2-A, 2-B, 2-D, 3-A, 4-A, and 16-F - to the extent that they require complete fire suppression systems.
4. Interfacing boundaries between the following fire zones:

<u>Boundaries Between</u>	<u>Fire Rating</u>	<u>Expected Fire Load (HR)</u>
1C and 2A/2B	1-1/2 hr rated upper stairwell door	0.16
1D " 2A/2B	1-1/2 hr rated lower stairwell door	0.13
1D " 2A/2B	1-1/2 hr rated stairwell door	0.13
1D " 2A/2B	1-1/2 hr rated damper	0.13
2A/2B " 1C	1-1/2 hr rated stairwell door	0.38/0.21
2A/2B " 1D	1-1/2 hr rated lower stairwell door	0.38/0.21
2A/2B " 1D	1-1/2 hr rated stairwell door	0.38/0.21
2A/2B " 1D	1-1/2 hr rated damper	0.38/0.21
2A/2B " 3A/3B	1-1/2 hr rated stairwell door	0.38/0.21
2A/2B " 3A/3B	2 hr rated elevator door	0.38/0.21
3A/3B " 2A/2B	1-1/2 hr rated stairwell door	0.39/0.26
3A/3B " 4A	1-1/2 hr rated stairwell door	0.39/0.26
3A/3B " 2A/2B	2 hr rated elevator door	0.39/0.26
4A " 3A/3B	2 hr rated stairwell door	0.09

-to the extent that they require separation by three-hour rated fire boundaries.

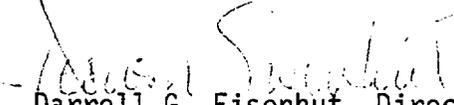
5. A 360 squarefoot vertical equipment hatch opening in the floor between the CRD Module Areas (Fire Areas 2-A/2-B) and Laydown Areas (Fire Zones 3-A/3-B) - to the extent that it requires a complete automatic suppression system.

The granting of these Exemptions will not result in any significant environmental impact, and pursuant to 10 CFR 51.5(d)(4) an environmental statement or negative declaration and environmental impact appraisal need not be prepared in connection with this action.

A copy of the Safety Evaluation associated with 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 Cedar Rapids Public Library, 426 Third Avenue, S. E., Cedar Rapids, Iowa 52401. A copy may be obtained upon request when addressed to the U. S. Nuclear Regulatory Commission, Washington, D. C. 20555, Attention: Director, Division of Licensing.

The 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 19th day of December, 1983.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
ON EXEMPTION REQUEST FROM
DUANE ARNOLD ENERGY CENTER
DOCKET NO. 50-331

INTRODUCTION

Iowa Electric Light and Power Company (the licensee), by a letter dated June 22, 1982, and by subsequent supplemental transmittals, requested certain exemptions from the requirements of Appendix R to 10 CFR 50, which requires that one train of cables and equipment necessary to achieve and maintain safe shutdown of the plant be maintained free of fire damage. Our evaluation of the licensee's request and the conclusions to it are as follows:

1.0 Reactor Building Southwest Corner Room (Fire Zone 1-G)

By letter dated June 22, 1982, the licensee requested an exemption from Section III.G to the extent that it requires automatic suppression and a 1-hour-fire barrier for the protection of redundant cables and equipment.

1.1 Discussion

This area contains redundant cables located within 12 feet horizontally and three feet vertically and redundant conduits separated by three feet horizontally. An automatic suppression system is not provided in the area and the redundant cable trays and conduits in the room are not enclosed in a one hour fire barrier as required by Section III.G.2.

The fire loading, consisting of combustible cable insulation and lubricating oil is approximately 800 BTU/ft². The fire load, if totally consumed, would correspond to a fire severity less than one minute on the ASTM E-119 standard time temperature curve. Portable fire extinguishers and an ionization type detection system are provided in the area. Manual fire hose stations are provided in an adjacent fire area.

By letters dated January 10, 1983 and February 15, 1983, the licensee committed to provide a 1-hour rated fire barrier for the protection of all division I equipment in the zone, and provided additional information to justify an exemption request for the lack of automatic suppression in the zone.

