

August 21, 1985

Docket Nos. 50-266
and 50-301

Mr. C. W. Fay, Vice President
Nuclear Power Department
Wisconsin Electric Power Company
231 West Michigan Street
Milwaukee, Wisconsin 53201

Dear Mr. Fay:

By letter dated June 30, 1982, you requested several exemptions from the requirements of 10 CFR Part 50 Appendix R. In part, these requests included an exemption from the requirements of Section III.G.2 of Appendix R to the extent that it requires separation of redundant trains of safe shutdown capability equipment by 1 hour fire rated barriers or by 20 feet of horizontal separation free of intervening combustibles in the common 4160 volt switchgear room for Point Beach Units 1 and 2.

You supplemented your June 30, 1982 letter with letters dated September 29 and October 11, 1982, February 7 and 25, April 28, May 31, July 20 and October 26, 1983, April 4 and 27, 1984 and January 3 and 9, 1985. Additionally, you and members of your staff have met with the NRC staff on March 22, 1983 and December 13, 1984 to reach resolution of the technical differences associated with your exemption request. The March 22, 1983 meeting included an appeal on your part to the technical review branch Division Director from a staff position transmitted in the staff's draft Safety Evaluation dated January 14, 1983.

The staff has completed its review of your requests relating to this submittal. While it appeared from the results of the March 22, 1983 and December 13, 1984 meetings that resolution of the technical issues related to this exemption request might be forthcoming, the staff has concluded that, for reasons set forth in the enclosed Safety Evaluation, your request for exemption should be denied. Therefore, based on the staff's review, your request for exemption from the requirements of Section III.G.2 of Appendix R to 10 CFR Part 50 to the extent that it requires separation of redundant trains of safe shutdown capability equipment by 1-hour fire rated barriers or by 20 feet of horizontal separation with no intervening combustibles for the Point Beach Nuclear Plant Units 1 and 2 4160 volt switchgear room is hereby denied.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATING TO 10 CFR PART 50 APPENDIX R
EXEMPTION REQUEST-SWITCHGEAR ROOM
WISCONSIN ELECTRIC POWER COMPANY
POINT BEACH NUCLEAR PLANT UNIT NOS. 1 AND 2
DOCKET NOS. 50-266 AND 50-301

I. Prior History

Following the Browns Ferry fire in March 1975, Wisconsin Electric Power Company, licensee for Point Beach Nuclear Plant Units 1 and 2, was requested to evaluate the fire protection afforded the safe shutdown capability of the Point Beach Nuclear Plant in light of NRC fire protection guidelines. This issue was not resolved in late 1980 when the NRC issued a rule (10 CFR 50.48 and Appendix R to that part) which required all licensees to provide a specific level of fire protection for safe shutdown capability (Sections III.G and III.L of Appendix R).

By letter dated October 21, 1980, the staff informed the licensee that an alternate shutdown capability should be provided for several areas of the plant (including the switchgear room) and that such capability should meet the requirement of Section III.L of the proposed Appendix R to 10 CFR Part 50.

On November 19, 1980, the Commission published the final fire protection rule with an effective date of February 19, 1981.

By letters dated June 30 and October 11, 1982, the licensee requested exemptions from the requirements of Section III.G of Appendix R for several plant areas, one of which was the switchgear room. By letter dated January 14, 1983, the staff transmitted a draft Safety Evaluation that recommended, in part, that the exemption for the switchgear room be denied. The licensee appealed this denial to NRC's Director, Division of Engineering, by meeting on March 22, 1983, and by letters dated April 28, 1983, May 31, 1983, July 20, 1983 and October 26, 1983, provided additional information. The licensee provided further additional information relating to specifics of their alternative shutdown design by letters dated April 4, 1984 and April 27, 1984.

The staff and the licensee had a series of telephone conversations concerning the fire protection features of the switchgear room and, on December 13, 1984, the staff visited the switchgear room and held further discussions with the licensee. By letters dated January 3 and January 9, 1985, the licensee provided additional information and summarized the modifications proposed for the switchgear room.

2. Exemption Requested

The licensee requested an exemption from Section III.G.2 of Appendix R to the extent it requires separation of redundant trains of safe shutdown capability by 1-hour fire rated barriers or 20 feet of separation free of intervening combustibles.

3. Discussion

The switchgear room is located in the Control Building on elevation 8'-0" and is separated from other plant fire areas by 3-hour fire rated barriers.

This area contains both units' redundant 4160V ac switchgear; redundant power feeds from the off-site power grid, the gas turbine and diesel generators; redundant 125V dc power feeds from the station batteries; redundant 125V dc distribution panels; redundant battery chargers for the station batteries; and redundant cables for the service water pumps.

