

JUN 16 1983

Docket No. 50-263

Mr. D. M. Musolf
Nuclear Support Services Department
Northern States Power Company
414 Nicollet Mall - 8th Floor
Minneapolis, Minnesota 55401

Dear Mr. Musolf:

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

Re: Monticello Nuclear Generating Plant

The Commission has issued the enclosed Exemption from certain requirements of Section 50.48 and Appendix R to 10 CFR Part 50 for the Monticello Nuclear Generating Plant. This action responds to your request dated June 30, 1982, as supplemented with additional information on October 28, 1982. In your letter, you requested exemptions from the requirements of Section III.G of Appendix R for the:

1. Suppression Pool Area, (Fire Zone 1F);
2. Intake Structure Pump Room (23A);
3. Structural Steel in Six Areas;
 - a. Load Center No. 1 (12A)
 - b. Lube Oil Reservoir and Feedwater Pump Area (13B)
 - c. ESF Motor Control Center Room (13C)
 - d. RCIC Room (1C)
 - e. Division II Battery Room (7C)
 - f. Cable Spreading Room (8); and
4. Control Room (9).

Based on our evaluation, we find that the level of protection currently provided in the Suppression Pool Area 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 for this area.

However, based on our Safety Evaluation (Enclosure 2), your requests for the Intake Structure Pump Room, Structural Steel (all areas), and the Control Room are denied. On January 12, 1983, we forwarded a draft copy of our Safety Evaluation and requested that you review it for accuracy of technical content. In a February 14, 1983 letter, you agreed with the staff's conclusions in denying the exemption requests for the Intake Structure Pump Room and three of the six areas for structural steel (specifically items 3a, 3b, and 3c above). For the remaining three areas for structural steel

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DATE						

Mr. Musolf

- 2 -

(RCIC Room, Battery Room, Cable Spreading Room), and the Control Room, you requested a meeting with the staff. Following the meeting and in a letter dated March 22, 1983 you decided to:

1. withdraw the exemption request for structural steel in the RCIC Room;
2. conform to the requirements of the Rule for structural steel in the Battery Room and;
3. provide alternative shutdown capability for the Control Room and Cable Spreading Room.

The description of the modifications for alternative shutdown capability, for the Control Room, should be submitted to the NRC, within six months of the date of this letter.

A copy of the Exemption (Enclosure 1) is being filed with the Office of The Federal Register for publication. The bases of our findings and disposition of all your exemption requests are stated in the enclosed Safety Evaluation (Enclosure 2).

Sincerely,

ORIGINAL SIGNED BY

Darrell G. Eisenhut
Division of Licensing

Enclosures

1. Exemption
2. Safety Evaluation

cc w/enclosure
See next page

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Mr. D. M. Musolf
Northern States Power Company
Monticello Nuclear Generating Plant

cc:

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of)	Docket No. 50-263
)	
NORTHERN STATES POWER COMPANY)	
)	
(Monticello Nuclear Generating Plant)	

EXEMPTION

I.

The Northern States Power Company (NSP/the licensee) is the holder of Facility Operating License No. DPR-22 which authorizes NSP to operate the Monticello Nuclear Generating Plant at power levels not in excess of 1670 megawatts thermal. The facility is a boiling water reactor located at the licensee's site in Wright County, Minnesota. 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.

On February 17, 1981, the fire protection rule for nuclear power plants, 10 CFR 50.48 and Appendix R, became effective. Section 50.48 requires that licensed operating reactors be subject to the requirements of Appendix R to 10 CFR Part 50. Appendix R contains the general and specific requirements for fire protection programs. This rule requires all licensees of plants licensed prior to January 1, 1979, to submit: (1) plans and schedules for meeting the applicable requirements of Appendix R, (2) a design description of any modifications proposed to provide alternative safe shut-down 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) is to be invoked.

The licensee responded to these requirements by letter dated June 30, 1982, as supplemented and amended by letters dated October 28, 1982, and February 14 and March 22, 1983. In these letters, the licensee requested certain exemptions from the requirements of Section III.G of Appendix R. Section III.G requires that one train of cables and equipment necessary to achieve and maintain safe shutdown be kept 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 three-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 twenty 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.

III.

The licensee requests an exemption from Section III.G.2 in the Suppression Pool Area (Fire Zone 1F), to the extent that it requires the installation of an automatic fire suppression system.

