



444 South 16th Street Mall
Omaha NE 68102-2247

February 4, 2008
LIC-08-0006

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

- References:
1. Docket No. 50-285
 2. Letter from E. J. Butcher (NRC) to R. L. Andrews (OPPD) dated July 3, 1985, "Exemption Requests for the Fort Calhoun Station, Unit No. 1, 10 CFR Part 50 Appendix R, Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," (NRC-85-0200)
 3. Letter from K. M. Kennedy (NRC) to R. T. Ridenoure (OPPD), "Fort Calhoun Station-NRC Integrated Inspection Report 05000285/ 2004003," dated August 11, 2004 (NRC-04-0103)
 4. Letter from L. J. Smith (NRC) to R. T. Ridenoure (OPPD), "Fort Calhoun Station - Inspection Report 05000285/2005008," dated November 30, 2005 (NRC Triennial Fire Protection Inspection at Fort Calhoun Station (NRC-05-0141))
 5. Letter from H. J. Faulhaber (OPPD) to Document Control Desk (NRC), "Request for Exemption from Requirements of 10 CFR 50, Appendix R, Section III.G.1.b for Fire Area 31 at the Fort Calhoun Station," dated June 29, 2007 (LIC-07-0060)
 6. Letter from R. P. Clemens (OPPD) to Document Control Desk (NRC), "Withdrawal of the Request for Exemption from Requirements of 10 CFR 50, Appendix R, Section III.G.1.b for Fire Area 31 at the Fort Calhoun Station," dated December 7, 2007 (LIC-07-0110) (ML073410655)

SUBJECT: Request for Exemption from Requirements of 10 CFR 50, Appendix R, Section III.G.1.b. for Fire Area 31 at the Fort Calhoun Station

The Omaha Public Power District (OPPD) requests an exemption, pursuant to 10 CFR 50.12 and 10 CFR 50.48, from the requirements of Appendix R, Section III.G.1.b., which requires that fire protection features be provided for the structures, systems and components important to safe shutdown (raw water pump and valve cables) at Fort Calhoun Station (FCS). The NRC has previously approved an exemption for the existing cable configuration at the auxiliary building pull boxes and at the intake structure building per Reference 2. However, the cables between these locations are not discussed in that exemption.

An exemption request for the cables located between the auxiliary building pull boxes and at the intake structure building was originally provided in Reference 5. However, the NRC staff determined that the exemption request did not meet the NRC acceptance criteria and requested that OPPD withdraw its request. Therefore, that exemption request was subsequently withdrawn in Reference 6.

This exemption request meets the criteria of 10 CFR 50.12(a)(2)(ii) where application of the regulation in the particular circumstances is not necessary to achieve the underlying purpose of the rule. The bases for the exemption are contained in Attachment 1.

This exemption request, provided as Attachment 1, will address the non-cited violation finding 05000285/2004003 identified in References 3 and 4.

No regulatory commitments are made in this letter.

If you should have any further questions regarding this exemption request, please contact Mr. Thomas C. Matthews at (402) 533-6938.

Sincerely,



R. P. Clemens
Division Manager
Nuclear Engineering

RPC/DLL/dll

- Attachments:
1. Request for Exemption from Requirements of 10 CFR 50, Appendix R Section III.G.1.b for Fire Area 31 at the Fort Calhoun Station
 2. Layout of Duct Bank and Manholes

Request for Exemption from Requirements of 10 CFR 50, Appendix R, Section III.G.1.b.
for Fire Area 31 at the Fort Calhoun Station

Abstract:

This exemption request addresses an issue originally identified in NRC Safety Evaluation Report (SER) dated July 3, 1985, (Reference 1) for 10 CFR 50 Appendix R that pertains to physical separation of redundant safe shutdown components necessary for cold shutdown capability.

Fort Calhoun Station (FCS) is requesting exemption from 10 CFR 50 Appendix R, Section III.G.1.b, and the 72-hour requirement to provide repair procedure(s) and materials for cold shutdown capability for redundant cold shutdown components.