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The licensee bases this exemption request on the contention that due to the limited quantity of combustible materials in the fire area, a fire of sufficient intensity to bridge redundant cable trays or damage the redundant cables in conduit protected by 1-hour barriers is not probable.

1.2 Evaluation

To meet the requirements of Section III.G.2, an automatic suppression system and a 1-hour barrier need to be installed to prevent the spread of fire between redundant trains of cables and equipment separated by less than 20 feet. The licensee will provide a 1-hour barrier for the protection of all Division 1 cables and equipment. Because of the low combustible loading and the existing early warning detection system, there is reasonable assurance that the proposed 1-hour barrier will maintain one train free of fire damage in the time interval needed for the fire brigade to respond and manually extinguish the fire.

1.3 Conclusion

The existing protection in the reactor building southwest corner room (Fire Zone 1-G) combined with the proposed one hour barriers provide a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

2.0 Turbine Building Water Treatment Condensate Pump Area (Fire Zone 7-E)

By letters dated June 22, 1982 and January 10, 1983 the licensee requested an exemption from Section III.G to the extent that it requires automatic suppression and 1-hour rated fire barriers for the protection of redundant cables and equipment.

2.1 Discussion

This area includes the south portion of the turbine building basement. It is bounded by reinforced concrete floors, walls and ceiling. The ceiling height is 23 feet. Redundant divisions are separated by a minimum of 29 feet, and are installed inside conduits which are mounted 20 feet above the floor elevation. The separation distance between the cables is not free of intervening combustibles.

The combustible loading in this area consists of cable insulation, 76 gallons of lubricating oil, and miscellaneous transient combustible materials. The calculated value of the fire load is 6,230 BTU/FT². The fire load, if totally consumed, would correspond to a fire severity of approximately five minutes on the ASTM E-119 standard time temperature curve.

The lubricating oil, is distributed among the two condensate pumps and two air compressors. Curbing and floor drain prevent spilled oil from the compressors from coming within 20 feet of the Division 2 cables and within 55 feet of Division 1 cables.

The condensate pumps are located more than 15 feet from Division 2 cables and 50 feet from Division 1 cables with intervening floor drains precluding the possibility of a fire from this source involving cables of both divisions.

Portable fire extinguishers, manual hose stations, and an early warning ionization type smoke detection system have been provided in the area.

By letter dated February 15, 1983, the licensee committed to provide a 1-hour rated fire barrier for the protection of all Division 1 cables in the zone, and provided additional information to justify the lack of automatic suppression.

2.2 Evaluation

This fire zone does not comply with Section III.G because automatic suppression and twenty feet separation free of intervening combustibles is not provided. The combustibles consist of the lubricating oil inventories of the condensate pumps and air compressors. This equipment is not located directly beneath redundant safety related cables. Additionally, curbing and floor drains are provided to prevent any spills from spreading to areas beneath safe shutdown cables. The licensee proposes to enclose all Division 1 cables in the zone in a 1-hour rated fire barrier. This protection in conjunction with the configuration of the area, ceiling height and installed early warning detection system provides reasonable assurance that one train will be maintained free of fire damage in the interval needed for the fire brigade to respond and manually extinguish the fire.

2.3 Conclusion

The existing protection in the turbine building water treatment condensate pump area combined with the proposed one-hour barriers provides a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

3.0 Partial Suppression Systems

By letters dated January 10, 1983, the licensee requested an exemption from Section III.G to the extent that it requires automatic suppression throughout several fire areas.

3.1 Discussion

By letter dated June 22, 1982 the licensee submitted proposed modifications to several plant areas to comply with Appendix R. The licensee's conclusions with regard to compliance with Appendix R were evaluated and found to be in error. Specifically, the extent of fire detection and fire suppression, consisted of partial (spot) coverage, intended to provide protection from specific, isolated hazards. This protection, is not sufficient to comply with the requirements of Section III.G, which requires that fire detectors and a fixed fire suppression system be installed throughout the fire area. However, this partial coverage may provide adequate fire protection in some instances. By letters dated January 10, 1983 and February 15, 1983 the licensee submitted additional information and requested exemptions from Section III.G for the six areas protected by partial suppression systems. The protected areas are as follows:

Zone 2-A - North CRD Module Area

Zone 2-A contains primarily Division 2 cables. Redundant Division 1 trays are separated by a minimum distance of 5 feet horizontally, 20 feet above the floor level and 6 feet below the ceiling. The spot suppression system provides fire suppression coverage for the Division 1 cables which will be enclosed in a 1-hour fire barrier. In addition, the sections of other conduits which pass through Zone 2-A and carry Division 1 cables from Zone 2-D to Zone 3-A will be enclosed in a 3-hour fire barrier.

