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Docket No. 50-336

April 15, 1986

Mr. John F. Opeka, Senior Vice President
Nuclear Engineering and Operations
Northeast Nuclear Energy Company
P. O. Box 270
Hartford, Connecticut 06141-0270

Dear Mr. Opeka:

SUBJECT: APPENDIX R EXEMPTION REQUESTS FOR MILLSTONE UNIT 2

By letter dated March 1, 1982, you requested 12 exemptions from the specific provisions of Section III.G of Appendix R. By letter dated July 16, 1982, you provided additional information and revised the number of exemptions requested from 12 to 8. The lower number reflects modifications that were engineered by you for several areas, resulting in compliance with Section III.G.

In our January 6, 1983 draft Safety Evaluation, we denied six out of the eight exemption requests and requested followup action. By letters dated April 15, 1983, May 25, 1983, January 31, 1985 and August 7, 1985, you provided additional information, including commitments to provide additional fire protection in areas where exemptions were denied. Your most recent letter of April 7, 1986 provided additional information on the need for the requested exemptions.

Based on our evaluation of this new information, we conclude that your existing fire protection configuration, with the proposed modifications, achieves an equivalent level of safety to that attained by compliance with Sections III.G and III.L.

Therefore, your request for exemption in all eight areas is granted (Enclosure 1). The following is a summary of the areas.

1. Closed Cooling Water Pump Area (Fire Area A-1B)
2. Boric Acid Pumps-Spent Fuel Pool Heat Exchangers (Fire Area A-14)
3. Boric Acid Batch Tank-Chemical Addition Tank Area (Fire Area A-24)
4. Cable Vault (Fire Area A-40)
5. Main Control Room (Fire Area I-42)
6. Intake Building (Fire Area I-1)
7. Charging Pump Room (Fire Area A-19)
8. Auxiliary Feed Pump Pit (Fire Area T-9)

Our bases for granting these exemptions are contained in the enclosed Safety Evaluation (Enclosure 2). Also included in Section 8 of the Safety Evaluation is our approval of your post-fire safe shutdown capability.

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Our bases for granting these exemptions are contained in the enclosed Safety Evaluation (Enclosure 2). Also included in Section 8 of the Safety Evaluation is our approval of your post-fire safe shutdown capability.

A notice of Environmental Assessment and Finding of No Significant Impact was published for this action in the Federal Register on February 11, 1986 (51 FR 5120).

A notice of granting of exemption is being forwarded to the Office of the Federal Register for publication.

Sincerely,

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Ashok C. Thadani, Director
PWR Project Directorate #8
Division of PWR Licensing-B

Enclosures:

- 1. Exemption
- 2. Safety Evaluation
- 3. Notice of Granting Exemption

cc w/enclosures:
See next page

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Therefore, pursuant to 10 CFR 50.54(f) of the Commission's regulations, you are requested to submit written statements, signed under oath or affirmation, to enable the Commission to determine whether or not your license should be modified. Specifically, you are requested to submit to the NRC, within 20 days from the date of this letter, your plans and schedules for inspecting the RCP shafts and other structural components of your RCPs.

In addition you are requested to provide the following information regarding your justification for continued operation until you inspect your RCP shafts and other structural components of your RCPs:

1. A description of the design and operational history of the Maine Yankee RCPs, which are different from the design and/or operation of the Crystal River, Unit 3, and Davis Besse 1 RCPs.
2. The results of any analysis performed subsequent to those done for the FSAR which would address the consequences of a locked rotor or broken shaft event during plant operation .
3. Considering the higher probability than previously envisioned of a postulated RCP shaft failure, describe any actions you have implemented or have planned such as operator review and associated training concerning the specific events at Crystal River, Unit 3, and Davis Besse 1 and monitoring plant parameters such as primary to secondary reactor coolant leakage.

The staff has prepared reasons for this information request to assure that the burden to be imposed on you is justified in view of the potential safety significance of the issues to be addressed in the requested information. The evaluation of these justifications has been performed by the staff and approved by the Executive Director for Operations or his designee.

The reporting and/or recordkeeping requirements of this letter affect fewer than 10 respondents; therefore, OMB clearance is not required under P.L. 96-511.

Sincerely,

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

cc: See next page *See previous concurrences

PD#8:*	PD#8:*	PD#8:*	FOB:PWR-B*	FOB:PWR-B*	A/D:PWR-B*
PKreutzer	PSears:jch	ATHadani	FAllenspach	WRegan	DCrutchfield
3/31/86	3/31/86	3/31/86	3/31/86	3/31/86	3/31/86

OELD	D:DPL-B*	DD:NRR	A/D:EDO	D:NRR
/ /86	FMiraglia	DEisenhut	VStello	HDenton
	4/1/86	/ /86	/ /86	/ /86

Mr. John F. Opeka
Northeast Nuclear Energy Company

Millstone Nuclear Power Station
Unit No. 2

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

Millstone Nuclear Power Station,
Unit No. 2)

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Docket No. 50-336

EXEMPTION

I.

The Northeast Nuclear Energy Company et al. (the licensee), is the holder of Facility Operating License No. DPR-65 which authorizes operation of the Millstone Nuclear Power Station, Unit No 2, at a steady state power level not in excess of 2700 megawatts thermal. The facility is a pressurized water reactor located at the licensee's site in the town of Waterford, Connecticut. The license provides, among other things, that it is subject to all rules, regulations and orders of the Nuclear Regulatory Commission (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 Section 50.48 and Appendix R became effective on February 17, 1981. Section III of

Appendix R contains 15 subsections, lettered A through O, each of which specifies requirements for a particular aspect of the fire protection features at a nuclear power plant. Two of these 15 subsections, III.G and III.L, are the subject of this exemption request. Specifically, Subsection III.G.2 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:

- 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 or 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 1-hour rating. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area. Subsection III.G.3 and III.L of Appendix R also requires that the alternate shutdown capability be independent from the specific fire area.

III.

By letters dated March 1 and July 16, 1982, as supplemented by letters dated April 15 and May 25, 1983, and January 31 and August 7, 1985, the licensee requested exemptions from the requirements of Section III.G of Appendix R, to the extent that it requires physical separation and/or fire protection systems to protect redundant trains of safe shutdown related cable and equipment. By letter dated April 7, 1986, the licensee provided additional information relevant to the "special circumstances" finding required by 10 CFR 50.12(a). The licensee stated that existing and proposed fire protection features at Millstone Unit 2 accomplish the underlying purpose of the rule. Furthermore, if the exemptions requested were not granted and the licensee was forced to implement the modifications to provide the additional suppression systems, detection systems, and fire barriers, the licensee stated that the costs incurred for such additions are significantly in excess of those required to meet the underlying purpose of the rule and would represent an unwarranted burden on the licensee's resources. Costs to provide additional suppression systems, detection systems, and/or fire barriers are estimated by the licensee to be at least \$5 million. The staff concludes that "special circumstances" exist for the licensee's requested 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. See 10 CFR 50.12(a)(2)(ii).

The acceptability of the exemption requests for each of the eight fire areas is addressed below. Details are contained in the NRC staff's related Safety Evaluation.

The fire areas related to the eight exemptions are:

1. Closed Cooling Water Pump Area (Fire Area A-1B)
2. Boric Acid Pumps-Spent Fuel Pool Heat Exchangers (Fire Area A-14)
3. Boric Acid Batch Tank-Chemical Addition Tank Area (Fire Area A-24)
4. Cable Vault (Fire Area A-40)
5. Main Control Room (Fire Area I-42)
6. Intake Building (Fire Area I-1)
7. Charging Pump Room (Fire Area A-19)
8. Auxiliary Feed Pump Pit (Fire Area T-9)

IV.

Exemption 1 - Closed Cooling Water Pump Area

(Fire Area A-1B)

The requirements of Section III.G.2 were not met because of the lack of an area-wide automatic fire suppression system.

Safe shutdown equipment which is located in this area includes the three redundant Reactor Building closed cooling water pumps; the three Reactor Building closed cooling water heat exchangers; and cables associated with the following systems:

1. Charging Pumps A, B and C
2. LPSI Pumps A and B
3. RBCCW Trains A, B and C

The staff concluded that the principal fire hazard consists of IEEE-383 qualified cable or cables that have been coated with a fire retardant. A fire involving these cables will initially burn slowly and with limited heat release. The smoke produced would be detected by the fire detection system at an early stage, before rapid ambient temperature rise occurred. The fire brigade would then be summoned and would effect fire extinguishment using manual fire fighting equipment.