The fuel load in this area is due to PE/PVC cable insulation. This cable is not qualified to IEEE-383. The fuel load is 108,000 BTU/sq. ft. which corresponds to a fire severity of 81 minutes on the ASTM E-119 standard time temperature curve.

The existing fire protection consists of an automatic Halon 1301 fire suppression system, smoke detectors, standpipe hose stations and portable extinguishers.

By letter dated January 3, 1985, the licensee summarized the additional fire protection features proposed for the switchgear room as follows:

1. Provision of a single failure proof, total room flooding, Halon automatic fire suppression system.
2. Provision of diverse means of fire detection and automatic Halon suppression system initiation by either cross zoned photoelectric smoke detectors or rate-compensated heat actuated detectors.
3. Provision of an independent Halon automatic fire suppression system for each unit to discharge into each individual safeguards switchgear cabinet actuated by a photoelectric smoke detector in each cabinet.
4. Provision of wrapping for conduit within the room which contains one division of incoming safeguards power cable from one diesel generator with 1-hour fire rated material.
5. Provision of wrapping for conduit within the room which contains one division of outgoing safeguards power cable necessary to power required safe shutdown equipment with 1-hour fire rated material.
6. Provision of wrapping for cable tray and pullbox enclosure of power cables for two service water pumps which are necessary to achieve safe shutdown with 1-hour fire rated material.

7. Provision of wrapping of cable trays which contain incoming and outgoing non-safeguards power cables for one alternate set of switchgear which can be used to accomplish safe shutdown with 1-hour fire rated material.

Item 1 above is installed at this time.

The licensee's report titled, "Response to 10 CFR Part 50 Appendix R Fire Protection of Safe Shutdown Capability," June 1982, stated that:

"Electrical equipment in the cable spreading and switchgear rooms is not of waterproof construction or sufficiently separated to ensure against damage from a water suppression system actuation." (pg 2-10) It also states: "Water damage to the electrical equipment due to manual suppression could be significant..." (pg 5-101). By letter dated January 3, 1985, the licensee stated that: "...if water mists were to enter the cabinet, no adverse effects on switchgear operation would be expected." This letter also indicated that fire hoses with fog nozzles are available if other means of extinguishment, i.e., Halon, Carbon Dioxide or Dry Chemical, were not successful.

By letter dated January 3, 1985, the licensee stated that: "Operator actions in the event of a fire in the switchgear room would follow fire extinguishment and the time sequence would be similar to those described in our October 1983 submittal for the Control Room Fire."

By letter dated January 3, 1985, the licensee described an alternate shutdown capability that would be independent of the switchgear room and estimated that equipment costs alone would be in the order of \$500,000, excluding engineering and installation costs. The licensee indicated that this alternative was rejected as economically unfeasible.

4. Evaluation

The fire protection for this area does not comply with the requirements of either Section III.G.2 or III.G.3 of Appendix R because redundant cables and equipment are not separated by either 1-hour fire rated barriers or 20 feet of separation free of intervening combustibles and the alternate shutdown capability for this area is not independent of the area.

The staff's concern is that, if the automatic Halon system does not function as designed (i.e., does not extinguish the fire within 90 seconds), a single cable fire of significant magnitude may result in the loss of both the normal and alternate shutdown capability. This loss may result in unreviewed transient conditions and has the potential of damaging two reactor cores. This concern is raised by the type of existing in-situ combustible (i.e., PE/PVC cables), the quantity, close proximity, and nature of critical shutdown components, and the potential consequences of the loss of the critical power supplies and cables.

The PE/PVC cables are not qualified to IEEE-383. This type of cable is relatively easy to ignite, will sustain a fire when the ignition source is removed, and will fail at relatively low temperatures. Some of these cables are in vertical cable trays that are 3-5 feet from the floor in four locations around the room. These vertical cables are potential sources of a rapidly developing fire that would present a significant threat to the cables located above the switchgear and to the switchgear, if the automatic Halon system does not extinguish the fire promptly.

The switchgear may fail if water used for suppression or soot deposits result in adverse conductive paths in the switchgear or if their internal temperature is raised significantly. If it is necessary to use water suppression in this room, the staff doubts that water from a hose with a fog nozzle can be controlled within this room such that there is reasonable assurance that redundant switchgear will not be damaged (i.e., that water entering the switchgear will be limited to a mist). Neither the amount of soot needed to fail the switchgear is known nor is the amount produced by fires for which the automatic Halon system either works or does not work. Likewise, neither the amount of internal temperature rise nor the rate of such rise is known nor is the value of those parameters which will result in loss of function. In the staff's opinion, reasonable assurance does not exist that loss of switchgear function will not occur due to water, soot deposits or internal temperature rise.