The licensee based the exemption request for full zone coverage of the suppression systems, the distance of the cable trays above the floor and below the ceiling, and automatic suppression in the vicinity of those trays enclosed in a 1-hour fire barrier.

Zone 2-B - South CRD Module Area

The Division 1 cables in Zone 2-B are enclosed in conduits. These conduits will be enclosed within a 1-hour fire barrier. The conduit routing is separated by a distance of at least 20 feet horizontally from the area where transient material could potentially be located. Combustible material in the vicinity of those conduits being protected consists of cable insulation, the majority of which is enclosed in conduit.

The spot suppression system for Fire Zone 2-B provides fire suppression coverage for the Division 1 instruments and cables which will be enclosed in a 1-hour fire barrier. If redundant instruments in the common instrument rack cannot be wrapped in a 1-hour fire barrier due to clearance problems, the instruments will be relocated, as necessary.

The licensee based the exemption request for full zone coverage of the suppression system on the low combustible loading from material in the vicinity of the protected cables, and automatic suppression in the vicinity of those conduits enclosed in a 1-hour fire barrier.

Zone 2-D - RHR Valve Room

The licensee proposes to enclose tray 1L7F and associated conduits in a 1-hour equivalent fire barrier and provide automatic fire suppression in the vicinity of the protected cables and equipment.

The minimum horizontal separation between trays and conduits, containing redundant cables is 32 feet and 7 feet respectively. The possibility of transient combustibles being introduced into Zone 2-D is remote because the area is a High Radiation Area and does not lead to any other area.

The licensee based the exemption request for full zone coverage of the suppression system on the low fire loading (0.01 hr.), horizontal separation, automatic suppression in the vicinity of those conduits and trays enclosed in a 1-hour fire barrier.

Zone 3-A - Laydown Area

The spot suppression system provides fire suppression coverage for the Division 2 cables which will be enclosed in a 1-hour fire barrier.

The shutdown functions which are located within this zone include only systems required to achieve cold shutdown conditions.

The licensee based the exemption request for full zone coverage of the suppression system on redundant trays being separated by a minimum distance of 8 feet horizontally, the low fire loading in the area and automatic suppression in the vicinity of those conduits and trays enclosed in a one-hour fire barrier.

Zone 4-A - HVAC Heat Exchanger and Chiller Area

The spot suppression system provides coverage for all equipment whose loss due to fire could result in evacuation of the control room and resultant use of the alternate shutdown capability.

The shutdown functions which are located within this zone include only systems required to achieve cold shutdown conditions.

The licensee based the exemption request for full zone coverage of the suppression system on the low fire loading in the area and separation of redundant trays.

Zone 16-F - Pump House

The spot suppression system provides coverage for the Division 1 cables which will be enclosed in a 1-hour fire barrier. Redundant trays are separated by a minimum of 21 feet horizontally. The redundant shutdown functions which are located within this zone include only systems required to achieve cold shutdown conditions.

The licensee based the exemption request for full coverage of the suppression system on the low fire loading in the area, separation of redundant trains, and automatic suppression in the vicinity of those conduits and trays enclosed in a one-hour fire barrier.

3.2 Evaluation

For the protection of redundant cables and equipment separated by less than 20 feet free of intervening combustibles, Section III.G requires automatic suppression and detection throughout the area in conjunction with a 1-hour fire rated barrier to separate one train of components. For these six areas, the licensee has provided 1-hour fire rated barriers. The licensee, however, prefers not to install a complete suppression system due to the possibility of damaging sensitive electrical equipment in adjacent areas. These areas represent a common hazard in that the inadequate separation of redundant components, the low to moderate quantity of in-situ combustibles, and the potential for the accumulation of transient combustible materials does not provide reasonable assurance that a one-hour barrier alone will maintain one train of components free of fire damage in the event a fire occurred in the area.