Pending arrival of the brigade, the proposed fire-rated barriers will protect hot shutdown-related cable from the effects of a fire. If cold shutdown-related cables were damaged by a fire, the licensee has the capability to repair the damaged cable within 72 hours. Therefore, an area-wide automatic fire suppression system is not necessary to provide reasonable assurance that safe shutdown can be achieved and maintained.

Based on the above evaluation, the staff concluded that the existing fire protection with the proposed modifications will provide a level of fire protection equivalent to that provided by Section III.G.2. Additional modifications needed to meet the requirements of Section III.G of Appendix R would not significantly increase fire safety of the plant. Therefore, the staff finds the licensee's request for exemption from Section III.G.2 of Appendix R to 10 CFR Part 50 for automatic fire suppression in the Closed Cooling Water Pump Area to be acceptable.

Exemption 2 - Boric Acid Pumps - Spent Fuel Pool Heat Exchangers (Fire Area A-14)

The requirements of Section III.G.2 were not met because of the lack of an area-wide automatic fire suppression system.

Safe shutdown equipment which is located in this area includes the redundant boric acid pumps; the redundant boric acid tanks, and cables associated with the following systems:

1. Charging pump trains A and B
2. DC controls
3. AC instruments
4. RBCCW pump Trains A and B
5. LPSI pump trains A and B

The staff concluded that the principal fire hazard consists of IEEE-383 qualified cable or cables that have been coated with a fire retardant. A fire involving these cables will initially burn slowly and with limited heat release. The smoke produced would be detected by the fire detection system at an early stage, before rapid ambient temperature rise occurred. The fire brigade would then be summoned and would effect fire extinguishment using manual fire fighting equipment.

Pending arrival of the brigade, the proposed 1-hour fire-rated barriers will protect hot shutdown-related cable from the effects of a fire. If cold shutdown-related cables were damaged by a fire, the licensee has the capability to repair the damaged cable within 72 hours. Therefore, an area-wide automatic fire suppression system is not necessary to provide reasonable assurance that safe shutdown can be achieved and maintained. Based on the above evaluation, the staff concluded that the existing fire protection with the proposed modifications will provide a level of fire protection equivalent to that provided by Section III.G.2. Additional modifications needed to meet the requirements of Section III.G of Appendix R would not significantly increase fire safety of the plant. Therefore, the staff finds the licensee's request for exemption from Section III.G.2 of Appendix R to 10 CFR Part 50 for automatic fire suppression in the Boric Acid Pumps Area to be acceptable.

Exemption 3 - Boric Acid Batch Tank - Chemical Addition Tank Area

(Fire Area A-24)

The technical requirements of Section III.G were not met in this area because certain shutdown systems are not separated by a 3-hour fire-rated barrier and an area-wide automatic fire suppression system is not provided where required.

Safe shutdown systems located in this area include motor control centers MCC-22-IE and MCC-22-IF, which are located approximately 120 feet apart. In addition, cables for the following systems are located here:

1. Diesel Trains A and B
2. Charging Pumps A and B-Swing
3. RBCCW Trains C and B-Swing
4. LPSI Trains A and B

Redundant shutdown systems are completely protected by an automatic fire detection system. A fire, if one should occur, would be detected in its formation stages, before significant flame propagation or room temperature rise occurred. The plant fire brigade would then be dispatched to the area and would effect fire extinguishment using manual fire fighting equipment.

Pending arrival of the brigade, the redundant shutdown systems in these areas would be separated/protected by either an automatic fire suppression system or fire barriers. The licensee has proposed to install an automatic sprinkler system between certain shutdown systems, designed to discharge water in a "curtain" fashion. This concept has been used successfully to protect openings in fire walls and floor/ceiling assemblies. The staff, therefore, has reasonable assurance that one train of safe shutdown will remain free of fire damage. For other shutdown-related cables in this area, the licensee will protect one division by a 1-hour fire-rated barrier and/or a partial sprinkler system located over the cables. If room temperatures rise to a significant extent during the fire, the barriers and sprinklers will protect the cables from damage until the fire is put out by the fire brigade. Therefore, a complete area-wide sprinkler system is not necessary to provide reasonable assurance that one train of shutdown-related systems will remain free of damage.

Based on the above evaluation, the staff concluded that the licensee's alternate fire protection configuration will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the staff finds the licensee's request for exemption from Section III.G.2 of Appendix R to 10 CFR Part 50 for the Boric Acid Batch Tank-Chemical Addition Tank Area acceptable.

Exemption 4 - Cable Vault (Fire Area A-40)

The technical requirements of Section III.G were not met in this area because of the lack of a complete, area-wide automatic fire suppression system. In addition, redundant shutdown related cables were not separated by a complete 1-hour fire-rated barrier or by more than 20 feet with no intervening combustible material.

Safety systems located within this area include redundant instrument, control and power cables necessary for safe shutdown.

The principal fire hazard in this location consists of combustible cable insulation. However, because the cables are either IEEE-383 qualified or coated with a fire retardant, the staff does not expect a fire involving these cables to spread rapidly or to cause rapid room temperature rise. Because the area is completely protected by a fire detection system, the staff expects the potential fire to be detected in its formative stages, before significant damage occurs. The fire brigade would then be dispatched and would effect fire extinguishment using manual fire fighting equipment.

If rapid fire spread occurred or if room temperatures rose significantly during a fire event, the sprinkler systems would actuate to control the fire, reduce the air temperature in the room and protect the shutdown systems.

Pending actuation of the systems, the proposed fire barriers and spatial separation between redundant divisions achieves sufficient passive fire protection to provide reasonable assurance that one shutdown division would remain free of damage.

Based on the above, the staff concluded that the licensee's alternate fire protection configuration will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the staff finds the licensee's request for exemption for the Cable Vault Area acceptable.

Exemption 5 - Main Control Room (Fire Area A-42)

The requirements of Section III.G.2 were not met because of the absence of a complete area wide fixed fire suppression system, and the lack of adequate physical separation between redundant shutdown divisions. The requirements of Sections III.G.3 and III.L were not met because the alternate shutdown capability was not independent of the main control room.

The control room contains the controls for normal station operation and for shutdown of the plant under all anticipated conditions. Operating indicators, controls, and alarms are mounted on an L-shaped walk-through control board. Auxiliary electrical equipment cabinets are located in the area behind the control boards.

The control room is enclosed by complete reinforced concrete shielding walls. All openings are protected by fire rated doors, dampers or penetration seals. Also, in all other plant locations, redundant safe shutdown divisions are separated and protected so that one division will

remain free of fire damage. The staff, therefore, has reasonable assurance that a fire that occurs outside of the control room will affect only one shutdown division within the control room and, because the control room is a separate area from the rest of the plant, a fire that occurs anywhere else in the plant will not endanger control room operators.

The fire hazard within the control room is low. In-situ combustible material consists mainly of paper and plastics. Additional combustibles include cable insulation within the control panels and small quantities of anticipated transients. The quantity, nature, and distribution of the in-situ combustibles is such that if a fire were to occur, it would not propagate quickly or extend over a large area of the control room. The hazards associated with transient combustible materials will be further mitigated to a limited extent by the shift inspections and the licensee's administrative control. While these measures by themselves are not enough to ensure that additional accumulations of combustible materials will not occur, they will reduce the probability of having them. Because the control room is continuously manned and because a fire detection system is present in all areas outside of the normal line of sight of the operators. The staff expects that any potential fire would be detected in its incipient stages. This early warning capability, coupled with the portable fire fighting equipment in the room, provides reasonable assurance that a fire will be discovered and suppressed before reaching a significant magnitude.

The staff concluded that a fire located away from the control panels will not pose a direct threat to safe shutdown systems in the panels.

Because of the limited spatial separation between redundant shutdown divisions in either the auxiliary panels or the main control console, a fire at or within the panels has the potential for damaging both divisions. Protection against this threat will be achieved by the previously mentioned administrative controls and the need to keep the space around the panels free of obstruction for operator access.

If a fire should occur at, near, or within the panels, it is possible that the fire or fire suppression activities, such as the discharge of a portable fire extinguisher, may cause a loss of function of a portion of the main control board or auxiliary control panels. If such a consequence resulted, safe shutdown conditions could still be achieved and maintained via the alternate shutdown capability.