The licensee justifies the exemption by stating that the area is separated from other plant areas by three-hour fire rated barriers. Fire protection consists of smoke detectors, manual hose stations, and portable fire extinguishers. The only redundant safe shutdown equipment in the area consists of instrumentation for measuring the water temperature and level in the torus. The redundant trains are separated by one hundred feet and are free of intervening combustibles. Essentially no combustible material is stored or located in the area. Furthermore, all surfaces are concrete except the torus, which is steel. All cables are installed in conduit.

We have reviewed the licensee's submittals and agree with the licensee's evaluation that the area does not comply with Section III.G.2 because it does not have an automatic suppression system and there is no alternate shutdown capability independent of the area. However, we find that because of the restricted access to this area, the probability of an exposure fire from the accumulation of transient combustibles, during normal operation, is low. We find that this feature, in conjunction with the one hundred feet of separation between redundant trains and early warning fire detection, provides reasonable assurance that one train will be maintained free of fire damage.

Therefore, we conclude that the level of safety provided in the Suppression Pool Area (Fire Zone 1F) is equivalent to the technical requirements of Section III.G of Appendix R and therefore, the licensee's request should be granted.

IV.

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 the following exemption request:

Exemption is granted from the requirements of Section III.G.2. of Appendix R of 10 CFR Part 50 to the extent that no automatic suppression system is required for the Suppression Pool area (Fire Zone TF).

The NRC staff has determined that the granting of these exemptions will not result in any significant environmental impact and that pursuant to 10 CFR 51.5(d)(4), an environmental impact 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 Environmental Conservation Library, 300 Nicollet Mall, Minneapolis, Minnesota. 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



Robert A. Purple, Deputy Director
Division of Licensing
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland
this 16th day of June 1983.



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ON EXEMPTION REQUEST FROM

10 CFR PART 50, APPENDIX R

FIRE PROTECTION

MONTICELLO NUCLEAR GENERATING PLANT

DOCKET NO. 50-263

1.0 Introduction

By letter dated June 30, 1982 Northern States Power Company (licensee) requested several exemptions from Section III.G of Appendix R. By letter dated October 28, 1982 the licensee provided additional information. The licensee requested exemptions from the requirements of Section III.G of Appendix R for the:

1. Suppression pool Area, (Fire Zone 1F);
2. Intake Structure Pump Room (23A);
3. Structural Steel in Six Areas:
 - a) Load Center No. 1 (12A);
 - b) Lube Oil Reservoir and Feedwater Pump Area (13B)
 - c) ESF Motor Control Center Room (13C)
 - d) RCIC Room (1C)
 - e) Division II. Battery Room (7C)
 - f) Cable Spreading Room (8); and
4. Control Room (9).

On January 12, 1983 we forwarded a draft copy of this Safety Evaluation and requested that the licensee review it for accuracy of technical content.

In a February 14, 1983 letter, the licensee agreed with the staff's conclusions in denying the exemption requests for the Intake Structure Pump Room and three of the six areas for structural steel (specifically items 3a, 3b, and 3c above). For the remaining three areas for structural steel (RCIC Room, Battery Room, cable Spreading Room), and the Control Room, the licensee requested a meeting with the staff. Following the meeting and in a letter dated March 22, 1983, the licensee decided to:

1. withdraw the exemption request for structural steel in the RCIC Room;
2. conform to the requirements of the Rule for structural steel in the Battery Room and;
3. provide alternative shutdown capability for the Control Room and Cable Spreading Room.

Section 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 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 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 alternative shutdown capability independent of the fire area of concern. It also requires a fixed suppression system 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 for all configurations, 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 alternative fire protection configurations must be justified by a fire hazard analysis.

Our general criteria for accepting alternative fire protection configurations are the following:

- .. The alternative assures that one train of equipment necessary to achieve hot shutdown from either the control room or emergency control stations is free of fire damage.

- The alternative assures that fire damage to at least one train of equipment necessary to achieve cold shutdown is limited such that it can be repaired within a reasonable time (minor repairs with components stored on-site).
- 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 Analytical Method

The licensee employed an analytical method to demonstrate the inherent protection afforded to existing safe shutdown systems in the control room. The intent of this method was to provide common parameters by which the existing level of fire protection for the control room could be judged, in order to demonstrate that verbatim compliance with Section III.G of Appendix R would not enhance the fire protection for safe shutdown.

The method can be summarized as follows:

- The redundant components of concern are identified.
- Their geometry and configuration within the fire area are described.
- The failure criteria is specified.

The analysis determines resultant temperatures from a constant heat flux produced by either internal cabinet fires or exposure fires to redundant cabinets in the control console. The heat flux is generated for a limited period of 120 seconds.