Section III.G requires a suppression system throughout the protected area to prevent a fire adjacent to the protected components from becoming large enough to overwhelm the partial suppression system's capability prior to its operation. In these six areas, it is our

opinion that the amount of in-situ and anticipated transient combustible materials could not cause a fire of sufficient magnitude to overwhelm the partial system. However if this did occur, the 1-hour rated fire barriers will provide additional assurance that one train will be maintained free of fire damage in the time interval required for the fire brigade to respond and manually extinguish the fire.

3.3 Conclusion

The level of protection provided for the North and South CRD module areas, the RHR valve room, the laydown area, HVAC heat exchanger and chiller area, and the pumphouse provides a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

4.0 Fire Area Boundary Penetrations

4.1 Discussion

By letter dated June 7, 1979 the licensee submitted a fire hazards analysis (FHA) which detailed the fire protection features for each fire area in the plant. In this FHA, the fire resistance of divisional boundaries between fire areas was specified. Many of these boundaries were rated less than 3-hours or contained penetrations, such as doors, ventilation ducts, or openings, which had lesser fire resistance. The FHA was accepted as meeting our guidelines, and divisional boundaries of less than 3-hours were accepted on the basis of the combustible loading exposing the barrier. Subsequent to our acceptance of the licensee's FHA, a new fire protection rule, Appendix R to 10 CFR 50, was issued. The new rule requires that previously approved configurations of fire protection for safe shutdown capability be verified as providing a level of fire safety equivalent to Appendix R via the exemption process.

By letter dated June 22, 1982 the licensee stated that the boundaries of 34 plant fire areas which provide fire protection for safe shutdown did not meet NRC requirements and requested an exemption for the fire resistance of certain boundary walls. The 1979 FHA and our previous acceptance was referenced as justification from the request.

By memorandum dated August 31, 1982, we concluded that five of the 34 boundaries were acceptable, and the remaining 29 boundaries contain penetrations such as non-rated steel doors or open hatchways or both which violate the integrity of the fire barrier and were not acceptable as providing a level of fire protection equivalent to that required by Section III.G of Appendix R.

By letters dated January 10, 1983 and February 15, 1983, the applicant provided additional information. The following boundaries will be modified as indicated to comply with Section III.G:

<u>Boundary</u>		<u>Modification</u>
<u>Between Fire Zones</u>		
1A	1C	Replace existing door with 3-hr. door
1F	1H	Replace existing door with 3-hr. door
17C	17D	Replace existing door with 3-hr. door
1E	2A/2B	Replace existing door with 3-hr. door
1A	1D	Modify watertight door to 3-hr.
1E	2A/2B	Modify watertight door to 3-hr.
1E	2A/2B	Replace existing damper with 3-hr. damper
1A	1C	Replace existing damper with 3-hr. damper
1A	1D	Replace existing damper with 3-hr. damper
7A	7F	Replace existing damper with 3-hr. damper
7C	7B	Replace existing damper with 3-hr. damper
7A	7C	Close open penetration by construction 3-hr. wall with fusible-link 3-hr. door
16B	16F	Close open penetration by constructing 3-hr. wall with door
16A	16B	

*See table 1 for description of designated fire zones.

These exemption requests are withdrawn.

The licensee has evaluated the remaining boundaries and conclude that the following penetrations between the zones comply with Section III.G.2 of Appendix R.

Boundary
Between Fire Zones

1A	1B, 1G, 2A/2B, 2C, 2D
1B	1A, 2A/2B
1F	2A/2B
1G	1A, 2A/2B
2A/2B	1A, 1B, 1F, 1G, 2C, 2D, 2G
2C	1A, 2A
2D	1A, 2A/2B
2G	2A/2B, 7F
3A/3B	3C
7C	7E, 7F
3C	3A/3B
7E	7C, 7F
7F	2G, 7C, 7E
12A	12B
12B	12A
16A	16F
16F	16A

Exemptions for these boundaries are therefore not needed.