Local fire damage to the panels is also possible. Because of the limited nature of the fire hazards and the level of the fire protection in the control room, the level of damage that the staff expects to occur is the complete loss of two adjacent panels in the main control console or one enclosed auxiliary control panel. The licensee has demonstrated that safe shutdown can be achieved if a fire caused a loss of function to all of the safe shutdown systems within any one of two fire zones in the Control Room, as delineated in the January 31, 1985 submittal. The staff found this acceptable.

The staff's remaining concern was on the effects of a fire on control room habitability. Because the achievement of safe shutdown after a fire in the control room is dependent on some undamaged safe shutdown systems in the room, fire effects have to be limited so that safe shutdown can be achieved and maintained if control room evacuation becomes necessary.

Because of the limited fire hazards in the control room, the continuous presence of control room operators and the added fire protection proposed by the licensee, including an automatic fire suppression system in the main control console, the effects of a fire in the control room would not be serious enough to cause long term evacuation. The licensee has demonstrated that safe shutdown can be achieved and maintained if either the control room remained habitable during a fire or if evacuation became necessary. Reentry into the control room is not necessary. The staff, therefore, has reasonable assurance that under all credible fire scenarios for the control room, a capability to achieve and maintain safe shutdown conditions will remain free of fire damage.

Based on the above evaluation, the staff concluded that the existing fire protection with the proposed modifications will provide a level of fire protection equivalent to that provided by Item III.G.2. Additional modifications needed to meet the requirements of Section III.G of Appendix R would not significantly increase fire safety of the plant. Also, the staff concluded that the licensee has proposed acceptable safe shutdown capability in the event of a fire in the main control board, auxiliary control boards, or isolation switch cabinet. This was based upon the licensee's assessment that a control room fire is limited to a loss of function of the shutdown systems within either one of the two control rooms. Therefore, the staff finds the licensee's request for exemption from Sections III.G.2, III.G.3 and III.L of Appendix R to 10 CFR Part 50, for the control room acceptable.

Exemption 6 - Intake Building (Fire Area I-1)

The technical requirements of Section III.G were not met in this area because certain shutdown systems are not separated by a 3-hour fire-rated barrier and an area-wide automatic fire suppression system is not provided where required.

Safe shutdown equipment consists of the three service water pumps and related cables.

Redundant shutdown systems are completely protected by an automatic fire detection system. A fire, if one should occur, would be detected in its formation stages, before significant flame propagation or room temperature rise occurred. The plant fire brigade would then be dispatched to the area and would effect fire extinguishment using manual fire fighting equipment.

Pending arrival of the brigade, the redundant shutdown systems in these areas would be separated/protected by either an automatic fire suppression system or fire barriers. The licensee has proposed to install an automatic sprinkler system between certain shutdown systems, designed to discharge water in a "curtain" fashion. This concept has been used successfully to protect openings in fire walls and floor/ceiling assemblies. The staff, therefore, has reasonable assurance that one train of safe shutdown systems will remain free of fire damage. For other shutdown-related cables in this area, the licensee will protect one division by a 1-hour fire-rated barrier and/or a partial sprinkler system located over the cables. If room temperatures rise to a significant extent during the fire, the barriers and sprinklers will protect the cables from damage until the fire is put out by

the fire brigade. Therefore, complete area-wide sprinkler system is not necessary to provide reasonable assurance that one train of shutdown-related systems will remain free of damage.

Based on the above evaluation, the staff concluded that the licensee's alternate fire protection configuration will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the staff finds the licensee's request for exemption from Section III.G.2 of Appendix R to 10 CFR Part 50 for the Intake Building acceptable.

Exemption 7 - Charging Pump Room (Fire Area A-19)

The technical requirements of Section III.G.2 were not met in this room because of the lack of an area-wide automatic fire suppression system. In addition, the charging pumps were not separated from each other by a complete 1-hour fire-rated barrier or by a distance of more than 20 feet without intervening combustibles.

Safe shutdown equipment in this room consists of the three charging pumps and related cabling. The charging pumps are separated by a distance of approximately 18 feet and by reinforced concrete missile shield walls. A single cable tray which represents the only intervening combustible is routed between the pumps.

The presence of a smoke detection system in this room provides reasonable assurance of early fire warning and response by operating personnel and the plant fire brigade. Also, the fire load in this room is low and widely dispersed. Consequently, it is the staff's judgement that a fire, if one should occur, would not be of significant magnitude or

duration. Because of the low fire load, the 1-hour fire rated enclosure provided for the charging pump cables should be sufficient to keep the cables free of fire damage until the fire brigade arrives.

The pumps are separated by a distance of approximately 18 feet and by partial height missile shield walls as well as oil collection curbs/dikes. This protection should prevent adjoining pumps from being damaged by direct flame impingement and radiant heat. In addition, because of the 18 foot ceiling height in the room, the room ventilation system would dissipate most hot gases before they can become a threat to the pumps.

It is the staff's judgment that an automatic fire suppression system is not necessary to assure that one shutdown division in this room will be kept free of fire damage.

Based on the above evaluation, the staff concluded that the licensee's alternate fire protection configuration will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the staff finds the licensee's request for exemption for the Charging Pumps Room acceptable.

Exemption 8 - Auxiliary Feed Pump Pit (Fire Area T-9)

The technical requirements of Section III.G.2 were not met in this area because the watertight door separating the pumps is not 3-hour fire rated.

Safe shutdown equipment in this location consists of two motor driven and one steam driven auxiliary feedwater pumps, one of which is required for hot shutdown, and related cables. The steam driven pump and its cables are

completely separately from the motor driven pumps and their cables by a 12-inch thick concrete divider wall. The only opening in this wall is a doorway which is provided with a heavy gauge steel, submarine-type, watertight door.

The in-situ load is insignificant for this room and since access to this room is via a single stairway, a large accumulation of transient combustibles would not likely occur. Consequently, a fire of significant magnitude and duration is not anticipated.

The area is equipped with a smoke detection system. This provides reasonable assurance of early fire warning and response by operating personnel and the plant fire brigade. During the time delay, prior to the arrival of the brigade, the concrete divider wall and the watertight door provide passive fire protection. The door is of heavy gauge steel construction and, therefore, would act as an effective barrier against direct flame impingement and radiant heat. Because it is watertight, it would also act to prevent smoke and hot gases from affecting the pumps on both sides of the door.

The staff concluded that because of the low fire load, the existing watertight door in the closed position would effectively prevent fire damage to the redundant pumps on both sides of the divider wall until the fire is self-extinguished or is put out by the plant fire brigade.

Based on the above evaluation the staff concluded that the licensee's alternate fire protection configuration will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the staff finds the licensee's request for exemption for the auxiliary Feed Pump Pit acceptable.

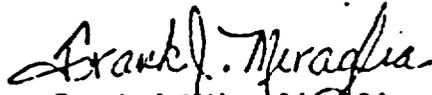
V.

Accordingly, the Commission has determined pursuant to 10 CFR 50.12(a), that (1) these exemptions as described in Section IV are authorized by law, will not present an undue risk to the public health and safety, and are consistent with the common defense and security, and (2) special circumstances are present for these 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. Therefore, the Commission hereby grants the exemption requests identified in Section IV above.

Pursuant to 10 CFR 51.32 the Commission has determined that the granting of these Exemptions will not result in any significant impact on the environment (51 FR 5120).

Dated at Bethesda, Maryland, this 15th day of April, 1986.

FOR THE NUCLEAR REGULATORY COMMISSION



Frank J. Miraglia, Director
Division of PWR Licensing-B
Office of Nuclear Reactor Regulation



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO 10 CFR 50 APPENDIX R EXEMPTION REQUESTS

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2

DOCKET NO. 50-336

1.0 INTRODUCTION

By letter dated March 1, 1982, the license requested 12 exemptions to the specific provisions of Section III.G of Appendix R to 10 CFR Part 50. By letter dated July 16, 1982, the licensee provided additional information and revised the number of exemptions requested from 12 to 8. The lower number reflects modifications that were engineered by the licensee for several areas, resulting in their compliance with Section III.G.

Based on the evaluation of this information, the staff concluded that the licensee's alternate fire protection configuration in the Charging Pump Room and Auxiliary Feed Pump Pit represented an equivalent level of safety to that achieved by compliance with Section III.G of Appendix R. In the remaining six areas, the staff concluded that an equivalent level of safety had not been achieved and recommended that the exemptions be denied.

By letters dated April 15, 1983, and January 31, 1985, the licensee provided additional information, including commitments to provide added fire protection in areas where exemptions were recommended for denial.

