

DCS MS-016

Docket Nos. 50-282
and 50-306

JAN 9 1984

DISTRIBUTION:

Mr. D. M. Musolf
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Dear Mr. Musolf:

The Commission has issued the enclosed Exemption to certain requirements of 10 CFR 50 Appendix R Subsection III.G.2 in response to your letters of February 17 and March 11, 1983 as supplemented by letters dated May 16 and September 2, 1983 for the Prairie Island Nuclear Generating Plant Unit Nos. 1 and 2. Subsection III.G.2 specifies the separation, fire barrier, and suppression requirements where both trains of redundant safe shutdown components are located within the same fire area.

In your letter dated June 30, 1982, you requested exemptions from the requirements specified in Subsection III.G.2 in nine fire areas throughout the plant. By our letter dated May 4, 1983, the Commission issued exemptions related to five of the nine fire areas throughout the plant and the exemptions for the four remaining areas were denied. Areas for which the requests were denied are identified as follows:

1. Auxiliary Building Ground Floor Level Unit 1 (Fire Area 58).
2. Auxiliary Building Mezzanine Level Unit 1 (Fire Area 59).
3. Auxiliary Building Ground Floor Level Unit 2 (Fire Area 73).
4. Auxiliary Building Mezzanine Level Unit 2 (Fire Area 74).

By letter dated February 17, 1983 you elected to propose other alternatives regarding the exemption denials related to the four areas described above. With the proposed alternatives in these four fire areas, we conclude that additional modifications would not enhance fire protection safety at the facility and therefore exemptions from the requirements in III.G.2 are granted for these areas. The bases for these findings are given in the Safety Evaluation (Enclosure 2).

You must meet the implementation schedules specified in 10 CFR 50.48(c) for all modifications associated with these exemption requests for which the tolling period was terminated by the action taken on May 4, 1983.

Sincerely,

Original Signed by J. R. Miller

James R. Miller, Chief
Operating Reactors Branch #3
Division of Licensing

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See minor comments on pp. 4 & 6 of Exemption. Comments incorporated 1/3/83

Enclosures: As stated

cc: See next page

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discussed with [Signature] & incorporated all comments 12/9

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- 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.

III.

By letters dated February 17 and March 11, 1983 and supplemented by letters dated May 16 and September 2, 1983, the licensee requested an exemption from installing a fixed suppression system in fire areas described below as required by Subsection III.G.2 of Appendix R. The Auxiliary Building ground floor level is one fire area which is designated as two fire zones-58 and 73. The Auxiliary Building mezzanine level is the second fire area which is designated as two fire zones-59 and 74. The two fire areas are enclosed by three-hour rated walls with three-hour rated seals provided for combustible pathway penetrations. The two fire zones within the fire areas are separated from the nearest area of concern by approximately 100 feet. The

acceptability of the exemption request for the four fire zones within these two fire areas is addressed below. More details are contained in the NRC staffs' related Safety Evaluation (SE) dated January 9, 1984 , which is included herein by reference.

IV.

Auxiliary Building Ground Floor Level Unit 1 (Fire Zone 58)

Auxiliary Building Ground Floor Level Unit 2 (Fire Zone 73)

The licensee requested an exemption from Subsection III.G.2. to the extent that these fire zones lack an automatic fire suppression system.

The combustible in fire zone 58 is cable insulation containing a fuel load of 10,354 Btu/ft² which, if totally consumed, would result in a fire severity of approximately 8 minutes on the ASTM E-119 standard time-temperature curve. The combustible in fire zone 73 is cable insulation containing a fuel load of 8,000 Btu/ft² which, if totally consumed, would result in a fire severity of approximately 6 minutes on the ASTM E-119 standard time-temperature curve. Fire protection in these zones consists of smoke detectors, standpipe hose stations and portable fire extinguishers. All redundant hot shutdown equipment is separated by greater than 20 feet free of intervening combustibles. The redundant power, control and instrument cables are installed in open horizontal cable trays between 11 and 18 feet above the floor. The divisions are separated by approximately 8 feet horizontally and are installed 3 feet below the ceiling.