The intake structure building at FCS provides river water to various safety and non-safety related components throughout the plant. This building is separate from the main body of the plant and is located on the river bank to the east of the turbine building. Major components located in the intake structure building are three (3) circulating water pumps, four (4) raw water pumps, and two (2) fire pumps. The redundant raw water pumps, necessary for cold shutdown functions only, are located in a common fire area in the intake structure building, Fire Area 31.

The power and control cables for the raw water pumps are routed from the auxiliary building through outside cable pull boxes, into an underground cable duct bank (including two manhole vaults, with the cables accessible in cable trays in one vault), and into the intake structure building. In the duct bank, the cables are routed in individual cable tubes. The Omaha Public Power District (OPPD) has determined that there is no credible threat from a fire, occurring in the area of the cable duct bank or manhole vaults, which would disable all trains of raw water and prevent the safe shutdown of the plant. The raw water system will remain available to achieve post-fire cold shutdown conditions within 72 hours. Any potential fire would be within the capabilities of the plant fire brigade to extinguish with manual fire fighting equipment before significant levels of damage occurred.

In the unlikely event that all raw water pumps are lost for any reason, OPPD maintains an abnormal operating procedure (AOP) for loss of the raw water system. If all raw water pumps are lost, due to any condition, the procedure directs the operators to trip the reactor and enter emergency operating procedures (EOPs) based on observed plant conditions.

Background/Licensing & Design Basis

As a result of OPPD's ongoing review of Appendix R inspection items delineated in References 2 and 3, OPPD discovered that the original SER (Reference 1) for Fire Area 31 is incorrect.

The original SER, letter from E. J. Butcher (NRC) to R. L. Andrews (OPPD) dated July 3, 1985, "Exemption Requests for the Fort Calhoun Station, Unit No. 1, 10 CFR Part 50 Appendix R, Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," (NRC-85-0200) states:

Intake Structure and Pull Boxes (Fire Area 31)

The licensee requested an exemption from Section III.G.2 to the extent that it requires that systems associated with redundant shutdown divisions be completely separated by a continuous 1-hour fire-rated barrier and the fire area containing these systems be protected by an area-wide automatic fire suppression system.

In addition, the area around the pull boxes is not provided with fire detectors, and the licensee requested an exemption from this requirement.

The technical requirements of Section III.G are not met in these areas because of the absence of an area-wide automatic fire suppression system and because redundant shutdown systems are not separated by a 1-hour-rated fire barrier. Also, the area around the pull boxes is not provided with fire detectors.

The staff's principal concern with the level of fire protection in these areas is that, if a fire were to occur, components and cables of redundant shutdown systems would be damaged, preventing the achievement and maintenance of safe shutdown conditions. The fire loading within these areas is limited. Combustible materials are widely dispersed. Consequently, any potential fire would be within the capabilities of the plant fire brigade to extinguish with manual fire fighting equipment before significant levels of damage occurred. Because the intake structure and pull boxes are located away from and outside of the main plant structure, the staff has reasonable assurance that a fire would not spread to other areas containing safety-related equipment. Therefore, an automatic fire suppression system is not necessary to limit fire propagation.

In the Intake Structure, if a fire were to occur at the raw water pumps, it would be detected in its initial stages by the existing fire detectors. The fire brigade would then be summoned and would effect fire extinguishment using manual hose stations or portable fire extinguishers. During the time delay associated with the arrival of the fire brigade, two of the pumps would be shielded from the effects of the fire by the concrete wall. In addition, smoke and heat from the fire would be vented upward and away from the pumps. Therefore, a complete 1-hour fire-rated barrier is not necessary to provide reasonable assurance that at least two pumps will remain free of fire damage.

Based on the above evaluation, the staff concludes that the existing fire protection provides an equivalent level of safety to that achieved by compliance with Section III.G. Therefore, the licensee's request for exemption for the Intake Structure and Pull Boxes is granted.

