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NUCLEAR REGULATORY COMMISSION  
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PLANT SYSTEMS BRANCH

DIVISION OF SYSTEMS SAFETY AND ANALYSIS

LICENSEE REQUEST FOR DEVIATION FROM

REQUIREMENTS OF APPENDIX R TO 10 CFR PART 50

RIVER BEND STATION

DOCKET NO. 50-458

1.0 INTRODUCTION

Appendix R to Part 50 of Title 10 of the Code of Federal Regulations (10 CFR Part 50) establishes fire protection features required to satisfy Criterion 3 (GDC 3) of Appendix A to 10 CFR Part 50 with respect to certain generic issues for nuclear power plants licensed to operate prior to January 1, 1979. River Bend Station (RBS) was licensed to operate on August 29, 1985. Therefore, Appendix R is not applicable to RBS. However, by letter dated October 20, 1981, Gulf States Utilities, the applicant for RBS, committed to comply with Appendix R. The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the RBS fire protection program for conformance with the guidelines of Branch Technical Position CMEB 9.5-1, Sections III.G, III.J, and III.O of Appendix R, and GDC 3. The staff approved the RBS fire protection program in Supplemental Safety Evaluation Report 3 dated August 1985. By letter dated January 20, 1995, Entergy Operations Inc., (EOI, the licensee) requested a deviation from its commitment to meet the technical requirements of Section III.G.3 of Appendix R in fire area C-17.

2.0 DEVIATION REQUESTED

The licensee requested a deviation from its commitment to meet the technical requirements of Section III.G.3 of Appendix R to the extent that it requires the installation of an automatic fixed fire suppression system in an area for which alternative post-fire safe shutdown capability is provided. Specifically, alternative safe shutdown capability (using the remote shutdown system) is provided for fire area C-17. Fire area C-17 does not have an automatic fixed fire suppression system.

3.0 DISCUSSION

The redundant control room heating, ventilation, and cooling (HVAC) equipment is located in the same room in fire area C-17, which is located at 115 foot

Enclosure

level of the control building. The redundant air handling units, which are located about 10 feet apart in the same room in fire area C-17, share ducting for air inlet and discharge to the control room. The redundant dampers that isolate each air handling unit are less than 5 feet apart near the ceiling. Alternative shutdown capability is available for fire area C-17 by the remote shutdown system, which is located in a separate fire area.

The walls, floor, and ceiling of fire area C-17 are constructed of poured concrete with 3-hour fire ratings and a removable section composed of 3-hour fire rated solid concrete block. The ducts that penetrate the area contain fire dampers at the penetrations. The room contains four instrumentation and control panels, four dry type transformers, two air conditioning units with one motor each, four fans with motors, one air filter, and two charcoal filter units.

The combustible materials in fire area C-17 consist primarily of the charcoal in the enclosed filters and Thermo-Lag 330-1 fire barrier material (about 6620 pounds). Less significant amounts of combustibles are contributed by the electric motors, electrical cabinets, and pipe insulation (about 50 pounds). With the exception of a small number of air drops to equipment, all cables are routed in conduit and, therefore, make up only a minor component of the overall combustible loading (fuel load). Transient combustibles are controlled by administrative procedures. In its submittal, the licensee stated that total fuel load described above, yields an equivalent fire severity of about 35 minutes. The licensee also stated that by eliminating the charcoal in the enclosed filters and the Thermo-Lag 330-1 material from the total fuel load, the equivalent fire severity drops to about 4 minutes. The staff agrees that the combustible load contributed by the charcoal does not need to be considered as a component in the fire severity calculation. However, the staff does not agree with the licensee's assertion that it is not reasonable to consider the Thermo-Lag 330-1 a combustible material in fire area C-17. The staff's evaluation of the combustible loading and equivalent fire severity are provided in the Section 4, "Evaluation," of this Safety Evaluation.

The fire protection features in fire area C-17 include an area-wide fire detection system arranged to alarm locally and in the main control room, portable extinguishers, and fire hose reels. The charcoal filter units have detectors in the charcoal beds that alarm to the main control room. Each charcoal filter unit also has a manually-operated water spray system. The area is not congested and is accessible to the fire brigade.

#### 4.0 EVALUATION

Fire area C-17 does not meet the technical requirements of Section III.G.3 of Appendix R because an automatic fixed fire suppression system is not provided in the HVAC room. Section III.G of Appendix R could be satisfied by either separating the redundant trains of control room HVAC equipment with a 3-hour fire rated barrier or installing an automatic fixed fire suppression system in the HVAC room.

A fire in fire area C-17 could cause the loss of the redundant trains of control building HVAC equipment due to the lack of fire barrier separation or a fixed fire suppression system for the control room air handling units. The loss of both units would cause the loss of the control building chillers which would cause inoperability of the remaining control building air handling units. Loss of the control building HVAC system affects the accredited train of equipment in the main control room, standby switchgear room 1B, and the mechanical equipment room. This could cause the loss of main control room habitability. The staff was concerned that in the event of such a fire, the ability to achieve and maintain post-fire safe shutdown could be adversely affected.