The licensee has committed to enclose all Division B safe shutdown cable in a one-hour fire rated barrier and to similarly enclose Division A safe

shutdown cable trays in the vicinities of the motor control centers and coordinates identified in the NRC's Safety Evaluation for each zone.

The fuel load in these zones, including anticipated transients combustibles, is low. Hazardous quantities of transient combustibles would not be expected in these fire zones for several reasons. First, the zones are not adjacent to or near any major plant traffic route. Second, maintenance and operations in these zones do not involve the use of combustible materials. Third, accessibility to these zones is restricted to personnel performing essential duties in the zones because of potential radiation hazards. On this basis, we agree with the licensee that any fires in these zones resulting from transient combustibles would be of low severity and short duration.

Due to the presence of the smoke detection system and the availability of adequate manual fire fighting equipment, the fire brigade would be expected to extinguish a postulated fire before significant damage occurred. During the time a fire is being detected and extinguished as a result of fire brigade intervention, the one-hour fire-rated barriers enclosing safe shutdown cable trays and spatial separation between safe shutdown equipment provide reasonable assurance that one shutdown division will remain free of fire damage.

Based on our evaluation, we conclude that, with the existing fire protection combined with the licensee's commitment to provide an additional level of fire protection for fire zones 58 and 73, fire protection features are equivalent to the requirements specified in Subsection III.G.2 of Appendix R and therefore the licensee's requested exemption is granted for these fire zones.

Auxiliary Building Mezzanine Level Unit 1 (Fire Zone 59)

Auxiliary Building Mezzanine Level Unit 2 (Fire Zone 74)

The licensee requested an exemption from Subsection III.G.2 to the extent that these fire zones lack an automatic fire suppression system.

The combustibles in fire zone 59 is cable insulation containing a fuel load of 20,000 Btu/ft², which, if totally consumed, would result in a fire severity of approximately 15 minutes on the ASTM E-119 standard time-temperature curve. Similarly the combustibles in fire zone 74 is cable insulation containing a fuel load of 18,111 Btu/ft², which, if totally consumed, would result in a fire severity of approximately 14 minutes on the ASTM E-119 standard time-temperature curve. The fire protection in these zones consists of smoke detectors, standpipe hose stations and portable fire extinguishers. These fire zones contain motor control centers and redundant division cables for safe shutdown equipment. The motor control centers are separated by approximately 28 feet free from intervening combustibles. The redundant cables are installed in open horizontal trays between 13 and 19 feet above the floor. Each division is separated by approximately 8 feet and installed within 3 feet of the ceiling. To further increase the level of fire protection in these zones, the licensee committed to enclose all redundant Division B safe shutdown cables in a one-hour fire rated barrier.

The fuel load in these zones, including anticipated transients combustibles, is low. Hazardous quantities of transient combustibles would not be expected in these fire zones for several reasons. First, the zones are not adjacent to or near any major plant traffic route. Second, maintenance and operations in

these zones do not involve the use of combustible materials. Third, accessibility to these zones is restricted to personnel performing essential duties in the zones because of potential radiation hazards. On this basis, we agree with the licensee that any fires in these zones resulting from transient combustibles would be of limited severity and duration.

Because smoke detectors are installed in the fire zones and because of the availability of adequate manual fire fighting equipment, the fire brigade would be expected to extinguish a postulated fire before significant damage occurred. During the time a fire is being detected and extinguished as a result of fire brigade intervention, the one-hour fire rated barriers enclosing safe shutdown cable trays and spatial separation between safe shutdown equipment will provide reasonable assurance that one safe shutdown division will remain free of fire damage.

Based on our evaluation, we conclude that, with the existing fire protection combined with the licensee's commitment to provide an additional level of fire protection for zones 59 and 74, the fire protection features are equivalent to the requirements specified in Subsection III.G.2 of Appendix R and therefore the licensee's requested exemption is granted for these fire zones.

These exemptions are contingent upon the licensee's maintenance of administrative control of transient combustibles which are equivalent to those specified in Sections III.K.1 through III.K.8 of Appendix R of 10 CFR 50 and any characterization of transient combustibles or design features which are specifically discussed in the NRC staff's Safety Evaluation.

V.