This original SER provided in Reference 1 incorrectly referenced Section III.G.2 and subsequently provided exemption from 10 CFR 50, Appendix R, Section III.G, for the cables at the intake structure building and at the auxiliary building pull boxes. This exemption request thereby provides notification and clarification that the original SER and exemption should have referenced 10 CFR 50, Appendix R, Section III.G.1.b, which addresses the cold shutdown capability requirements.

Licensing Basis

Fort Calhoun Station Unit No. 1 was licensed to operate prior to January 1, 1979, and 10 CFR 50.48(a) establishes the requirement that FCS must have a Fire Protection plan that satisfies Criterion 3, "Fire Protection," of 10 CFR 50, Appendix A, "General Design Criterion for Nuclear Power Plants." Nuclear power plants licensed to operate prior to January 1, 1979, must satisfy the applicable requirements of Appendix R to 10 CFR 50, including specifically the requirements of sections III.G, III.J, and III.O, pursuant to 10 CFR 50.48(b).

The NRC has granted a number of exemptions from Appendix R requirements, including the exemption for Fire Area 31 at FCS. Exemption for Fire Area 31 was originally granted in Reference 1.

Appendix R Requirements:

Appendix R, Section III.G.1.b, states:

G. Fire protection of safe shutdown capability. 1. Fire protection features shall be provided for structures, systems, and components important to safe shutdown. These features shall be capable of limiting fire damage so that:

b. Systems necessary to achieve and maintain cold shutdown from either the control room or emergency control station(s) can be repaired within 72 hours.

The exemption provided in Reference 1 for Fire Area 31 is from the requirements of Appendix R, Section III.G.2, which states, in part:

G. Fire protection of safe shutdown capability...

2. Except as provided for in paragraph G.3 of this section, where cables or equipment, including associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment, one of the following means of ensuring that one of the redundant trains is free of fire damage shall be provided:

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 combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area; or

c. Enclosure of cable 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;

The requirements of 10 CFR 50, Appendix R, Section III.G.2 are for equipment necessary for hot shutdown and the raw water system is credited to support cold shutdown functions for post-fire safe shutdown analysis. Therefore, Section III.G.2 is not applicable to Fire Area 31. Thus, this exemption request is being submitted to request exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.1.b. in lieu of Section III.G.2.

In addition, this exemption request will address the non-cited violation of 10 CFR 50, Appendix R (05000285/2004003), for failure to provide fire protection features for structures, systems, and components important to achieve and maintain cold shutdown or having the capability of repairing these components within 72 hours, as identified in References 2 and 3.

Evaluation:

The original exemption was granted via Reference 1 for the intake structure building and the pull boxes. This exemption request specifically addresses the cables in the duct bank and manhole vaults that are routed between the pull boxes and the intake structure building.

The raw water system is credited to support cold shutdown functions for post-fire safe shutdown analysis. The FCS intake structure building provides river water to various safety and non-safety related components throughout the plant. The intake structure building is separate from the main body of the plant and is located on the river bank to the east of the turbine building. Major components located in the intake structure building are three (3) circulating water pumps, four (4) raw water pumps, and two (2) fire pumps.

The redundant raw water pumps, necessary for cold shutdown functions only, are located in a common fire area in the intake structure building, Fire Area 31.

The power and control cables for the raw water pumps are routed from the auxiliary building through outside cable pull boxes, into an underground cable duct bank (including two manhole vaults, with the cables accessible in cable trays in one vault), and into the intake structure. In the duct bank, and in manhole vault No. 31, the cables are routed in individual cable tubes. These cables have thermoset insulation and are IEEE-383 qualified or equivalent.

The duct bank consists of a direct buried concrete raceway for electrical cables. The cables are routed through individual metallic tubes cast within the concrete duct bank. Access to the duct bank is available at pull boxes 128T and 129T, manhole vault No. 5 or manhole vault No. 31. Dimensions of the duct bank are 7 feet wide by 3 feet deep. The bottom of the duct bank is at elevation 999'-0", which is 5 feet below site grade.