An exemption is requested for the remaining areas, based on the low fuel load exposing the barriers:

<u>Fire Zone</u>	<u>Communicates</u>		<u>Fire Load</u> (hr)
	<u>To</u>	<u>Via</u>	
1C	2A/2B	1-1/2 hr rated upper stairwell door	0.16
1D	2A/2B	1-1/2 hr rated lower stairwell door	0.13
1D	2A/2B	1-1/2 hr rated stairwell door	0.13
1D	2A/2B	1-1/2 hr rated damper	0.13
2A/2B	1C	1-1/2 hr rated stairwell door	0.38/0.21
2A/2B	1D	1-1/2 hr rated lower stairwell door	0.38/0.21
2A/2B	1D	1-1/2 hr rated stairwell door	0.38/0.21
2A/2B	1D	1-1/2 hr rated damper	0.38/0.21
2A/2B	3A/3B	1-1/2 hr rated stairwell door	0.38/0.21
2A/2B	3A/3B	2 hr rated elevator door	0.38/0.21
3A/3B	2A/2B	1-1/2 hr rated stairwell door	0.39/0.26
3A/3B	4A	1-1/2 hr rated stairwell door	0.39/0.26
3A/3B	2A/2B	2 hr rated elevator door	0.39/0.26
4A	3A/3B	2 hr rated stairwell door	0.09

4.2 Evaluation

These area boundaries do not meet Section III.G because redundant trains of cable and equipment needed for safe shutdown are not separated by three-hour rated fire barriers. Because the combustible loading in these areas is appreciably lower than one-half the rating of the fire barriers, a fire in any of these areas would be short in duration and therefore the existing barriers will provide adequate protection. It is our opinion that the existing fire protection in these fire areas provides a level of fire protection equivalent to that provided by Section III.G of Appendix R to 10 CFR 50.

4.3 Conclusion

The fire protection provided for the following areas:

<u>Fire Zone</u>	<u>Communicates</u>	
	<u>To</u>	<u>Via</u>
1C	2A/2B	1-1/2 hr rated upper stairwell door
1D	2A/2B	1-1/2 hr rated lower stairwell door
1D	2A/2B	1-1/2 hr rated stairwell door
1D	2A/2B	1-1/2 hr rated damper
2A/2B	1C	1-1/2 hr rated stairwell door
2A/2B	1D	1-1/2 hr rated lower stairwell door
2A/2B	1D	1-1/2 hr rated stairwell door
2A/2B	1D	1-1/2 hr rated damper
2A/2B	3A/3B	1-1/2 hr rated stairwell door
2A/2B	3A/3B	2 hr rated elevator door
3A/3B	2A/2B	1-1/2 hr rated stairwell door
3A/3B	4A	1-1/2 hr rated stairwell door
3A/3B	2A/2B	2 hr rated elevator door
4A	3A/3B	2 hr rated stairwell door

provides a level of fire protection equivalent to the technical requirements of Section III.G Appendix R. Therefore, the licensee's request for an exemption for these areas should be granted.

5.0 Penetration Between Fire Zones 1-A and 1-H

5.1 Discussion

By letter dated January 10, 1983 the licensee requested an exemption from Section III.G for an open penetration in the 3-hour rated fire wall between fire zones 1-A (Torus Area) and 1-H (Radwaste Tankroom). By letter dated February 15, 1983 the licensee stated that only the Division 1 cables routed through Fire Zone 1-H and Division 2 cables routed through Fire Zone 1-A do not provide redundant functions, therefore, the request for this boundary exemption is withdrawn.

6.0 Equipment Hatch, Elevation 786'-0"

6.1 Discussion

By letter dated January 10, 1983, the licensee requested an exemption from Section III.G for a 360 ft² vertical equipment hatch opening in the floor between the CRD Module Areas (Fire Areas 2A/2B) and the laydown areas (Fire Zones 3A/3B). In Zone 2-B, three Division I trays are routed horizontally below the edge of the open equipment hatch, approximately 6 inches from the edge, 21 feet - 24 feet above the floor (El. 757'-6"). In Zone 3-B, one floor above four Division II trays are routed horizontally above the hatch's edge, approximately 6 feet from the edge, 16 feet - 20 feet above the Zone 3-B floor (El. 786'-0"). These cables are separated from the Division I cables by the concrete floor which acts as a considerable heat sink for any fire involving the cables in Zone 2-B, located below.