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 common defense and security and is otherwise in the public interest and hereby grants an exemption from the requirements of Subsection III.G.2. of Appendix R to 10 CFR 50 to the extent discussed in Section IV above.

The NRC staff has determined that the granting of this Exemption 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.

FOR THE NUCLEAR REGULATORY COMMISSION


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

Dated at Bethesda, Maryland
this 9th day of January, 1984.



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

Enclosure 2

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO EXEMPTIONS FROM 10 CFR 50, APPENDIX R
NORTHERN STATES POWER COMPANY
PRAIRIE ISLAND NUCLEAR GENERATING PLANT, UNITS 1 AND 2
DOCKET NOS. 50-282 AND 50-306

1.0 Introduction

By letters dated February 17 and March 11, 1983 the licensee requested exemptions from Section III.G of Appendix R. By letters dated May 16 and September 2, 1983, the licensee provided additional information.

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

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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 Auxiliary Building Elevation 695 ft. (Fire Zones 58 and 73)

2.1 Exemption Requested

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

2.2 Discussion

Elevation 695 ft. of the Auxiliary Building is one fire area which is designated as two fire zones, 58 and 73.

The fire area is enclosed by three-hour-rated walls, with three-hour-rated fire seals provided for combustible pathway penetrations. The height of the ceiling in the area is 19 ft. The fire protection in the area consists of smoke detectors, standpipe hose stations and portable fire extinguishers.

a. Fire Zone 58

The combustible in the area is cable insulation, comprising a fuel load of 10,354 BTU/sq. ft., which if totally consumed, would correspond to a fire

severity of approximately 8 minutes on the ASTM E-119 standard time temperature curve. The zone contains Division A and Division B equipment and cables, i.e., motor control centers MCC-1K1, 1K2, and 1KA2; Component Cooling Water Pumps #11, #12, #21 and #22; Residual Heat Removal Pumps #11 and #12, located in separate pits; Charging Pumps #11, #12 and #13 and Safety Injection Pump #12.

All redundant hot shutdown equipment is separated by greater than 20 ft. free of intervening combustibles. The charging pumps and safety injection pumps are located in separate compartments. Redundant cold shutdown equipment located in this area includes Residual Heat Removal (RHR) pumps #11 and #12. The pumps are installed in 30 foot deep concrete pits. The pits are separated by 3 foot thick reinforced concrete walls. Curbs and drains have been provided to prevent the spill of a flammable liquid into the pits. The redundant power, control and instrumentation cables are installed in open horizontal cable trays between 11 and 18 feet above the floor. The divisions are separated by 8 feet and are installed within 3 feet of the ceiling.

The licensee has committed to enclose all Division B safe shutdown cables in a one-hour fire rated barrier and to similarly enclose Division A safe shutdown cable trays in the vicinity of MCC 1K2 (Division B) bounded by coordinates 6.1/G, 6.1/H, 7.3/G and 7.3/H in a one-hour fire rated barrier.

b. Fire Zone 73

The combustible in the zone is cable insulation. The cable insulation comprises a fuel load of 8,000 BTU/sq. ft. which, if totally consumed, would correspond to a fire severity of approximately 6 minutes on the ASTM E-119 standard time temperature curve. The redundant power, control and instrumentation cables are installed in open horizontal cable trays between 13 and 16 feet above the floor. The divisions are separate by approximately 5 feet horizontally and installed within 3 feet of the ceiling.

The licensee has committed to enclose all Division B cables in a one-hour fire rated barrier and to similarly enclose Division A safe shutdown cable trays in the vicinity of Division B MCC 2K-2 bounded by coordinates 10.7/G, 10.7/H and 11.7/G and 11.7/H.

2.3 Evaluation

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

The fuel load in these zones, including anticipated transients, is low. Hazardous quantities of transient combustibles would not be expected in these fire zones for several reasons. First, the zones are not adjacent to or near any major plant traffic route. Second, maintenance and operations in these zones do not involve the use of combustible materials. Third, accessibility to these zones is restricted to personnel performing essential duties

in the zones because of potential radiation hazards. On this basis, we agree with the licensee that any fires in these zones resulting from transient combustibles would be of limited severity and duration.