We and our consultant, Brookhaven National Laboratory have reviewed the analytical method. A copy of the consultant's report is attached. We have determined that the results of the methodology, as applied, do not demonstrate the equivalence of the protection provided for safe shutdown to the specific alternative set forth in Section III.G of Appendix R. For example:

- . The method does not consider the heat released to the room by secondary fires involving in-situ combustibles.
- . The method does not consider fires of greater than 120 seconds duration.
- . The method does not consider all of the alternatives set forth in Section III.G; i.e., 3-hour fire barrier, 1-hour fire barrier with suppression system, twenty-foot separation free of combustibles with automatic suppression and alternate or dedicated shutdown capability independent of the area.

The licensee has not used the results of this analysis to compare the protection provided with that specified in Section III.G. The licensee has only stated that the accumulation of the calculated quantity of flammable liquids in the required configuration is an unrealistic condition, and will be prevented by administrative controls. We do not deem this to be a valid argument because there is no positive means of preventing the accumulation of transient materials in individual plant areas. As documented in Inspection and Enforcement Branch Reports, recent inspections at plants such as Davis Besse (50-346/82-03, April 1, 1982), Duane Arnold (50-331/81-25, January 11, 1982), D.C. Cook (50-315/82-11, December 31, 1981), and Nine Mile Point (50-220/82-09), have demonstrated that substantial quantities of hazardous substances such as 55 gallon drums of waste oil are located in even highly restricted and controlled entry areas.

We have not relied upon the results of the licensee's analysis in our evaluation. We have evaluated each exemption request using our standard method of review:

- a) Review the information submitted and that existing in the docket file to determine the configuration of the redundant components,
- b) Evaluate the existing fire protection, proposed modifications, and other compensating features or mitigating factors to determine the overall level of fire protection in the area of concern, and
- c) Determine if the overall level of safety is equivalent to that provided by Section III.G of Appendix R.

3.0 Structural Steel

3.1 Exemption Requested

The licensee requests an exemption from Section III.G.2 to the extent it requires structural steel forming a part of or supporting a 3-hour fire rated barrier shall be protected to an equivalent rating.

3.2 Discussion

The structural steel supporting 3-hour fire rated floor/ceiling assemblies in the following areas are unprotected:

- a. Fire Zone 1C RCIC Room
- b. Fire Zone 7C Division II Battery Room
- c. Fire Zone 8 Cable Spreading Room
- d. Fire Zone 12A Load Center No. 1
- e. Fire Zone 13B Lube Oil Reservoir and Reactor Feedwater Pump Area
- f. Fire Zone 13C ESF Motor Control Center Room

With the exception of Fire Zone 1C the unprotected structural steel usually consists of I beams installed below the 3-hour fire rated concrete floor/ceiling assemblies they are supporting. In Fire Zone 1C, the I beams are embedded in the concrete floor/ceiling assemblies they are supporting. Only the bottom web of the I beams could be exposed to a fire.

Fire Zone 1C RCIC Room

After determining that the steel was used for forming the concrete floor and is not considered in the building's structural analysis, the licensee has withdrawn the exemption request for structural steel in the RCIC room.

Fire Zone 7C Division II Battery Room

Fire Zone 7C is located in the Control Building at elevation 928 feet. The area contains the Division II 125-volt and 24-volt batteries and associated equipment. The ceiling height is 10 feet 2 inches. The in-situ combustibles comprise an equivalent fire severity of 45 minutes on the ASTM E-119 standard time temperature curve. Fire protection consists of an automatic Halon 1301 fire suppression system, smoke detectors, manual hose stations and portable fire extinguishers.

Fire Zone 8 Cable Spreading Room

Fire Zone 8 cable spreading room is located in the control building at elevation 928 directly above Fire Zone 7C. The ceiling height is 10 feet 2 inches. The in-situ combustibles comprise an equivalent

fire severity of 58 minutes on the ASTM E-119 standard time temperature curve. The fire protection in the area consists of an automatic Halon 1301 fire extinguishing system, smoke detectors, manual hose stations and portable fire extinguishers.

Fire Zone 12A Load Center No. 1

Fire Zone 12A is located in the turbine building at elevation 911 feet. The area contains 4160-volt switchgear, 480-volt load centers and askeral filled transformers. The ceiling height is 19 feet 4 inches. The in-situ fuel combustibles comprise an equivalent fire severity of 38 minutes on the ASTM E-119 standard time temperature curve. Fire protection in the area consists of smoke detectors, manual hose stations and portable fire extinguishers.

