

February 11, 2003

Mr. R. T. Ridenoure  
Division Manager - Nuclear Operations  
Omaha Public Power District  
Fort Calhoun Station FC-2-4 Adm.  
Post Office Box 550  
Fort Calhoun, NE 68023-0550

SUBJECT: FORT CALHOUN STATION, UNIT NO. 1 - FIRE PROTECTION EXEMPTION  
FOR FIRE AREA 32 (TAC NO. MB6746)

Dear Mr. Ridenoure:

By letter dated November 8, 2002, Omaha Public Power District requested an exemption from the requirements of Title 10 of the *Code of Federal Regulations*, Part 50, Appendix R, Section III.G.2 for fire area 32 at the Fort Calhoun Station, Unit 1. The staff has determined that additional information is needed to complete its review. Enclosed is our request for additional information (RAI) regarding the exemption request. As discussed with Mr. Gary Cavanaugh of your staff, you have agreed to respond to this RAI by April 1, 2003.

Sincerely,

*/RA/*

Alan B. Wang, Project Manager, Section 2  
Project Directorate IV  
Division of Licensing Project Management  
Office of Nuclear Reactor Regulation

Docket No. 50-285

Enclosure: Request for Additional Information

cc w/encl: See next page

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REQUEST FOR ADDITIONAL INFORMATION

REQUEST FOR EXEMPTION FOR FIRE AREA 32

OMAHA PUBLIC POWER DISTRICT

FORT CALHOUN STATION, UNIT 1

DOCKET NO. 50-285

1. The 3-dimensional Figure 1 attached in the November 8, 2002, exemption request (exemption request) does not provide the appropriate level of detail for staff review. Please submit a revised drawing (P&ID) which shows the following for Fire Area (FA) 32:
  - room dimensions (including height),
  - location of compressors and auxiliary feedwater pumps,
  - fire doors and fire barriers,
  - the location of cable trays identified in exemption request (identifying both power and control cables),
  - ventilation system details, and
  - locations of any fixed and/or transient ignition sources.
  
2. Attachment 2 of the exemption request contains a list of manual actions for FA-32. Omaha Public Power District (OPPD) states that some manual actions are already contained in existing procedures and training and that some procedures may be enhanced following approval of the exemption request.
  - It is not clear from Attachment 2 which manual actions are already approved and incorporated into the existing procedures and training, and which manual actions would require an enhancement to existing procedures. For each zone in FA-32, state which manual actions are already contained in existing procedures and training and which manual actions are considered as enhancements.
  - In addition, for those manual actions that are already contained in existing procedures and training, please state if they are NRC-approved manual actions for FCS and list the safety evaluation where the staff approved the manual action for FA-32.
  - With regard to the manual actions listed in Attachment 2 of the exemption request, OPPD did not provide the appropriate level of detail for the staff to determine if the manual actions are feasible. Evaluate each manual action with respect to the guidance contained in NRC staff's following letters to the Nuclear Energy Institute:
    - November 29, 2001 (ADAMS No.: ML0133703020)
    - May 16, 2002 (ADAMS No.: ML0214100260)

Both letters are also available on the NRC fire protection website at:  
<http://www.nrc.gov/reactors/operating/ops-experience/fire-protection/technical-issues.html#manual>

3. Page 5 of the exemption request states that the combustible loading in FA-32 consists of cable insulation, administratively controlled transient combustibles, and small quantities of lube oil. Combustible load is a measure of the maximum heat that would be released if all the combustibles in a given fire area burned and does not consider other significant factors such as heat release rate (HRR), room configuration, ventilation rate, or other parameters which describe the fire dynamics over a period of time. The 18<sup>th</sup> Edition of the National Fire Protection Association (NFPA) Fire Protection Handbook (FPH), pages 7-78, states that the original concepts of fire severity and fire load (combustible load) are very important even though they are technically obsolete. The National Institute of Standards and Technology (NIST) Technical Report NISTIR 5842<sup>1</sup>, page ix, also identifies that there are technical shortcomings of this method, and states that:
- there is no technical basis for the equal-area hypothesis<sup>2</sup>
  - real room fire intensities are not a sole function of fire (combustible) load
  - temperatures of real fires can rise much faster than the standard time-temperature curve<sup>3</sup>

NISTIR 5842, page ix, also states that the NFPA FPH 18<sup>th</sup> Edition acknowledges that the fire load method is technically obsolete. The staff requests that OPPD provide the rationale or technical justification for classifying large amounts of cable insulation as a low combustible loading.

