UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO REQUEST FOR DEVIATION FROM

FIRE PROTECTION PROGRAM INCORPORATING

THE REQUIREMENTS OF APPENDIX R TO 10 CFR PART 50

STP NUCLEAR OPERATING COMPANY

DOCKET NOS. 50-498 AND 50-499

SOUTH TEXAS PROJECT, UNITS 1 AND 2 (STP)

1.0 INTRODUCTION

By letter dated September 14, 1995 (superseding a letter dated April 13, 1995), supplemented by letters dated November 6, 1996, May 22, and August 4, 1997, Houston Lighting and Power, the former licensed operator of STP, requested Nuclear Regulatory Commission (NRC) staff review and approval of a deviation from its approved fire protection program as it incorporates certain technical requirements of Section III.G.2.c of Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," to Title 10 of the Code of Federal Regulations (10 CFR) Part 50. STP Nuclear Operating Company, the current licensed operator, has adopted this request.

2.0 DEVIATION REQUESTED

Appendix R, Section III.G, "Fire protection of safe shutdown capability," specifies fire protection features for structures, systems, and components important to safe shutdown. Section III.G.2.c. of Appendix R specifies, in part, that where cables or equipment of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area outside of primary containment the following means of ensuring that one of the redundant trains is free of fire damage shall be provided:

> Enclosure of cables and equipment and associated 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 licensee requested a deviation from its approved fire protection program as it incorporates the technical requirements of Section II.G.2.c of Appendix R for fire area 07 to the extent that it specifies that an automatic fire suppression system be installed in the area.

3.0 DISCUSSION

The licensee originally installed about 13,000 linear feet of Thermo-Lag fire barriers at STP. To address the concerns that the staff identified in Generic Letter 92-08, "Thermo-Lag 330-1 Fire Barriers," the licensee performed a safe shutdown reanalysis. As a result of the reanalysis, the licensee reduced to 84 feet (37 linear feet of 24-inch wide cable trays and 47 linear feet of 4-inch conduits) the Thermo-Lag barriers required to ensure that one train of safe shutdown cables, circuits and equipment remain free of fire damage in the event of a fire. The 84 feet of cable trays and conduits protected by Thermo-Lag barriers are located in fire area 07. According to the licensee, except for fire area 07, all of the installed Thermo-Lag fire barriers may be removed or "de-credited" from the South Texas Appendix R analysis. Most of the reduction resulted from taking credit for only a single pathway to bring the plant to a safe shutdown condition instead of both a primary and a redundant pathway. The staff did not review the licensee's safe shutdown reanalysis as part of this safety evaluation.

Fire area 07 is located on the 10 foot elevation of the auxiliary shutdown area of the mechanical and electrical auxiliary building. It measures approximately 19 feet by 50 feet and extends from the 10 foot elevation to the 34 foot elevation. The walls, floor, and ceiling are 3-hour fire rated barriers. Doors and penetrations in the barriers are constructed such that their ratings are equivalent to that of the structural fire barriers. In addition, ventilation ducts that penetrate the structural fire barriers are provided with 3-hour fire rated dampers. Fire protection features in fire area 07 include an area-wide ionization smoke detection system which alarms locally and alarms and annunciates remotely in the control room. There is no fixed automatic fire suppression system in fire area 07. Manual fire suppression is provided by a fire hose cabinet and portable hand-held carbon dioxide extinguishers located in the corridor just outside the entrance to fire area 07. Based on fire drill data, the licensee estimated that the onsite fire brigade would be able to respond to fire area 07 in less than 10 minutes.