See Attachment 2 for a simplified sketch of the layout of the duct bank and manholes.

In the unlikely event of a fire in the duct bank or manhole vaults, the site fire brigade would be able to identify the fire before significant damage is done, respond, and establish manual fire fighting efforts. Portable fire extinguishers and fire hose lines from nearby fire hydrants are available for these efforts. Access to the manhole vaults would be via the solid manhole covers.

Manhole Vault No. 5

Manhole Vault No. 5 is a direct buried concrete vault approximately 11 feet 6 inches square, 9 feet deep, with the floor of the vault at elevation 994'-0". The exterior concrete walls of the vault are 9 inches thick. Access to the vault is through either of the two solid cast iron manhole covers.

The vault has a 6-inch concrete divider wall separating the two partition sides. Each side contains cable trays. The cable trays are in a stacked arrangement with four trays high on each side of the divider wall. Separation of the cable trays is for Class 1E electrical separation.

The concrete divider wall has the following openings – two 4-inch conduit stubs mounted at 2 feet above the bottom of the vault and a weep hole in the bottom of the divider wall which measures 6 inches wide by 3 inches tall. The weep hole is to allow any water which may enter the vault to flow to the sump area located in the southeast corner of the vault. The vault is provided to allow a 90-degree turn for the duct bank. The vault is located approximately 30 feet diagonally from the southeast corner of the service building.

Manhole Vault No. 31

Manhole Vault No. 31 is a concrete vault with the following dimensions 6 feet wide, 18 feet long, and 9 feet deep; the bottom of the vault is at elevation 994'-6". Access to the vault is through a solid cast iron manhole cover. The vault is provided to allow entrance of the cables into the intake structure building. The vault is located near the southwest corner of the intake structure building. The cables are located entirely in individual metallic tubes/conduit in the vault.

There is no fire detection or suppression capability in the cable duct bank or the manhole vaults. There are no ignition sources in the cable duct bank or manhole vaults, with the exception of a self-ignited cable fire. The voltages of the subject cables are 4160 and 480 volt alternating current (VAC). Any fire in the duct bank or manhole vaults would be oxygen-limited and of minimal severity.

See Attachment 2 for a simplified layout of the duct bank, manholes, and plant structure arrangement.

OPPD has performed a fire hazards evaluation on the cable routing, cable configuration and installation. The duct bank is direct-buried below grade and is constructed of concrete and individual cable sleeve sections. The manhole vaults are concrete construction containing no ignition sources or combustible materials other than the cables and cable

insulation. The manhole vaults are not occupied and are only accessible through solid cast-iron manhole covers. These solid manhole covers will prevent flammable or combustible fluids from entering the manholes, and thus eliminate any credible transient fire loading scenario.

OPPD has determined that there is no credible threat from a fire, occurring in the area of the cable duct bank or manhole vaults, which would disable all trains of raw water and prevent the safe shutdown of the plant. The raw water system will remain available to achieve post-fire cold shutdown conditions within 72 hours.

Any potential fire would be within the capabilities of the plant fire brigade to extinguish with manual fire fighting equipment before significant levels of damage occurred.

In the unlikely event that all raw water pumps are lost for any reason, OPPD maintains an abnormal operating procedure (AOP) for loss of raw water system. If all raw water pumps are lost, due to any condition, the procedure directs the operators to trip the reactor and enter emergency operating procedures (EOPs) based on observed plant conditions.

Conclusion:

OPPD currently has an approved exemption for the cable configuration at the auxiliary building pull boxes and at the intake structure building (See Reference 1). However, the cables between these locations are not specifically discussed in that exemption. Therefore, this exemption request is to specifically address the cables in the duct bank and manhole vaults that are routed between the pull boxes and the intake structure building.