To provide protection of an AC power circuit through the switchgear room, the licensee proposes to wrap:

- Path 1. Specified conduits associated with Diesel Generator 1 and Bus 1-A05
- Path 2. Unspecified cable trays associated with incoming and outgoing non-safeguards power cables for an alternate set of switchgear.

Path 1 seeks to assure an AC power circuit from Diesel Generator 1 through Bus 1-A05 to transformer 1x13 in the cable spreading room. However, if the fire causes the loss of DC power prior to the faulting of other connected cables on the bus, it may not be possible to clear the bus. Path 2 has not been adequately described by the licensee but the staff assumes it would be subject to similar uncertainties.

The staff has reviewed the Point Beach Safe Shutdown Scenario and Timetable contained in Section 5 of the Final Report, Response to 10 CFR 50, Appendix R, "Alternate Shutdown Capability," October 1983, to determine the viability of the safe shutdown scenario provided for a worst-case fire affecting the control room and to estimate the viability of a similar scenario for a fire in the switchgear room. As a result of the staff's review, the staff cannot support its viability or the viability of a similar scenario for a fire in the switchgear room. The staff's concerns are with (1) the paths which must be traversed by the operators and the times allowed for traversing, (2) the requirements for radiation protection measures, and (3) the complexity of the control tasks performed by the operators and times allocated to perform them.

The licensee's safe shutdown scenario does not account for the different conditions of the control room and the switchgear room fire. For the control room fire, all power sources and power cables in the switchgear room are undamaged. The operator actions in the safe shutdown scenario need only to compensate for the loss of control and instrumentation functions. The access to the switchgear room is not restricted and the switchgear is tripped or closed manually without the benefit of protective circuitry. For the switchgear room fire, access for operator actions would be restricted until the fire is extinguished and the room is made habitable. Damage to switchgear, power feeds and other cables cannot be readily assessed. Because habitability and fire damage conditions in the switchgear room cannot be defined, the time to regain operability of the power supply and the time to reach recoverable core conditions cannot be assessed. Therefore, there is not reasonable assurance that the necessary operator actions could be performed in time to prevent both reactor cores from reaching an unrecoverable condition.

The licensee's safe shutdown scenario proposes to start the diesel generators with the loads connected. The staff doubts that the diesel generators can reach normal operating speeds under these conditions.

The licensee's safe shutdown scenario does not consider several potential system interactions that may result in unreviewed transient conditions if a fire is not promptly suppressed by the automatic Halon system. For example:

1. Fire damage to the battery feeds could place a short circuit across each battery that could not be cleared. This could result in (a) a total loss of 125V DC control power followed by cable faulting, (b) a fire or explosion in one or both battery rooms, (c) continuing heating of the battery feeds inside the switchgear room, (d) loss of one or both turbine emergency lube oil pumps with the potential for hydrogen or oil fires at the turbine generator due to vibration of bearings and subsequent damage during coast down, and (e) the loss of some of the alternative shutdown instrumentation being provided for the control room fire if it is also powered from these batteries.
2. Fire damage to the 4160V AC power feeds could place a short circuit across the diesel generators and across the Station Auxiliary Transformer that could not be cleared. These short circuits could lead to diesel generator damage that could not be repaired promptly. These short circuits would also prevent energy from either the off-site power supply or the gas turbine from reaching the switchgear. Wrapping of the specified cables does not preclude such shorts if the DC supply is lost before cables are faulted.

In October 1983, the licensee proposed a separate DC power supply for certain functions associated with the alternate shutdown capability for the control room, cable spreading room and the switchgear room. It is not clear that the proposed supply is adequate, if the fire damage to the present DC supply occurs as described in example 1 above.

The licensee's cost estimates for providing an alternate shutdown capability for the switchgear room appear reasonable and comparable to the costs expended by other licensees to provide similar features.

5. Conclusion

Based on the staff's evaluation, the staff concludes that: (1) a fire that does follow the design scenario may result in damage to the two reactor cores due to the inability of operators to fulfill the scenario assumptions; (2) a fire which does not follow the design scenario may result in damage to two reactor cores; (3) the proposed fire protection features do not provide equivalent protection to the requirements of Sections III.G.2 or III.G.3 of Appendix R; (4) if implemented, the provisions of an alternate shutdown capability for the switchgear room which conforms to Section III.L of Appendix R would provide a significant increase in fire safety and will not have an adverse impact on plant safety. Therefore, the exemption should be denied.

Principal Contributors:

J. Stang, DE
R. Ferguson, DE

Date: August 21, 1985

If you have any questions, please contact your NRC project manager, T. G. Colburn, at (301) 492-4709.

Sincerely,

Original Signed by

Hugh L. Thompson, Jr., Director
Division of Licensing
Office of Nuclear Reactor Regulation

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