In its submittal, the licensee stated that total combustible loading (fire load) in fire area C-17 (described in Section 3, "Discussion," above) yields an equivalent fire severity of about 35 minutes. However, in its calculation the licensee subsequently deleted the charcoal in the enclosed filters as a contributor to the fire load and equivalent fire severity. In the staff's view, the automatic detection systems in the filter units provide reasonable assurance that a fire in either unit would be promptly detected. The fire brigade would then use the manually actuated fixed fire suppression system and manual fire fighting to control and extinguish the fire. The substantial metal enclosures around the charcoal filters would contain the fire until the fire is extinguished and provide reasonable assurance that the charcoal will not present a significant exposure fire. Therefore, the staff agrees that the charcoal can be eliminated as a component that contributes to the overall fire severity. After eliminating the charcoal, the staff determined that the equivalent fire severity for fire area C-17 is about 17 minutes.

In its calculation of the equivalent fire severity, the licensee also eliminated the Thermo-Lag 330-1 material from the total fuel load. This reduced the equivalent fire severity for fire area C-17 to about 4 minutes. The licensee did not submit a technical basis for its assertion that it is not reasonable to consider the Thermo-Lag 330-1 installed in fire area C-17 as a combustible material. Conversely, as part of its overall review of Thermo-Lag 330-1 fire barriers, the staff had the National Institute of Standards and Technology (NIST) perform combustibility tests of Thermo-Lag 330-1 materials. These tests revealed that Thermo-Lag 330-1 is combustible. The staff issued the NIST test reports with Information Notice (IN) 92-82, "Results of Thermo-Lag 330-1 Combustibility Testing," dated December 15, 1992. Later, in IN 95-27, "NRC Review of Nuclear Energy Institute, Thermo-Lag 330-1 Combustibility Evaluation Methodology Plant Screening Guide," dated May 31, 1995, the staff provided information about assessing the combustibility hazards presented by Thermo-Lag materials in accordance with NRC regulations and previous staff positions, such as those stated in Generic Letter 86-10, "Implementation of Fire Protection Requirements," dated April 24, 1986. On the basis of the test data that it developed and the other information regarding the use of combustible materials, and absent a technical basis that substantiates its assertion, the staff concluded that the Thermo-Lag 330-1 installed in fire area C-17 is a combustible material. Furthermore, the staff concluded that the

Thermo-Lag 330-1 material should be included in the total fuel load and fire severity calculations. Therefore, the staff evaluated this deviation request on the basis of a calculated fire severity of about 17 minutes, which includes the Thermo-Lag 330-1 material.

In its submittal, the licensee stated that it would be impractical to separate the redundant air handling units with new fire barriers due to the limited access between the units and duct obstructions at the ceiling. The licensee also asserted that such barriers would interfere with routine maintenance operations. On the basis of its review of the arrangement of the HVAC room, the staff agrees with the licensee's position. The staff also noted that because the air handling units share ducting for air inlet and discharge to the control room, it would not be possible to separate the redundant equipment with fire barriers unless new separate ducts are also installed.

The area-wide fire detection system provides reasonable assurance that a fire in fire area C-17 will be detected in its incipient stage and, because of the relatively low fuel load, before significant flame propagation or temperature rise occurs. The plant fire brigade would then extinguish the fire using available equipment. In the event the fire brigade does not extinguish the fire before the redundant control room HVAC equipment is damaged, which could cause the loss of main control room HVAC, the remote shutdown system would provide an acceptable method of shutdown. HVAC for the remote shutdown panel is located in a separate fire area and would not be damaged by a fire in fire area C-17. The operation of the control building HVAC system from the remote shutdown panel bypasses the logic between the chilled water system and the air handling system. This would allow restart of the HVAC for all areas except the main control room. Therefore, there is reasonable assurance that a fire in fire area C-17 will not adversely effect the ability to achieve and maintain safe shutdown.

In addition, because of the close proximity of some of the redundant components of the control room HVAC equipment, in a worst case postulated fire, redundant components could be damaged by a single fire before an automatic fire system would actuate. Therefore, the addition of a fixed suppression system may not result in a significant increase in the level of fire protection for the redundant equipment.

## 5.0 CONCLUSION

On the basis of its evaluation, the staff concluded that the existing fire protection features, in combination with the alternate shutdown capability, provides an equivalent level of fire safety to that achieved by compliance with Section III.G.3 of Appendix R to 10 CFR Part 50. Therefore, the licensee's request for deviation from its commitment to meet Section III.G.3 of Appendix R to 10 CFR Part 50 in fire area C-17 should be granted.

Principal Contributor: S. Singh

Dated: October 4, 1995