Fire Zone 13B Lube Oil Reservoir and Reactor Feedwater Pump Area

Fire Zone 13B is located in the Turbine Building at elevation 911 feet. The area contains the turbine lubricating oil reservoir, centrifuge and transformer pumps, service and instrument air compressors and receivers and the reactor feedwater pumps. The ceiling height is 19 feet 4 inches. The in-situ combustibles comprise an equivalent fire severity of approximately 8 hours on the ASTM E-119 standard time temperature curve. Fire protection in the area consists of an automatic deluge sprinkler system to protect the lube oil reservoir, smoke detectors, manual hose stations and portable fire extinguishers.

Zone 13C ESF Motor Control Center Room

Fire Zone 13C is located in the Turbine Building at elevation 911 feet. The area contains the ESF MCCs and associate cabling. The ceiling height is 19 feet 4 inches. The in-situ combustibles comprise an equivalent fire severity of 26 minutes on the ASTM E-119 standard time temperature curve. Fire protection in the area consists of smoke detectors, manual hose stations and portable fire extinguishers.

3.3 Evaluation

Section III.G.2 of Appendix R requires that the structural steel which supports or is apart of barriers separating redundant divisions to have a rating equivalent to the fire resistance of the barrier. The protection of the structural steel is required because steel loses strength when subjected to temperatures that may be attained in a fire. A temperature of 1100° F is normally considered to be the critical temperature. At this temperature the yield stress in steel has decreased to about 60 percent of the value at room temperature. This is approximately the level normally used as the design working stress. Steel has a high thermal conductivity, therefore heat is transferred away from a localized heat source rather quickly, thereby requiring a relatively long period of time to reach the critical temperature. However, an exposure fire that distributes heat over a greater area may reduce this time considerably.

Because it is not possible to predict the specific condition under which fire may occur and propagate, structural steel forming a part of a supporting, 3-hour fire rated barriers needs to be protected to provide a fire resistance equivalent to that required of the barrier.

The combustible loading, the configuration of the areas of concern and the potential for the accumulation of transient combustible materials are what is typically found in nuclear power plants. There are no other fire protection features in these areas to compensate for the omission of the protection of the structural steel.

Fire Zones 7C and 8 are equipped with an automatic Halon 1301 fire suppression system. In the event of an exposure fire involving transient or in-situ combustible materials, there will be a time lag between the ignition of the fire, detection and alarm, and the

fire brigade response. The existing configuration of structural steel in each area provides no protection against the thermal flux of an exposure fire. We therefore do not have reasonable assurance that the critical temperature of the structural steel will not be reached in this interval.

The existing protection of the structural steel in the above fire zones does not provide a level of fire protection equivalent to Section III.G. Modifications such as applying a sprayed on fire proofing to the structural steel to obtain a 3-hour fire rating would provide the requisite levels of safety.

3.4 Conclusion

Based on the above evaluation, the existing protection for the structural steel in Fire Zone 7C Division II Battery Room, Fire Zone 8 Cable Spreading Room, Fire Zone 12A Load Center No. 1, Fire Zone 13B Lube Oil Reservoir and Reactor Feedwater Pump Area and Fire Zone 13 C ESF Motor Control Center Room is not equivalent to the protection required by the technical requirements of Section III.G of Appendix R. Therefore, the licensee's requests for exemption in the above areas should be denied. Fire Zone 1C RCIC Room was not included in this finding, since the licensee withdrew the exemption request for this area.

4.0 Suppression Pool

4.1 Exemption Requested

The licensee requests an exemption from Section III.G.2 to the extent that it requires the installation of an automatic fire suppression system.

4.2 Discussion

The area is located at 896 feet elevation of the reactor building. The area is separated from other plant areas by 3-hour fire rated barriers. The ceiling height is 35 feet. Fire protection in the area consists of smoke detectors, manual hose stations and portable fire extinguishers.

The only redundant safe shutdown equipment in the area consists of instrumentation for measuring the water temperature and level in the torus. The redundant trains are separated by 100 feet free of intervening combustibles.

In-situ combustibles are essentially non-existent.

All surfaces are concrete except the torus, which is steel. All cables in the area are installed in conduit.

4.3 Evaluation

This area does not have an automatic suppression system and there is no alternate shutdown capability independent of the area. The licensee justifies this alternative on the following mitigating features.

- a) All cables are routed in conduit
- b) The in-situ combustible loading is essentially non-existent
- c) Smoke detection is provided
- d) The area has limited areas during normal operation
- e) The redundant trains are horizontally separated by 100 feet free of intervening combustibles.