By letter dated February 15, 1983, the licensee proposed to provide a fixed fire suppression system in the vicinity of the Division I cables routed near the equipment hatch at elevation 786'-0". This suppression system is designed to prevent propagation of a fire through the equipment hatch from Fire Zone 2-B to the cables in the vicinity of the hatch in Fire Zone 3-B. The fire loading in both areas is low.

6.2 Evaluation

This area does not comply with Section III.G because complete automatic suppression is not provided throughout both areas. Based on the low combustibile loading, the separation and configuration of redundant cables, and the intervening concrete floor and partial suppression system, it is our opinion that one train of cables needed for safe shutdown will be maintained free of fire damage in the time period needed for the fire brigade to respond and manually extinguish the fire.

6.3 Conclusion

The protection provided for the equipment hatch between the CRD Module areas and the laydown areas provides a level of fire protection equivalent to the technical requirements of Section III.G. The exemption should, therefore, be granted.

7.0 Summary

We recommend that five exemptions requested by the licensee be granted.

Principal Contributor: R. Eberly

Dated: December 19, 1983

Table One

<u>Fire Zone</u>	<u>Description</u>
1-A	Torus Area
1-B	Northwest Corner Room
1-C	Northeast Corner Room
1-D	Southeast Corner Room
1-E	HPCI Room
1-F	RCIC Room
1-G	Southwest Corner Room
1-H	Radwaste Tank Room
2-A/2-B	North and South CRD Module Area
2-C	CRD Repair Room
2-D	RHR Valve Room
2-E	Off Gas Recombiner
2-F	Railroad Airlock
2-G	Main Steam Valve Chamber
3-A/3-B	Laydown Area, Corridor & Waste Tank Area
3-C	Standby Gas Treatment System Room
3-D	MG Set Room
4-A	HVAC Heat Exchanger & Chiller Area
4-B	Equipment Hatch Area
4-C	Main Exhaust Fan Room
4-D	Heating Hot Water Pump Room
4-E	Plant Air Supply Fan Room
5-A	Laydown Area
6-A	Refueling Floor
7-A	Reactor Feed Pump Area
7-B	Lower Switchgear Room
7-C	Turbine Lube Oil Tank Area
7-D	Oil Storage Tank Vault
7-E	Water Treatment and Condensate Pump Area
7-F	Condenser Area

Table One (Continued)

8-A	Ground Floor - South Portion
8-B	Upper Switchgear Room
8-C	Tube Pulling Area
8-D	Ground Floor - South Portion
8-E	Heating Boiler Room
8-F	Emergency Diesel Generator Room
8-G	Diesel Generator Day Tank Room
8-H	Emergency Diesel Generator Room
8-J	Diesel Generator Day Tank Room
9-A	Turbine Operating Floor
10-A	Corridor - Control Building
10-B	Battery Room
10-C	Battery Room
10-D	Battery Room
10-E	Essential Switchgear Room
10-F	Essential Switchgear Room
11-A	Cable Spreading Room
12-A	Control Room Complex
12-B	Control Building HVAC Room
13-A	Radwaste - Drumming & Shipping
13-B	Radwaste - Treatment and Access Area
13-C	Radwaste - Precoat and Access Area
13-D	Radwaste - Control Room
14-A	Machine Shop
15-A	Off-Gas - Charcoal Adsorber Vault
15-B	Off-Gas - Control & Glycol Area
15-C	Off-Gas - Prefilter & Condenser Area
16-A	Pumphouse - RHR & ESW Pump Area
16-B	Pumphouse - RHR & ESW Pump Area

Table One (Continued)

16-C	Pumphouse - Main Pump Room
16-D	Pumphouse - Diesel Fire Pump
16-E	Pumphouse - Fire Pump Day Tank
16-F	Pumphouse - Safety Related Piping
17-A	Intake Structure - Pump Area
17-B	Intake Structure - Pump Area
17-C	Intake Structure - Pump Area
17-D	Intake Structure - Pump Area
OGS	Off-Gas Stack