Fire area 07 contains the auxiliary shutdown panel and all trains of the qualified display processing system (QDPS) and sequencer control cables. The auxiliary shutdown panel is needed to achieve post-fire safe shutdown in the event of a control room fire. In the event of a fire in fire area 07, one of the trains of QDPS and sequencer control cables located in fire area 07 must remain free of fire damage to ensure that a safe shutdown path is available. The QDPS and sequencer control cables are the post-fire safe shutdown components of interest here. Currently, all trains of QDPS and sequencer control cables in fire area 07 are protected with Thermo-Lag fire barriers. The Thermo-Lag barriers were originally designed to have 3-hour fire resistance ratings. However, the licensee recently concluded that these Thermo-Lag fire barriers can only be qualified for a 1-hour fire resistance rating. Specifically, the licensee applied the methodology contained in the Nuclear Energy Institute Application Guide to reevaluate the fire-resistive rating of the 3-hour fire rated Thermo-Lag fire barriers. On the basis of its reevaluation, the licensee concluded that, contingent upon implementing certain modifications, the Thermo-Lag barriers could qualify for a 1-hour fire resistive rating. The staff did not review the licensee's calculation for concluding that the Thermo-Lag fire barriers could be upgraded to achieve a 1-hour fire resistance rating as a part of this safety evaluation. The licensee proposed to remove the Thermo-Lag barriers from all but one of the safe shutdown trains in fire area 07.

Fire area 07 is normally locked with access controlled by the control room unit or shift supervisor. The principal in-situ combustibles in fire area 07 are cable insulation and Thermo-Lag fire barrier material. Most of the exposed cables in fire area 07 meet the criteria of IEEE 383-1974, "Standard for Type Test of Class IE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations." Additional in-situ combustibles include a computer terminal, three electrical cabinets and two bookshelves. Transient combustibles and ignition sources are controlled by administrative control procedures that are applicable throughout the plant. Assuming that the Thermo-Lag fire barriers are removed from all but one of the trains of QDPS and sequencer control cables, the licensee estimated that the combustible loading in fire area 07 is less than 40,000 BTU/ft^2 and that the calculated fire severity would be less than 30 minutes. The in-situ combustibles are distributed throughout the fire area.

4.0 EVALUATION

Fire area 07 does not meet the licensee's approved fire protection program as it incorporates the technical requirements of Section III.G.2.c of Appendix R because an automatic fixed fire suppression system is not provided in the area. The staff was concerned that in the event of a fire, the lack of an automatic fire suppression system in fire area 07 could result in damage to redundant trains of safe shutdown components (QDPS and sequencer control cables). This could adversely affect the ability to achieve and maintain post-fire safe shutdown.

The fire rated construction of fire area 07 provides reasonable assurance that a fire that starts outside of the area will not spread into the area. Therefore, a fire that originates outside of fire area 07 will not cause fire damage to the QDPS and sequencer control cables and will not adversely affect the post-fire safe shutdown capability.

Access to fire area 07 is limited and transient combustibles and ignition sources are controlled by administrative procedures. Therefore, there is reasonable assurance that a fire involving transient combustibles will not occur. Nevertheless, in the event of a fire involving transient or in-situ combustibles in fire area 07, the area-wide fire detection system provides reasonable assurance that a fire will be detected in its incipient stage and 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 grows beyond the incipient stage before the fire brigade responds, the Thermo-Lag fire barriers installed on one train of QDPS and sequencer control cables provide reasonable assurance that the train will remain free of fire damage until the fire is controlled and extinguished. Specifically, the combination of low combustible loading, calculated fire severity of less than 30 minutes, and fire brigade response time of less than 10 minutes, provides reasonable assurance that the fire brigade would control and suppress the fire before the 1-hour Thermo-Lag barrier is challenged. Therefore, there is reasonable assurance that the post-fire safe shutdown capability will be available.

On the basis of its review, it is also the staff's view that the installation of an automatic fire suppression system in fire area 07 would not result in a significant increase in the level of fire safety.

5.0 CONCLUSION

On the basis of its evaluation, as documented above, and contingent on the licensee's fulfillment of its commitment to upgrade the Thermo-Lag fire barriers protecting one train of QDPS and sequencer control cables in fire area 07 to a 1-hour fire resistance rating, the staff concludes that the licensee's proposed deviation from its approved fire protection program as it incorporates the technical requirements of Section III.G.2.c of Appendix R to 10 CFR Part 50, to the extent that it requires the installation of an automatic fire suppression system in fire area 07, is a change to the approved fire protection program that does not adversely affect the ability to achieve and maintain safe shutdown in the event of a fire and, therefore, does not require prior approval of the Commission under Paragraph 2.E of Facility Operating Licenses Nos. NPF-76 and NPF-80.

Principal Contributor: D. Oudinot

Date: October 15, 1998