Because of the restricted access to this area, the probability of an exposure fire from the accumulation of transient combustibles during normal operation is low. This combined with the 100 feet of separation between redundant trains and early warning fire detection provides reasonable assurance that one train will be maintained free of fire damage, and therefore, is acceptable.

4.4 Conclusion

Based on our evaluation, we conclude that the level of safety provide in the Suppression Pool Area is equivalent to the technical requirements of Section III.G of Appendix R and therefore, the licensee's request should be granted.

5.0 Intake Structure

5.1 Exemption Requested

The licensee requests an exemption from Section III.G.2 to the extent that it requires an automatic fire suppression system and no intervening combustibles between redundant trains.

5.2 Discussion

The Intake Structure is separated from adjacent areas by 3-hour fire rated barriers. The ceiling height in areas containing safe shutdown systems is 13 feet.

Safe shutdown systems in the area include 2 Residual Heat Removal (RHR) pumps, 2 Emergency Service Water Pumps and associated equipment. One RHR and one Emergency Service Water Pump are required for safe shutdown. The RHR and Emergency Service Water Pump trains are separated horizontally by 28 feet traversed by open horizontal cable trays.

The combustible loading in the area consists of PVC cables in open horizontal cable trays, and approximately 170 gallons of lubricating oil contained in the 9 pump reservoirs.

A smoke detection system is installed in the area. Portable fire extinguishers and manual fire hose stations are also available.

The licensee justifies this alternative on the basis that (1) manual fire suppression capability, and (2) smoke detection are provided.

5.3 Evaluation

This area does not comply with Section III.G because it does not have an automatic suppression system and twenty feet of separation free of intervening combustibles or one hour fire rated barriers. There is no alternative shutdown capability independent of this area.

There are generally two mechanisms by which fire damage can occur; either an exposure fire in close proximity to the redundant equipment or an exposure fire at any point in the room of sufficient magnitude to form a stratified layer of hot gases at the ceiling, which descends to the floor level at a rate correlated to the room volume, the burning time and fuel quantity. In the case of a fire which produces a stratified layer of hot gases at the ceiling level, the most severe damage will occur to cables and equipment located within several feet of the ceiling. The redundant emergency service water and RHR pump cables are installed approximately 12 feet above the floor level, and the ceiling height of the room is 13 feet. The configuration does not provide reasonable protection from a descending hot gas layer. A local exposure fire could also cause damage to the redundant cables and pumps if they are exposed to a heat flux of sufficient intensity. This exposure is independent of room volume.

No additional protective features or mitigating features are provided to compensate for the lack of automatic suppression specified by Section III.G.

The combustible loading, the configuration of the room, the type of cable insulation, and the potential for the accumulation of transient combustible materials are what is typically found in intake structures. There are no fire protection features in this area to compensate for the omission of an automatic suppression system.

In the event of an exposure fire involving transient combustible materials, there will be a time lag between the ignition of the fire, detection and alarm, and the fire brigade response. The existing configuration of cables, without an automatic suppression system provides no protection against the thermal flux of an exposure fire. We, therefore, do not have reasonable assurance that redundant cables of both trains will not be damaged in this interval.

5.4 Conclusion

The level of existing protection in this area does not provide a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R, therefore the exemption should be denied.

6.0 Control Room

6.1 Exemption Requested

The licensee requests an exemption from Section III.G.2 to the extent that it requires 20 feet of separation without intervening combustibles between redundant trains and the installation of an automatic fire suppression system.

6.2 Discussion

The control room is separated from all other areas of the plant by 3-hour fire rated barriers. Fire protection is provided by ionization smoke detectors with manual fire suppression provided by standpipe hose stations and portable fire extinguishers. The combustible loading in this area consists of wood, paper and plastic. Cables and components of all redundant safe shutdown trains are located in the control room. Redundant divisions are in separate cabinets, but are separated by less than 20 feet free of intervening combustibles. This fire area is continuously manned by operating personnel, trained in fire fighting.

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 administrative controls, would result in no significant quantities of flammable liquids being present in the control room, thus limiting the fire hazard.
3. The results of an analysis featuring a fire model were presented to demonstrate that a fire involving a 2-foot by 2-foot pan of flammable liquid for a 2-minute duration external to the control console and an internal panel fire of 2-minute duration would not affect the ability to achieve safe shutdown from the control board.