Due to the presence of the smoke detection system and the availability of adequate manual fire fighting equipment, the fire brigade would be expected to extinguish a postulated fire before significant damage occurred.

During the time a fire is being detected and extinguished as a result of fire brigade intervention, the one-hour fire rated barriers enclosing safe shutdown cable trays and spacial separation between safe shutdown equipment will provide reasonable assurance that one shutdown division will remain free of fire damage.

2.4 Conclusion

Based on our evaluation, the existing fire protection combined with the licensee's commitments provides a level of fire protection in the Auxiliary Building Elevation 695 ft. (Fire Zones 58 and 73) equivalent to the technical requirements of Section III.G.2, therefore, the exemption should be granted.

3.0 Auxiliary Building Elevation 715 ft. (Fire Zones 59 and 74)

3.1 Exemption Requested

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

3.2 Discussion

Elevation 715 ft. of the Auxiliary Building is one fire area which is designated as two fire zones, 59 and 74.

The fire area is enclosed by three-hour-rated fire walls with three-hour-rated fire seals provided for combustible pathway penetrations. The height of the ceiling in the area is 19 ft. Fire protection in the area consists of smoke detectors, standpipe hose stations and portable fire extinguishers.

a. Fire Zone 59

The combustible in the zone is cable insulation comprising a fuel load of 20,000 BTU/sq. ft. which, if totally consumed, would correspond to a fire severity of 15 minutes on the ASTM E-119 standard time temperature curve.

This fire area contains two Motor Control Centers, MCC-1L1 and MCC-1L2, and redundant division cables for safe shutdown equipment. One of the motor control centers is required for cold safe shutdown. The motor control centers are separated by 28 feet free of intervening combustibles.

The redundant cables are installed in open horizontal trays between 13 and 19 feet above the floor. The cables are separated by approximately 4 feet 6 inches and installed within 3 feet of the ceiling.

The licensee has committed to enclose all redundant Division B safe shutdown cables in a one-hour fire rated barrier.

b. Fire Zone 74

The combustible in the zone is cable insulation comprising a fuel load of 18,111 BTU/sq. ft. which, if totally consumed, would correspond to a fire severity of approximately 14 minutes on the ASTM E-119 standard time temperature curve.

This fire zone contains two Motor Centers, MCC-2L1 and MCC-2L2 and redundant cables required for safe shutdown. One of the motor control centers is required for cold shutdown. The redundant motor control centers are separated by 28 feet free of intervening combustibles. The redundant cables are installed in horizontal cable trays between 12 and 19 feet above the floor. Each division is separated by approximately 8 feet and installed within 3 feet of the ceiling.

The licensee committed to enclose all Division B safe shutdown cables in a one-hour fire rated barrier.

3.3 Evaluation

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

Hazardous quantities of transient combustibles would not be expected in these fire zones for several reasons. First, the zones are not adjacent to or near any major plant traffic route. Second, maintenance and operations in these zones do not involve the use of combustible materials. Third, accessibility to these zones is restricted to personnel performing essential duties in the zones because of potential radiation hazards. On this basis, we agree with the licensee that any fires in these zones resulting from transient combustibles would be of limited severity and duration.

Because smoke detectors are installed in the fire zones and because of the availability of adequate manual fire fighting equipment the fire brigade would be expected to extinguish a postulated fire before significant damage occurred. During the time a fire is being detected and extinguished as a result of fire brigade intervention, the one-hour fire rated barriers enclosing safe shutdown cable trays and spacial separation between safe shutdown equipment will provide reasonable assurance that one safe shutdown division will remain free of fire damage.

3.4 Conclusion

Based on our evaluation, the existing fire protection combined with the licensee's commitments provides a level of fire protection in the Auxiliary Building Elevation 715 ft. (Fire Zones 59 and 74) equivalent to the technical requirements of Section III.G.2, therefore the exemption should be granted.

4.0 Summary

Based on our evaluation, the following exemptions should be granted:

1. Auxiliary Building Elevation 695 ft. (Fire Zones 58 and 73)
2. Auxiliary Building Elevation 715 ft. (Fire Zones 59 and 74).

Date: January 9, 1984

Principal Contributor:
J. Stang