Section III.G.2 of Appendix R requires that one train of cables and equipment necessary to achieved and maintain safe shutdown be maintained free of fire damage by one of the following means:

- 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.
- c. 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 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 the design basis fire. Plant specific features may require protection different than 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 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 is limited such that it can be repaired within a reasonable time (minor repairs with components stored on-site).
- ° 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.

2.0.1 Closed Cooling Water Pump Area (Fire Area A-1B)

2.0.2 Boric Acid Pumps - Spent Fuel Pool Heat Exchangers (Fire Area A-14)

2.1 Exemption Requested

The licensee requested exemption from Section III.G.2.b to the extent that it requires the installation of an area-wide fire suppression system.

2.1.1. Discussion (Fire Area A-1B)

The wall, floor and ceiling in this area are of reinforced concrete. However, this portion of the Auxiliary Building freely communicates, via unprotected openings, with other locations, which the licensee has designated as separate fire areas.

Safe shutdown equipment which is located in this area includes the three redundant Reactor Building closed cooling water pumps; the three Reactor Building closed cooling water heat exchangers; and cables associated with the following systems:

1. Charging Pumps A, B and C
2. LPSI Pumps A and B
3. RBCCW Trains A, B and C

Cables in this area consist of both IEEE 383 qualified and PE/PVC insulated cables that have been coated with a fire retardant. They are located at various heights within the area near the ceiling and up to 1 foot from the ceiling.

In-situ combustible material includes locker contents, combustible containers and cable insulation which represent a fire load of approximately 6,600 BTU/ft².

Existing fire protection includes a smoke detection system, manual hose station and portable fire extinguishers.

The licensee proposes to implement the following modifications:

1. Completely protect Charging Pump Train B and B-swing cables by a 1-hour fire-rated barrier.
2. Stock spare parts (connectors-cabling) required to support post fire repairs to cold shutdown equipment.
3. Develop repair procedures to assure that cables needed for cold shutdown will be repaired promptly and within 72 hours, as required by Appendix R.
4. Erect a marine board radiant energy shield around Reactor Building Closed Cooling water pump and motor A.

2.2.2 Discussion (Fire Area A-14)

The walls, floor and ceiling in this area are of reinforced concrete. However, this portion of the Auxiliary Building freely communicates, via unprotected openings, with other locations, which the licensee has designated as separate fire areas.

Safe shutdown equipment which is located in this area includes the redundant boric acid pumps, the redundant boric acid tanks, and cables associated with the following systems:

1. Charging pump trains A and B
2. DC controls
3. AC instruments
4. RECCW pump trains A and B
5. LPSI pump trains A and B

Cables in this area consist of both IEEE 383 qualified and PE/PVC insulated cables that have been coated with a fire retardant. They are located at various heights within the area near the ceiling and up to 1 foot from the ceiling.

In-situ combustible material includes clothing racks, containers, cables and plastics which represent a fire load of approximately 82,900 BTU/ft².

The licensee proposes to implement the following modifications:

1. Re-route most of the charging pumps A and A-swing cables outside of this fire area.
2. Protect the remaining charging pump A and A-swing cables by a 1-hour fire barrier.
3. Stock spare parts (connectors-cabling) required to support post fire repairs to cold shutdown equipment.
4. Develop repair procedures to assure that cables needed for cold shutdown will be repaired promptly and within the 72 hours required by Appendix R.

The licensee justifies the exemptions in these areas on the basis of the existing fire protection plus proposed modifications.

2.3 Evaluation

The technical requirements of Section III.G are not met in these areas because of the lack of complete area-wide, automatic fire suppression systems.

The principal fire hazard in this area consists of IEEE-383 qualified cable or cables that have been coated with a fire retardant. A fire involving these cables will initially burn slowly and with limited heat release. The smoke produced would be detected by the fire detection system at an early stage, before rapid ambient temperature rise occurred. The fire brigade would then be summoned and would effect fire extinguishment using manual fire fighting equipment.

Pending arrival of the brigade, the proposed 1-hour fire-rated barriers will protect hot shutdown-related cable from the effects of a fire. If cold shutdown-related cables were damaged by a fire, the licensee has the capability to repair the damaged cable within 72 hours. Therefore, an area-wide automatic fire suppression system is not necessary to provide reasonable assurance that safe shutdown can be achieved and maintained.

2.4 Conclusion

Based on the above evaluation, the staff concludes that the existing fire protection with the proposed modifications will provide a level of fire protection equivalent to that provided by Section III.G.2. Additional modifications needed to meet the requirements of Section III.G of Appendix R would not significantly increase fire safety of the plant. Therefore, the staff finds the licensee's request for exemption from Section III.G.2 of Appendix R to 10 CFR Part 50, for automatic fire suppression in the Closed Cooling Water Pump Area and Boric Acid Pumps Area acceptable.

3.0.1 Boric Acid Batch Tank - Chemical Addition Tank Area (Fire Area A-24)

3.0.2 Intake Building (Fire Area I-1)

3.1 Exemption Requested

The licensee requested an exemption from the technical requirements of Section III.G.2 to the extent that it requires that redundant shutdown systems be separated by a 3-hour fire-rated barrier and from the technical requirements of Section III.G.2.c to the extent that it requires an area-wide automatic fire suppression system where shutdown systems are protected by a 1-hour barrier.

3.2.1 Discussion (Fire Area A-24)

The walls, floor and ceiling in this area are of reinforced concrete. However, this portion of the Auxiliary Building is open to adjoining plant locations which the licensee has identified as separate fire areas.

Safe shutdown systems located in this area include motor control centers MCC-22-IE and MCC-22-IF, which are located approximately 120 feet apart. In addition, cables for the following systems are located here:

1. Diesel Trains A and B
2. Charging Pumps A and B-Swing
3. RBCCW Trains C and B-Swing
4. LPSI Trains A and B

Cables in this area consist of both IEEE 383 qualified and PE/PVC insulated cables that have been coated with a fire retardant. They are located at various heights within the area up to 1 foot below the ceiling.

In-situ combustible materials include combustible containers and cable insulation which represent a fire load of 34,600 BTU/ft².

Existing fire protection consists of a smoke detection system, portable fire extinguishers and manual hose stations.

The licensee proposes to implement the following modifications:

1. Re-route cables from the "B" diesel outside of the fire area.
2. Install an automatic sprinkler system designed to discharge water in a "curtain" fashion to separate the remaining Train "B" cables and motor control center from the Train "A" cables and MCC in this fire area.
3. Protect Train "B" cables which pass through the "water curtain" in a 1-hour fire-rated barrier.
4. Provide automatic sprinkler protection for all of the Train "B" cables which pass through the water curtain.
5. Stock spare parts (connectors-cabling) required to support post fire repairs to cold shutdown equipment.
6. Develop repair procedures to assure that cables needed for cold shutdown will be repaired promptly and within the 72 hours required by Appendix R.

3.2.2 Discussion (Fire Area I-1)

The walls, floor and ceiling are of reinforced concrete construction.

Safe shutdown equipment consists of the three service water pumps and related cables.

3.3 Evaluation

The technical requirements of Section III.G are not met in these areas because certain shutdown systems are not separated by a 3-hour fire-rated barrier and an area-wide automatic fire suppression system is not provided where required.

Redundant shutdown systems are completely protected by an automatic fire detection system. A fire, if one should occur, would be detected in its formation stages, before significant flame propagation or room temperature rise occurred. The plant fire brigade would then be dispatched to the area and would effect fire extinguishment using manual fire fighting equipment.

Pending arrival of the fire brigade, the redundant shutdown systems in these areas would be separated/protected by either an automatic fire suppression system or fire barriers. The licensee has proposed to install an automatic sprinkler system between certain shutdown systems, designed to discharge water in a "curtain" fashion. This concept has been used successfully to protect openings in fire walls and floor/ceiling assemblies. The staff, therefore, has reasonable assurance that one train of safe shutdown systems will remain free of fire damage. For other shutdown-related cables in these areas, the licensee will protect one division by a 1-hour fire-rated barrier and/or a partial sprinkler system located over the cables. If room temperatures rise to a significant extent during the fire, the barriers and sprinklers will protect the cables from damage until the fire is put out by the fire brigade. Therefore, a complete area-wide sprinkler system is not necessary to provide reasonable assurance that one train of shutdown-related systems will remain free of damage.

3.4 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternate fire protection configuration will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the staff finds the licensee's request for exemption for the Boric Acid Batch Tank-Chemical Addition Tank Area and Intake Building acceptable.