4. OPPD states on page 8 of the exemption request that an analysis was performed which demonstrates that fire damage would be limited due to the response of the extensive fire detection/suppression system. In particular, OPPD states that the maximum HRR estimated is not sufficient to damage redundant cables. With regard to the fire analysis provide the following:
- From Attachment 3 of the exemption request, it appears that the Electric Power Research Institute FIVE fire methodology was used to determine that in the

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1. NISTIR 5842, METHODOLOGY for Developing and Implementing Alternative Temperature-Time Curves for Testing the Fire Resistance of Barriers for Nuclear Power Plant Applications, @ by Cooper, L., and Steckler, K., May 1996, page 3.

2. The equal-area hypothesis is that the area beneath a temperature-time curve is a measure of the intensity or severity of a fire, and all fires with equal-area exposures are equally severe.

3. ASTM E 119-98, A Standard Test Methods for Fire Tests of Building Construction and Materials, @ ASTM Fire Test Standard, Fifth Edition, American Society of Testing and Materials, West Conshohocken, PA, 1999, pp 793-813.

event of a fire in FA-32, redundant cables, which are not adequately separated in accordance with Appendix R, would not be damaged. The staff requests the analysis for further review.

- What failure temperature was assumed to damage redundant cables? The thresholds are different for IEEE-383 rated cables versus non-IEEE-383 rated cables.
  - What was the maximum HRR estimated for each fire zone that was used in the fire modeling analysis?
  - From review of the exemption request, the staff determined that FA-32 is a large open area without physical barriers (walls, etc.). Discuss how this type of configuration (open area) is considered in a fire model hazard analysis which typically requires that zones contain physical barriers which will prevent the spread of fire and smoke to adjacent areas.
  - Provide the detailed analysis, which includes assumptions and results of the fire model for further staff review.
5. OPPD states on page 8 of the exemption request that there are areas within FA-32 where non-credited Train A and Train B cables cross, specifically at the south end of the room. The cables in this area are not credited for Appendix R and therefore were not addressed in this analysis by the licensee. The staff is concerned that although these cables are not credited for Appendix R, they may provide a potential path for propagation of a fire to cables that are credited for Appendix R within FA-32. Because cables and circuits credited for Appendix R frequently share certain physical or electrical configurations with cables which are not credited for Appendix R, it is not sufficient to only consider the effects of fire damage to cables required for Appendix R. Address the staff's concerns and provide a circuit analysis for these cables to demonstrate that a fire which impacts non-credited Train A and Train B cables could not impact the achievement of safe shutdown conditions.
6. Fire Zone D contains redundant power cables for the low-pressure safety injection pumps which are separated by 3 feet. In addition, page 11 of the November 8, 2002, exemption request states that actions to align charging pumps to the safety injection and refueling water or to the boric acid storage tank are not time critical as there are no failures in this zone that result in a challenge to the reactor coolant system inventory and that spurious operation of the power operated relief valves (PORVs) are not credible for a fire in this zone. Provide a technical analysis to support the statement that a spurious operation of the PORVs are not credible for a fire in this zone considering that Zone G, which contains the control cables for the PORV, is adjacent to Zone D. In accordance with the defense-in-depth concept, as defined in Appendix R, there is no physical separation provided by a barrier such as a wall or other feature, which might hinder or prevent fire and smoke spread to an adjacent zone in the event that the first levels of defense-in-depth (prevention, detection and fire suppression) fail to control the fire.

7. Zone E contains redundant control cables for auxiliary feedwater pumps FW-6 and FW-10. The exemption request states that adequate separation in accordance with Appendix R, Section III.G.2 is not provided. What is the distance between the redundant control cables for FW-6 and FW-10 since it does not meet the minimum 20 foot separation required by the regulation? This information was not provided in the exemption request.
8. In Zone F, the exemption request states that Train A cable trays cross above the Train B trays. The licensee states that their analysis shows that the exposed tray system could be exposed to damaging threshold energies without crediting partial barrier and fire suppression system. This area contains redundant power cables to motor control centers 3A1, 3B1, 3C1, 4A1, 4B1, and 4C1, which are separated by less than 10 feet.
  - What is the distance between the Zone F redundant power cables, which are separated by less than 10 feet? This information was not reported in the exemption request.
  - Discuss how a fire in this area is not considered credible, even though the exemption request states that the exposed cable tray system could be exposed to damage threshold energies for Zone F. Also, state which scenario in Attachment 3 of the exemption request represents the fire scenario associated with Zone F?
  - Page 13 of the November 8, 2002, exemption request states that OPPD considers this zone acceptable based on the licensing for FA-32. The staff reviewed the licensing information included by OPPD in the reference section and did not find any discussion pertaining to approval of redundant power cables separated by less than 10 feet. In fact, the letters dated January 9, 1985, July 3, 1985, and July 1, 1986, do not even address the concept of fire zones for FA-32 or state that for this particular zone that the power cables do not meet the minimum 10 foot separation as stated in the January 9, 1985, letter to the NRC. Provide an explanation to clarify the OPPD position that this fire area is acceptable based on the licensing documents included as references for the exemption request.