The raw water system is credited to support cold shutdown functions for post-fire safe shutdown analysis. OPPD has determined that there is no credible threat from a fire, occurring in the area of the cable duct bank or manhole vaults, which would disable all trains of raw water and prevent the safe shutdown of the plant, based on the following:

- A fire of significant size to damage cables of redundant trains in the duct bank or manhole vaults is extremely unlikely due to the inaccessibility of these locations and limited combustible material present.
- The duct bank is of concrete construction, with individual cable sleeves and is direct-buried below grade.
- The manhole vaults are concrete construction (concrete exterior walls and concrete divider wall between the cable trays in Manhole Vault No. 5).
- The manhole vaults are not occupied and are only accessible via solid cast-iron manhole covers, which will prevent flammable or combustible fluids from entering the manholes, thus eliminating any credible transient fire loading scenario.
- The cables in the duct bank and manhole vaults have thermoset insulation and are IEEE-383 qualified or equivalent.
- Combustible material in the duct bank and the manhole vaults is limited to cable insulation.
- Internally generated cable fires are considered to be extremely unlikely given the nature of the cables, the sizing of the cables, and the electrical overcurrent protection provided for the circuits.

- In the unlikely event of a fire in the duct bank or manhole vaults, the site fire brigade would be able to identify the fire before significant damage is done, respond, and establish manual fire fighting efforts. Portable fire extinguishers and fire hose lines from nearby fire hydrants are available for these efforts. Access to the manhole vaults would be via the solid manhole covers.
- The NRC previously granted OPPD exemption, in Reference 1, on the identical cables described in this exemption request where these cables exit the auxiliary building at the pull boxes and in the intake structure building. This exemption request will cover the cable routing between these two locations and correct the reference to Appendix R.

OPPD requests an exemption from the requirements of 10 CFR Part 50, Appendix R, Section III.G.1.b., to provide a repair procedure and materials for cold shutdown capability for redundant cold shutdown components. Based on the above, the provision of additional fire protection features (i.e., repair procedures and materials) for cold shutdown capability for redundant cold shutdown components (raw water pump and valve cables) in Fire Area 31 located between the intake structure building and auxiliary building would not augment or materially enhance plant safety. Therefore, this exemption request meets the criteria of 10 CFR 50.12(a)(2)(ii) where application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule.

References:

1. Letter from E. J. Butcher (NRC) to R. L. Andrews (OPPD) dated July 3, 1985, "Exemption Requests for the Fort Calhoun Station, Unit No. 1, 10 CFR Part 50 Appendix R, Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," (NRC-85-0200)
2. Letter from K. M. Kennedy (NRC) to R. T. Ridenoure (OPPD), "Fort Calhoun Station—NRC Integrated Inspection Report 05000285/2004003," dated August 11, 2004 (NRC-04-0103)
3. Letter from L. J. Smith (NRC) to R. T. Ridenoure (OPPD), "Fort Calhoun Station - Inspection Report 05000285/2005008," dated November 30, 2005 (NRC Triennial Fire Protection Inspection at Fort Calhoun Station (NRC-05-0141))
4. Letter from H. J. Faulhaber (OPPD) to Document Control Desk (NRC), "Request for Exemption from Requirements of 10 CFR 50, Appendix R, Section III.G.1.b for Fire Area 31 at the Fort Calhoun Station," dated June 29, 2007 (LIC-07-0060)
5. Letter from R. P. Clemens (OPPD) to Document Control Desk (NRC), "Withdrawal of the Request for Exemption from Requirements of 10 CFR 50, Appendix R, Section III.G.1.b for Fire Area 31 at the Fort Calhoun Station," dated December 7, 2007 (LIC-07-0110) (ML073410655)
6. 10 CFR Part 50, Appendix R, Section III.G.
7. 10 CFR Part 50.12, Specific Exemptions
8. 10 CFR Part 50.48, Fire Protection

Layout - Duct Bank and Manholes