Existing fire protection includes redundant fire detection systems, a manually operated, water deluge system, a partial wet-pipe sprinkler system that covers the cable tray concentration area under the main control room, manual hose stations and portable fire extinguishers.

The technical requirements of Section III.G are not met because of the lack of a complete, area-wide automatic fire suppression system. In addition, redundant shutdown related cables are not separated by a complete 1-hour fire-rated barrier or by more than 20 feet with no intervening combustible material.

3.4 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternate fire protection configuration will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the staff finds the licensee's request for exemption for the Boric Acid Batch Tank-Chemical Addition Tank Area and Intake Building acceptable.

4.0 Cable Vault (Fire Area A-40)

4.1 Exemption Requested

The licensee requested an exemption from the technical requirements of Section III.G.2 to the extent that it requires that redundant shutdown systems be separated by a complete 1-hour fire-rated barrier.

4.2 Discussion

The area is enclosed on three sides by walls constructed of reinforced concrete. The fourth side is open to an adjoining plant location, which the licensee has identified as a separate fire area. The floor and ceiling are of reinforced concrete. Safety systems located within this area include redundant instrument, control and power cables necessary for safe shutdown.

Existing fire protection includes redundant fire detection systems, a manually operated, water deluge system, a partial wet-pipe sprinkler system that covers the cable tray concentration area under the main control room, manual hose stations and portable fire extinguishers.

The licensee proposes to extend the existing wet-pipe sprinkler system to protect one train of the diesel power cables and to develop and implement customized administrative controls to limit the introduction of flammable materials into the vault. The licensee also proposes to provide 1-hour fire-rated barriers between redundant shutdown cables where they come within 20 feet of one another at cross over points.

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

4.3 Evaluation

The technical requirements of Section III.G are not met because of the lack of a complete, area-wide automatic fire suppression system. In addition, redundant shutdown related cables are not separated by a complete 1-hour fire-rated barrier or by more than 20 feet with no intervening combustible material.

The principal fire hazards in this location consist of combustible cable insulation. However, because the cables are either IEEE-383 qualified, or coated with a fire retardant, the staff does not expect a fire involving these cables to spread rapidly or to cause rapid room temperature rise. Because the area is completely protected by a fire detection system, the staff expects the potential fire to be detected in its formative stages, before significant damage occurs. The fire brigade would then be dispatched and would effect fire extinguishment using manual fire fighting equipment.

If rapid fire spread occurred or if room temperatures rose significantly during a fire event, the sprinkler systems would actuate to control the fire, reduce the air temperature in the room and protect the shutdown systems. Pending actuation of the systems, the proposed fire barriers and spatial separation between redundant division achieves sufficient passive fire protection to provide reasonable assurance that one shutdown division would remain free of damage.

4.4 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternate fire protection configuration will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the staff finds the licensee's request for exemption for the Cable Vault Area acceptable.

5.0 Main Control Room (Fire Area A-4?)

5.1 Exemption Requested

The licensee requested an exemption from Section III.G.2 to the extent that it requires the installation of an area-wide automatic fire suppression system and physical separation between redundant shutdown divisions.

5.2 Discussion

The room is bounded on three sides by reinforced concrete walls. The fourth side consists of a metal panel and glass wall which separates the Unit 1 and 2 control rooms. The floor and ceiling are of reinforced concrete.

The control room contains the controls for normal station operation and for shutdown of the plant under all anticipated conditions. Operating indicators, controls, and alarms are mounted on an L-shaped walk-through control board. Auxiliary electrical equipment cabinets are located in the area behind the control boards.

The combustibles in this area include electrical cable and wire insulation, and a small quantity of combustibles such as log books and operating procedures. This represents a fire load of 23,100 BTU/ft.².

Existing fire protection consists of a partial smoke detection system, with detectors located inside the control cabinets. In addition, the room is equipped with portable fire extinguishers and a manual hose station.

The licensee proposes to implement the following modifications:

1. Customized administrative controls will be implemented to minimize introduction of flammable materials in the control room.
2. Normal operating procedures will be revised to require an inspection of the control room for flammable materials during each shift.
3. A transfer scheme utilizing a Wiedmuller Test Block (or equivalent) to isolate required instrumentation from the control room and redirect the instrumentation signals to the new remote Fire Shutdown Panel will be installed.

4. Disconnecting devices for pressurizer PORVs main steam isolation valves, atmospheric dump valves, and SG blowdown valve control circuitry will be installed to assure closure of these valves during a control room fire.
5. The Millstone Unit No. 1 - Millstone Unit No. 2, 4-kV cross-feed bus will be modified to facilitate the alignment of Unit No. 1 emergency AC power to the Unit No. 2 emergency buses.
6. Manual/air operated valves to provide RCS level and pressure control for cold shutdown will be installed in charging and auxiliary spray flow paths.
7. The pressurizer and reactor head vent control circuits will be modified to protect against hot shorts for control room fires.
8. A remote Fire Shutdown Panel in Fire Zone T8 will be installed.
9. Procedures to assure the following will be developed:
 - ° Capability to achieve safe shutdown with the loss of equipment in any one of the two control room fire zones.
 - ° Spurious operation of affected equipment can be compensated for using alternate systems and manual actions.
 - ° Actions being taken outside the control room are achievable considering a fire in the control room, time needed to accomplish the function and manpower required.

The licensee has developed alternate shutdown methods under the assumption that a control room fire will cause the loss of function of all systems in any one of two fire zones that are delineated in the licensee's submittal of January 31, 1985.

The licensee justified the exemption based on the following considerations:

1. The control room is continuously manned by licensed operators. If a fire did occur, it would be discovered and extinguished promptly by the operators using portable extinguishers;
2. The control room is a restricted area. This restriction on access to the control room, coupled with the implementation of customized administrative controls, would result in no significant quantities of flammable liquids being present in the control room, thus limiting the fire hazard;
3. The control room contains no high/medium voltage sources and would present a reduced threat from the standpoint of ignition sources;
4. The results of an analysis featuring a fire model were presented to demonstrate that a fire involving one gallon of flammable liquid and external to the control board would not affect the ability to achieve safe shutdown from the control board; and
5. The results of an analysis were presented to identify compensating action that could be taken by operators outside of the control room to compensate for damage to individual control room panels so as to maintain safe shutdown capability.

5.3 Evaluation

The control room is not in compliance with Section III.G because of the absence of a complete area wide fixed fire suppression system, the lack of adequate physical separation between redundant shutdown divisions and the lack of an alternate shutdown capability independent of the control room.

The staff had several concerns with the level of fire safety in the control room.

1. A fire outside the control room may result in damage to safe shutdown systems inside the room;
2. A fire inside the control room, but located away from the main and auxiliary control panels may cause damage to safe shutdown systems in those panels;
3. A fire near or within the main or auxiliary control panels could damage redundant shutdown systems before being extinguished; and
4. A fire located anywhere in the control room could generate products of combustion in such quantities as to adversely affect habitability to a significant degree.

The control room is enclosed by complete reinforced concrete shielding walls. All openings are protected by fire rated doors, dampers or penetration seals. Also, in all other plant locations, redundant safe shutdown divisions are separated and protected so that one division will remain free of fire damage. The staff, therefore, has reasonable assurance that a fire that occurs outside of the control room will affect only one shutdown division within the control room and because the control room is a separate fire area from the rest of the plant, a fire that occurs anywhere else in the plant will not endanger control room operators.

The fire hazard within the control room is low. In-situ combustible materials consist mainly of paper and plastics. Additional combustibles include insulation within the control panels and small quantities of anticipated transients. The quantity, nature, and distribution of the in-situ combustible is such that if a fire were to occur, it would not propagate quickly or extend over a large area of the control room. The hazards associated with transient combustible materials will be further mitigated to a limited extent by the shift inspections and the licensee's administrative control. While these measures by themselves are not enough to ensure that additional accumulations of combustible materials will not occur, they will reduce the probability of having them. Because the control room is continuously manned and because a fire detection system is present in all areas outside of the normal line of sight of the operators, the staff expects that any potential fire would be detected in its incipient stages. This early warning capability, coupled with the portable fire fighting equipment in the room, provides reasonable assurance that a fire will be discovered and suppressed before reaching a significant magnitude.

The staff concludes that a fire located away from the control panels will not pose a direct threat to the safe shutdown systems in the panels.