6.3 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 control room contains the majority of the controls essential for station operation and for shutdown of the plant under all operating conditions. Redundant systems necessary for safe shutdown are located in close proximity within the control console and, without adequate protection, would be damaged by a single fire of significant magnitude. With the present design, if such a fire occurred, there is no capability to achieve safe shutdown independent of the control room.

Administrative controls, even if they are included into the plant Technical Specifications, do not provide reasonable assurance that hazardous accumulations of flammable liquids and combustible materials will not be present in individual plant areas. As documented in recent Inspection and Enforcement Branch Reports, recent inspections at plants such as Davis Besse (50-346/82-03, April 1, 1982), Duane Arnold (50-331/81-25, January 11, 1982), D. C. Cook (50-315/81-11, December 31, 1981); and Nine Mile Point (50-220/82-09), have demonstrated that substantial quantities of hazardous substances, such as computer printout paper, are located in even highly restricted and controlled entry areas. Consequently, they do not preclude the need for other fire protection design features.

With regard to the control room being constantly manned, we do not have reasonable assurance that prompt fire discovery and fire fighting activities by control room operators would assure that no damage would be sustained by redundant safety related cable and

equipment. The uncertainties concerning the location of the fire, the degree of physical separation of redundant trains, fire propagation speed, the fire damageability of cable and equipment, the timeliness and effectiveness of operator actions and extinguishing efforts, prevent the prediction of damage from fire or fire suppressants. Consequently, the continuous presence of control room operators and the availability of portable fire extinguishers by themselves, would not assure that redundant trains would be free of significant fire damage. Only when these considerations are coupled with the provision of an alternate shutdown capability, are they considered to be sufficient justification for granting an exemption from the requirement for a fixed fire suppression system in control rooms.

The licensee's fire analysis models both an exposure fire consisting of flammable liquid in a metal pan located on the floor adjacent to and outside of the control console and an internal panel fire for a two minute duration. This represents only two of a large number of potential fire scenarios for a plant control room and demonstrates that, only under the postulated conditions, could safe shutdown be achieved.

There is no basis to conclude that this analysis represents fires which would define a limit of concern for fire exposure in the area. The impact of a fire located in other areas of the control room, which would involve in-situ combustibles was not considered. The licensee assumed that a 2-foot by 2 foot pan of heptane fire burning for 2 minutes located adjacent to the control panel or an internal fire within one single control cabinet burning for two minutes are "worst case" fires. A similar fire of longer than a two minute duration or outside the control console could cause damage to control circuits for many shutdown systems. Therefore, there is no reasonable assurance that the plant could be safely shutdown after such a fire.

Because of the complex nature of the fire phenomenon and the infinitely large number of variables such as ventilation, flame propagation rate, length of time until fire detection and suppression, that impact it, no generally accepted, consistent, predictor of fire effect exists for any room or area. Consequently, the licensee's uni-directional approach toward providing protection from a postulated flammable liquid fire cannot provide reasonable assurance that safe shutdown capability will not be significantly compromised.

Although the licensee has provided capability to take local control for essential systems, the control room is not electrically isolated from the emergency control stations. We find that a fire in the control room or in the area of any emergency control station could affect both areas, thus resulting in the inability to safely shut-down the plant. Because the nature of the electrical panels in this area make protection in accordance with Section III.G.2 of Appendix R impractical, the licensee should provide an alternate shutdown system for the area in accordance with Section III.G.3 of Appendix R. The alternate shutdown capability should be electrically isolated from the control room so that a fire in the control room or in the area of alternate shutdown capability which destroys redundant circuits will not affect the ability to safely shut down the plant from the other area. With the alternate shutdown capability installed, a suppression system is not required in the area.

6.4 Conclusion

The level of existing protection in the control room does not provide a level of fire protection equivalent to the technical requirements of Section III.G, therefore, the exemption should be denied.

Summary

Based on our evaluation, we conclude that the licensee's request for exemption from Section II.G of Appendix R for the suppression pool should be granted.

However, the licensee's request for exemptions from Section III.G of Appendix R for the following areas should be denied:

- Structural Steel in:

Fire Zone 7C Division II Battery Room

Fire Zone 8 Cable Spreading Room

Fire Zone 12A Load Center No. 1

Fire Zone 13B Lube Oil Reservoir & Feedwater Pump

Fire Zone 13C ESF Motor Control Center Room

(Fire Zone 1C RCIC Room has been withdrawn)

- Intake Structure

- Control Room

Attachment:

Consultants Report dated
March 7, 1983

Dated: June 16, 1983

Principal Contributor: J. Stang