The fire hazard within the control room is low. In-situ combustible materials consist mainly of paper and plastics. Additional combustibles include insulation within the control panels and small quantities of anticipated transients. The quantity, nature, and distribution of the in-situ combustible is such that if a fire were to occur, it would not propagate quickly or extend over a large area of the control room. The hazards associated with transient combustible materials will be further mitigated to a limited extent by the shift inspections and the licensee's administrative control. While these measures by themselves are not enough to ensure that additional accumulations of combustible materials will not occur, they will reduce the probability of having them. Because the control room is continuously manned and because a fire detection system is present in all areas outside of the normal line of sight of the operators, the staff expects that any potential fire would be detected in its incipient stages. This early warning capability, coupled with the portable fire fighting equipment in the room, provides reasonable assurance that a fire will be discovered and suppressed before reaching a significant magnitude.

The staff concludes that a fire located away from the control panels will not pose a direct threat to the safe shutdown systems in the panels.

Because of the limited spatial separation between redundant shutdown divisions in either the auxiliary panels or the main control console, a fire at or within the panels has the potential for damaging both divisions. Protection against this threat will be achieved by the previously mentioned administrative controls and the need to keep the space around the panels free of obstruction for operator access.

If a fire should occur at, near, or within the panels, it is possible that the fire or fire suppression activities, such as the discharge of a portable fire extinguisher, may cause a loss of function of a portion of the main control board or auxiliary control panels. If such a consequence resulted, safe shutdown conditions could still be achieved and maintained via the alternate shutdown capability.

Local fire damage to the panels is also possible. Because of the limited nature of the fire protection in the control room, the level of damage that the staff expects to occur is the complete loss of two adjacent panels in the main control console or one enclosed auxiliary control panel. The licensee has demonstrated that safe shutdown can be achieved if a fire caused a loss of function to all of the safe shutdown systems within any one of two fire zones in the Control Room as delineated in the January 31, 1985 submittal. The staff finds this acceptable.

The staff's remaining concern is on the effects of a fire on control room habitability. Because the achievement of safe shutdown after a fire in the control room is dependent on some undamaged safe shutdown systems in the room, fire effects have to be limited so that safe shutdown can be achieved and maintained if control room evacuation becomes necessary.

Because of the limited fire hazards in the control room, the continuous presence of control room operators and the added fire protection proposed by the licensee, including an automatic fire suppression system in the main control console, the effects of a fire in the control room would not be serious enough to cause long term evacuation. The licensee has demonstrated that safe shutdown can be achieved and maintained if either the control room remained habitable during a fire or if evacuation became necessary (See Section 8). Re-entry into the control room is not necessary. The staff, therefore, has reasonable assurance that under all credible fire scenarios for the control room, a capability to achieve and maintain safe shutdown conditions will remain free of fire damage.

5.4 Conclusion

Based on the above evaluation, the staff concludes that the existing fire protection with the proposed modifications will provide a level of fire protection equivalent to that provided by Section III.G.2. Additional modifications needed to meet the requirements of Section III.G of Appendix R would not significantly increase fire safety of the plant. Also, the staff concludes that the licensee has proposed acceptable safe shutdown capability in the event of a fire in the main control board, auxiliary control boards, or isolation switch cabinet. This was based upon the licensee's assessment that a control room fire is limited to a loss of function of the shutdown systems within either one of the two control room fire zones. Therefore, the staff finds the licensee's request for exemption from Sections III.G.2, III.G.3, and III.L of Appendix R to 10 CFR Part 50 for the control room acceptable.

6.0 Charging Pumps Room (Fire Area A-19)

6.1 Exemption Requested

The licensee requested an exemption from the technical requirements of Section III.G to the extent that it requires the installation of a complete, area-wide automatic fire suppression system and separation between redundant shutdown divisions by more than 20 feet without intervening combustibles.

6.2 Discussion

The walls, floor and ceiling in this area are of reinforced concrete construction. However, this portion of the Auxiliary Building is open to adjoining locations which the licensee has identified as separate fire areas.

Safe shutdown equipment which is located in this room consists of the three charging pumps and related cabling. The charging pumps are separated by a distance of approximately 18 feet and by reinforced concrete missile shield walls. A single cable tray, which represents the only intervening combustible, is routed between the pumps.

In-situ combustible materials include combustible containers, cable insulation and lube oil which represent a fire load of less than 3,000 BTU/ft².

Existing fire protection consists of a smoke detection system in the room, manual hose station, and portable fire extinguishers.

The licensee proposes to implement the following modifications:

1. Install a curb/dike in front of each charging pump cubicle; and
2. Completely protect the charging pump cables for trains A & B in a 1-hour fire rated enclosure.

The licensee justifies the exemptions on the basis that the existing fire protection plus modifications are sufficient to assure that at least one pump and related cable are free of fire damage.

6.3 Evaluation

The technical requirements of Section III.G.2 are not met in this room because of the lack of an area-wide automatic fire suppression system. In addition, the charging pumps are not separated from each other by a complete 1-hour fire rated barrier or by a distance of more than 20 feet without intervening combustibles.

The presence of a smoke detection system in this room will provide reasonable assurance of early fire warning and response by operating personnel and the plant fire brigade. Also, the fire load in this room is low and widely dispersed. Consequently, it is the staff's judgment that a fire, if one should occur, would not be of significant magnitude or duration. Because of the low fire load, the 1-hour fire rated enclosure provided for the charging pump cables should be sufficient to keep the cables free of fire damage until the fire brigade arrives.

The pumps are separated by a distance of approximately 18 feet and by partial height missile shield walls as well as oil collection curbs/dikes. This protection should prevent adjoining pumps from being damaged by direct flame impingement and radiant heat. In addition, because of the 18 foot ceiling height in the room, the room ventilation system would dissipate most hot gases before they can become a threat to the pumps.

It is the staff's judgment that an automatic fire suppression system is not necessary to assure that one shutdown division in this room will be kept free of fire damage.

6.4 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternate fire protection configuration will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the staff finds the licensee's request for exemption for the Charging Pumps Room acceptable.

7.0 Auxiliary Feed Pump Pit (Fire Area T-9)

7.1 Exemption Requested

The licensee requested an exemption from the technical requirements of Section III.G to the extent that it requires a 3-hour fire rated barrier between redundant shutdown divisions.

7.2 Discussion

The area is bounded by walls, floor and ceiling of reinforced concrete construction.

Safe shutdown equipment in this location consists of two motor driven and one steam driven auxiliary feedwater pumps, one of which is required for hot shutdown, and related cables. The steam driven pump and its cables are completely separated from the motor driven pumps and their cables by a 12-inch thick concrete divider wall. The only opening in this wall is a doorway which is provided with a heavy gauge steel, submarine type, watertight door.

The fire load in this area is negligible. All cables are in conduit.

Existing fire protection consists of a smoke detection system, manual hose station and portable fire extinguishers.

The licensee bases the exemption on the ability of the watertight door to withstand the anticipated fire exposure and protect either the steam driven or the motor driven pumps until the fire self-extinguishes or is suppressed by the plant fire brigade.

7.3 Evaluation

The technical requirements of Section III.G.2 are not met in this area because the watertight door separating the pumps is not 3-hour fire rated.

The in-situ fuel load is insignificant for this room and since access to this room is via a single stairway, a large accumulation of transient combustibles would not likely occur. Consequently, a fire of significant magnitude and duration is not anticipated.

The area is equipped with a smoke detection system. This provides reasonable assurance of early fire warning and response by operating personnel and the plant fire brigade. During the time delay, prior to the arrival of the brigade, the concrete divider wall and the watertight door provide passive fire protection. The door is of heavy gauge steel construction and, therefore, would act as an effective barrier against direct flame impingement and radiant heat. Because it is watertight, it would also act to prevent smoke and hot gases from affecting the pumps on both sides of the door.

The staff concludes that because of the low fire load, the existing watertight door in the closed position would effectively prevent fire damage to the redundant pumps on both sides of the divider wall until the fire is self-extinguished or is put out by the plant fire brigade.

7.4 Conclusion

Based on the above evaluation, the staff concludes that the licensee's alternate fire protection configuration will achieve an acceptable level of fire protection equivalent to that provided by Section III.G.2. Therefore, the staff finds the licensee's request for exemption for the auxiliary Feed Pump Pit acceptable.

8.0 Safe Shutdown Capability

By submittals dated May 25, 1983 and January 31, 1985, the licensee provided the results of the analyses to demonstrate that safe shutdown can be achieved with operator actions performed inside and outside the control room assuming a loss of function to the shutdown systems in any one of the two control room fire zones. Also, the licensee provided additional information in a submittal dated August 7, 1985 in response to the staff's request by telephone on July 27, 1985, concerning the proposed plant modifications for the pressurizer and reactor head vent valve control circuits.

The staff's review of the safe shutdown capability proposed by the licensee was based on a fire that is limited to a loss of function to all of the shutdown systems within any one of the two control room fire zones. This approach is different from the approach taken in past reviews where the entire control room was considered to be a single fire area.

8.1 Systems Used For Post Fire Safe Shutdown

In the event of a fire concurrent with a loss of offsite power, the following method is used to provide safe shutdown capability. Reactor shutdown is initiated from the control room by scram of the control rods, if an automatic scram has not occurred. Reactor coolant inventory and reactor shutdown reactivity are maintained by a charging pump taking suction from the refueling water storage tank. Additionally, primary system pressure is maintained by a charging pump combined with letdown.

For hot shutdown, decay heat removal is accomplished by the turbine-driven auxiliary feedwater pump supplying water to steam generator (SG) No. 2 from the condensate storage tank. The atmospheric dump valve is used to remove heat from the steam generator. For cold shutdown, decay heat removal is accomplished by the low pressure safety injection (LPSI) system in conjunction with the shutdown cooling heat exchangers, the reactor building closed cooling water system (RBCCW), and the service water system. Cold shutdown can be achieved in 72 hours.

The above systems are normally controlled and monitored from the control room. In the event of a fire in the control room, alternate means of controlling and monitoring these systems are provided as described below. The licensee has demonstrated that the capability does exist to provide Unit 1 emergency AC power to the Unit 2 emergency buses per proposed modifications, as discussed below.

8.2 Main Control Board (MCB) And Auxiliary Control Board (ACB)

The licensee has divided the control room into two (2) fire zones, "A" and "B". Fire Zone "B" contains only a proposed panel of isolation ("kill") switches for the main steam isolation valve (MSIV), power operated relief valve (PORV), atmospheric dump valve and SG blowdown valve control circuitry. Fire Zone "A" includes the remainder of the control room consisting of the entire MCB and ACB panel sections for the redundant safe shutdown equipment control circuitry.

The licensee's analysis of potential fire damage in any one fire zone assumed a loss of function to all of the shutdown systems within that fire zone and provided a failure mode and effects analyses for each fire zone. A fire in any one of the two fire zones could result in damaged conditions and loss of shutdown functions as follows:

Fire Zone "A" - Spurious operations and inoperability of various valves and equipment could result in loss of coolant, loss of pressurizer level control, loss of charging flow, loss of LPSI pump, loss of auxiliary feedwater (AFW) pump and turbine, uncontrolled cooldown, uncontrolled decrease in RCS pressure, decrease in shutdown margin, decrease or increase in RCS pressure, and overflow of SGs. The systems/equipment affected are RCS, chemical volume control system (CVCS), main feedwater system, AFW system, MSIVs, PORVs, and main steam system. The loss of function of the entire MCB would result in loss of shutdown functions including reactivity control, reactor coolant makeup, reactor heat removal, process monitoring and supporting functions.

Fire Zone "B" - Spurious operations of various valves would result in decrease in RCS pressure and inventory, uncontrolled cooldown, and loss of feedwater (depletion of condensate). The equipment affected are the pressurizer PORVs, MSIVs SG blowdown valves and atmospheric dump valves.

The licensee identified the operator actions and proposed plant modifications and shutdown procedures to compensate for the shutdown functions damaged by the fire in a given fire zone. The operator actions consist of manually opening control circuits, manually operating circuit breakers or motor controllers, manual valve manipulations, and remote operation and monitoring of safe shutdown equipment and instrumentation. The safe shutdown operator actions, assuming a control room fire, were developed to achieve the following:

1. Assure reactor trip;
2. Remove decay heat via the atmospheric dump valves and supply auxiliary feedwater to the steam generators;
3. Isolate the primary system to maintain inventory and restore charging flow to accommodate reactor coolant shrinkage and leakage; and
4. Monitor safe shutdown instrumentation.

8.3 Modifications

The licensee proposed the following modifications for safe shutdown of the plant in their submittal dated January 31, 1985:

1. A transfer scheme to isolate required instrumentation from the control room and redirect the instrumentation signals to the new remote fire shutdown panel (see item 6. below).
2. Disconnecting devices for the pressurizer PORVs, main steam isolation valves, atmospheric dump valves, and SG blowdown valve control circuitry will be installed in fire zone "B" to assure closure of these valves during a control room fire zone "A". The PORVs are required to be closed to prevent a decrease in RCS pressure and inventory, MSIVs are required to be closed to prevent uncontrolled cooldown, SG blowdown isolation valves are required to be closed to prevent loss of feedwater (depletion of condensate) and atmospheric dump valves are required to be closed to prevent uncontrolled cooldown for a given fire in fire zone "A". The staff concludes that the proposed modification will assure that the above valves can be closed and remain closed for a postulated fire.
3. The Millstone, Unit 1, and Millstone, Unit 2, 4KV crossfeed bus will be modified to facilitate the alignment of Unit 1 emergency ac power to Unit 2 emergency buses.

The above modification was made in lieu of supplying essential onsite power by an existing Unit 2 diesel generator and associated electrical distribution equipment as previously stated in the licensee's submittal dated May 25, 1983. The staff concludes that the capability exists to provide Unit 1 emergency AC power to the Unit 2 emergency buses.

4. Manual/air operated valves to provide RCS level and pressure control for cold shutdown will be installed in the charging and auxiliary spray flow paths. The staff concludes that this modification will achieve necessary cold shutdown RCS control.
5. The pressurizer and reactor head vent valve control circuits will be modified to protect against hot shorts resulting from control room fires. The RCS/head vent valves and pressurizer vent valves are required to be closed to preclude loss of coolant during a fire in fire Zone "A".

The licensee stated, per submittal dated August 7, 1985 that power to the pressurizer and reactor head vent solenoid valve control circuits will be removed by removing fuses during plant operation to preclude hot shorts upstream of the fuses from spuriously opening these valves. The indication portion of the circuit will be separately fused in order to provide the capability to verify the valve position. The switchboard wire associated with the above vent solenoid valves will also be provided with special fire rated wire or fire rate cable wraps in order to provide assurance that the very unlikely occurrence of a hot short downstream of the fuses will not cause the vent valves to spuriously open. The staff concludes that the proposed modifications will provide reasonable assurance that the vent valves will remain closed during a postulated fire.

6. A remote fire shutdown panel in Fire Zone T8 will be installed. The licensee stated that the above panel will contain the following instrumentation and controls necessary to control RCS pressure, level, and cooldown rates:
- a. pressurizer pressure and level;
 - b. RCS hot and cold leg temperature;
 - c. steam generator No. 2 pressure and level;
 - d. atmospheric dump valve control for SG No. 2
 - e. charging pump charging flow control; and
 - f. auxiliary feed pump turbine steam supply and discharge flow control valve.

Indication of condensate storage tank level is provided locally at the tank.

Once the plant has been stabilized in a hot standby condition, cooldown to the shutdown cooling system entry conditions will begin utilizing the controls on the proposed fire shutdown panel and additional alternate operator actions.

8.4 Operator Actions

The licensee committed to provide procedures detailing the operator actions needed to achieve safe shutdown in the event of a fire in either of the two fire zones. A summary of the proposed procedures was provided for staff review. The licensee identified immediate hot shutdown operator actions (within the first hour), subsequent actions for the next 3 hours, and longer term cold shutdown actions.

The alternate safe shutdown actions would utilize three (3) operators who would perform various tasks in the control room, switchgear rooms, and other auxiliary building areas. The operator actions, for the corresponding fire zone fires, are as follows:

Fire Zone "A" - Operator actions in the control room consist of a manual scram, if an automatic scram has not occurred, and the closure of MSIVs, PORVs atmospheric dump valves and SG blowdown valves by utilizing the proposed isolation ("kill") switches as the operators exit the control room in order to preclude an uncontrolled cooldown, decrease in RCS pressure and inventory, and loss of feedwater.

The following actions are accomplished from the proposed new fire shutdown panel, located outside the control room in fire area T8 (E1. 56' -6", turbine building):

- a. Manual operation of the charging pumps and opening of a charging flow path;
- b. Manual closure of CVCS letdown flow path valves;
- c. Manual closure of the pressurizer auxiliary spray valve;
- d. Regulating pressurizer level using controls for the charging flow path;
- e. Utilizing steam-driven AFW pump and tripping the breakers for the electric-motor driven AFW pumps;
- f. Opening the d.c. motor operated steam supply valve to establish a steam supply to the auxiliary feed pump turbine after manually opening the appropriate main steam system valve locally;
- g. Opening the AFW control valve;

- h. Controlling AFW pump turbine speed;
- i. Controlling atmospheric dump valve; and
- j. Monitoring safe shutdown instrumentation, as required.

The following actions are accomplished external to the control room:

- a. Tripping breakers in the switchgear room for the LPSI pumps, reactor coolant pumps, charging pumps, and pressurizer heaters in order to prevent (1) damage to the LPSI pumps should they be running with the minimum flow recirculation line spuriously isolated, (2) uncontrolled decrease in RCS pressure if the spray valve spuriously opens when the reactor coolant pumps are running, (3) uncontrolled increase in pressurizer level if the charging pumps are left running, and (4) increase in pressurizer pressure if the pressurizer heaters are left on;
- b. manually closing of 1) an appropriate hand control CVCS valve and, 2) a motor operated CVCS valve in fire area A9 (auxiliary building elevation (-) 26' -6"), and manually opening of appropriate CVCS valves in fire area A14 (auxiliary building elevation (-) 5' -0") to preclude loss of shutdown margin should the CVCS be in "dilute" status;
- c. Manually closing of an appropriate AFWS valve to preclude uncontrolled AFW flow to SG No. 1;
- d. Administratively maintaining MSIV bypass valve circuit breakers in the open position with the valves in the closed position to preclude uncontrolled cooldown; and
- e. Tripping and closing breakers, in the switchgear room to align the Millstone Unit 1 diesel generator to supply emergency power to Millstone Unit 2.

Fire Zone B - Operator actions for a postulated fire inside the proposed isolation ("kill") switch cabinet would be limited to utilizing the normal controls on the MCB of fire zone A to open circuits which provide power to the "kill" switches, thus causing the affected MSIVs, PORVs, SG blowdown valves and atmospheric dump valves to close.

8.5 Remaining Control Panels In The Control Room

The licensee has confirmed that fires in the remaining control room panels do not affect safe shutdown.

8.6 Cold Shutdown

The licensee has delineated operator actions outside the control room required to achieve cold shutdown following a fire in the MCB, ACB or isolation switch panel. Cold shutdown is achieved utilizing the shutdown cooling system/LPSI system, RBCCW, service water system, CVCS and safe shutdown instrumentation. For the control room fire, the licensee has committed to prepare and implement the necessary repair procedures for the required cold shutdown equipment, and also to store the required repair materials onsite to ensure cold shutdown within 72 hours following a given fire. Repairs consist primarily of cable replacement for motor operated valves in cold shutdown systems.

8.7 Conclusion

Based on the above, the staff concludes that for limited fires in the control room, as described above, there is sufficient time and capability for operator action inside and outside the control room to assure safe shutdown of the plant. Further, the staff concludes that the identified safe shutdown approach satisfies the performance goals for alternate shutdown as indicated in the requirements of Section III.G.3 and III.L of Appendix R, although independence from the fire area is not provided. The staff concludes that the licensee has proposed acceptable safe shutdown capability for Millstone Unit 2 in the event of a fire in the main control board, auxiliary control boards or isolation switch cabinet based upon the licensee's assessment that a control room fire is limited to a loss of function of the shutdown systems within either one of the two control room fire zones. Therefore, the staff finds the licensee's request for exemption from Section III.G.3 and III.L of Appendix R to 10 CFR Part 50 for the control room acceptable.

9.0 Clarification of Appendix R Reviews

By letters dated June 25, 1982 and July 7, 1982, the staff expressed concern that the licensee's interpretation of certain Appendix R requirements, as exhibited in the exemption requests for Millstone Units 1 & 2, may result in the licensee's noncompliance with three requirements of Section III.G of Appendix R. The staff indicated that compliance needs to be assessed on the basis of valid fire areas, with both an area-wide fire detection system and an area-wide fire suppression system, to protect redundant shutdown divisions.

By letter dated July 30, 1982, the licensee responded by justifying its interpretations of these Section III.G requirements. The staff deems it prudent to restate its position in this matter to avoid any misunderstanding during the forthcoming Regional Inspections.

To provide clarification of these issues, as well as other issues raised by some licensees during the Appendix R review, i.e., protection of structural steel related to fire barriers, fixed suppression systems, intervening combustibles, and transient fire hazards, the staff positions concerning all of these issues were documented in Generic Letter 83-33 and supplemented as necessary in Generic Letter 85-01.

It is the staff's position that compliance with Section III.G of Appendix R needs to be assessed on the basis of valid fire areas, which are determined in conformance with the principles identified in Generic Letters 83-33 and 85-01.

10.0 Summary

Based on the above evaluation, the licensee's request for exemption for the following areas should be granted:

1. Closed Cooling Water Pump Area (Fire Area A-1B)
2. Boric Acid Pumps-Spent Fuel Pool Heat Exchangers (Fire Area A-14)
3. Boric Acid Batch Tank-Chemical Addition Tank Area (Fire Area A-24)
4. Cable Vault (Fire Area A-40)

5. Main Control Room (Fire Area I-42)
6. Intake Building (Fire Area I-1)
7. Charging Pump Room (Fire Area A-19)
8. Auxiliary Feed Pump Pit (Fire Area T-9)

Date: April 15, 1986

Principal Contributors:

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J. Raval

UNITED STATES NUCLEAR REGULATORY COMMISSIONDOCKET NO. 50-336NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.NOTICE OF GRANTING OF EXEMPTION FROM APPENDIX R TO 10 CFR PART 50
FIRE PROTECTION PROGRAM

The U. S. Nuclear Regulatory Commission (the Commission) has granted an Exemption from certain requirements of Appendix R to 10 CFR Part 50 to Northeast Nuclear Energy Company, et al., (the licensee). The Exemption relates to the fire protection program for the Millstone Nuclear Power Station, Unit No. 2 (the facility) located in the Town of Waterford, Connecticut. The Exemption is effective as of April 15, 1986.

A complete area-wide automatic fire suppression system will not be required for the Closed Cooling Water Pump Area, the Boric Acid Pumps Area, the Boric Acid Batch Tank-Chemical Addition Tank Area, the Cable Vault, the Main Control Room, the Intake Building, and the Charging Pump Room. The auxiliary feedwater pumps located in the Auxiliary Feed Pump Pit, the safe shutdown systems and related cables located in the Boric Acid Tank-Chemical Addition Tank Area and the service water pumps located in the Intake Building will not be required to be separated by a complete 3-hour fire-rated barrier. Redundant shutdown related cables located in the Cable Vault and the charging pumps and related cables located in the Charging Pump Room will not be required to be separated by a complete 1-hour fire-rated barrier or by more

than 20 feet with no intervening combustible material. Redundant shutdown divisions within the Control Room will not be required to have physical separation. Finally, the alternate shutdown capability will not be required to be independent of the Control Room. The Exemption is granted mainly on the basis that the existing fire protection, coupled with proposed modifications at Millstone Unit 2, is the most practical method for meeting the intent of Appendix R and literal compliance would not significantly enhance the the fire protection capability. Details are provided in the Exemption.

The requests for the Exemption comply with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations. The Commission has made appropriate findings as required by the Act and the Commission's rules and regulations which are set forth in the Exemption.

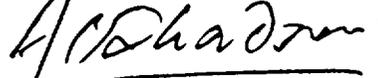
Pursuant to 10 CFR 51.32, the Commission has determined that the issuance of the Exemption will have no significant impact on the environment (51 FR 5120).

For further details with respect to this action, see (1) the requests for exemptions dated March 1 and July 2, 1982, April 15 and May 25, 1983, and January 31 and August 7, 1985, (2) the Commission's letter dated April 15, 1986 (3) the Exemption dated April 15, 1986, and (4) the staff's Safety Evaluation dated April 15, 1986. All of these items are available for public inspection at the Commission's Public Document Room, 1717 H Street, N.W., Washington, D.C. and at the Waterford Public Library, 49 Rope Ferry

Road, Waterford, Connecticut. A copy of items (2), (3), and (4) may be obtained upon request addressed to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Division of PWR Licensing-B.

Dated at Bethesda, Maryland, this 15th day of April, 1986.

FOR THE NUCLEAR REGULATORY COMMISSION



Ashok C. Thadani, Director
PWR Project Directorate #8
Division of PWR Licensing-B