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

August 21, 1989

Docket Nos. 50-269, 50-270
and 50-287

Mr. H. B. Tucker, Vice President
Nuclear Production Department
Duke Power Company
422 South Church Street
Charlotte, North Carolina 28242

Dear Mr. Tucker:

SUBJECT: EXEMPTION FROM THE FIRE PROTECTION REQUIREMENTS OF SECTION III.G OF 10 CFR PART 50, APPENDIX R (TACS 52674/52675/52676)

Re: Oconee Nuclear Station, Units 1, 2, and 3

The Commission has issued the enclosed exemption from the requirements of Section III.G of 10 CFR Part 50, Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979." This exemption responds to your letters dated November 11 and October 24, 1983, and August 14, 1984 as supplemented on February 28 and September 30, 1985, December 23, 1986, and April 21, 1987.

The staff's consultant, Science Applications International Corporation (SAIC), performed the review. On the basis of this evaluation and site inspections, the staff concluded that the existing fire protection for the following areas provides a level of safety equivalent to the technical requirements of Section III.G. Therefore, the following specific exemptions are granted.

1. Auxiliary and Reactor Buildings - Seismic Expansion Joints: Use of unrated seismic joints between fire areas containing safety-related equipment.

2. Reactor Buildings - Separation Distance between Safety Circuits and Non-Safety Circuits: Lack of twenty-foot separation between redundant pressurizer level instruments and the existence of intervening combustibles between redundant systems and equipment.

3. Pipe Tunnel Access Area: Use of unrated boundaries between fire areas containing safety-related equipment.

4. East and West Penetration Rooms: Use of combustible pipe insulation in penetration seals separating fire areas.

5. Reactor Building Walls: Unrated containment mechanical penetrations.

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Also enclosed, for your information, is a copy of the Technical Evaluation Report SAIC-87/3111, written by SAIC.

A copy of the exemption has been forwarded to the Office of the Federal Register for publication.

Sincerely,

David B. Matthews, Director
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Exemption
2. TER

cc w/encl:
See next page

Mr. H. B. Tucker
Duke Power Company

Oconee Nuclear Station
Units Nos. 1, 2 and 3

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
Duke Power Company	)	Docket Nos. 50-269
	)	50-270
Oconee Nuclear Station, Units 1, 2, and 3	)	50-287
	)	

EXEMPTION

I.

Duke Power Company (Duke or the licensee) is the holder of Facility Operating License Nos. DPR-38, DPR-47, and DPR-55 which authorize the operation of the Oconee Nuclear Station, Units 1, 2, and 3 (Oconee or the facility) at steady-state power levels not to exceed 2568 megawatts thermal for each unit. These licenses provide, among other things, that the facilities are subject to all rules, regulations, and Orders of the Nuclear Regulatory Commission (the Commission) now or hereafter in effect.

The facility consists of three pressurized water reactors at the licensee's site located in Oconee County, South Carolina.

II.

On November 19, 1980, the Commission published a revised Section 10 CFR 50.48 and a new 10 CFR Part 50 Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979." On February 17, 1981, the revised Section 50.48 and Appendix R became effective. Section III of Appendix R contains fifteen subsections, lettered A through O, each of which specifies requirements for a particular aspect of the fire protection features at a nuclear power plant. One of these subsections, III.G, is the subject of Duke's exemption requests.

Section III.G.2 of Appendix R requires that one train of cables and equipment necessary to achieve and maintain safe shutdown be maintained free of fire damage by one of six means. The two paragraphs, a and d, that pertain to the Duke exemption requests are as follows:

a. Separation of cables and equipment and associated non-safety circuits of redundant trains [shall be accomplished] 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; or

d. Separation of cables and equipment and associated non-safety circuits of redundant trains [shall be accomplished] by a horizontal distance of more than 20 feet with no intervening combustibles or fire hazards.

III.

By letters dated November 11 and October 24, 1983, and August 14, 1984, Duke requested exemptions for Oconee from Appendix R to 10 CFR Part 50. By letter dated February 28, 1985, Duke sent additional information to clarify the exemption requests. Further, Duke stated that two of the submitted exemption requests would be withdrawn based on the successful fire testing of associated fire barriers. In a letter dated September 30, 1985, Duke presented the fire test data, its favorable evaluation, and their formal request to withdraw exemption requests nos. 1 and 2 of the November 11, 1983 letter. By letter dated November 14, 1986, the staff requested further information on the remaining exemption requests. By letter dated December 23, 1986, Duke responded initially to the questions. Later, in a letter dated April 21, 1987, Duke sent additional information.

The staff has reviewed the remaining five exemption requests as discussed below.

1. Auxiliary and Reactor Buildings - Expansion Joints

Duke requested an exemption from the technical requirements of Section III.G.2.a of Appendix R because the seismic expansion joints, used in fire barriers between the auxiliary building and the reactor building, are not rated for 3-hour fire resistance.

The auxiliary building is next to the reactor building; these two buildings are above the east and west penetration rooms. A 3-hour fire resistive barrier was constructed to separate the east from the west penetration room. These fire barriers separate trains of safe shutdown equipment and associated circuits. Cork is embedded in the concrete slabs above and below the wall adjacent to the reactor building wall. Duke states that the exemption request is only for the compressed cork in the expansion joints, located between the auxiliary building floor slabs and the reactor building walls at the ceiling of the west penetration room. The joints have compressed cork installed as filler material. Because the compressed cork in the expansion joints is not a 3-hour, fire-rated assembly, Duke evaluated the acceptability of using these joints in fire-rated barriers.

In evaluating the exemption request, the staff considered the following three characteristics about the penetration rooms: (1) the amount of combustible material (also called combustible loading); (2) the installed smoke detectors; and (3) the distance between the combustibles and the cork.

First, the combustible loading of the area is low. It consists primarily of cable insulation for fan motors and lights. No fixed combustibles are installed near the exposed cork. The penetration rooms, constructed of reinforced concrete, have a ceiling height of about 25 feet. The area above the east and west penetration rooms contains only air handling equipment. The west penetration room contains only cables of one train of equipment necessary to achieve safe shutdown. If a fire were to occur, the redundant safe shutdown equipment would not be affected. Because this area has low combustible loading, the area is unlikely to have a fire that would propagate through the expansion joints and into the east and west penetration rooms and damage the redundant safe shutdown equipment.

Second, smoke detectors have been installed by Duke throughout the east and west penetration rooms. These detectors alarm in the main control room. If a fire were to occur, the smoke detectors would give the reactor operators early warning. Although this area does not have fire suppression, it does have portable extinguishers and manual hose stations. After receiving the alarm, the reactor operators would dispatch the fire brigade to the area; the fire brigade would then extinguish the fire by using the portable extinguishers and manual hose stations.

Finally, the distance between the combustibles and the exposed cork and also the separation between the two trains of safe shutdown equipment provide sufficient protection to ensure the ability to achieve and maintain safe shutdown until Duke extinguishes the fire.

Thus, the staff finds that the low combustible loading, the automatic fire detection, the passive protection of fire area boundaries, and the separation of safe shutdown equipment provide reasonable assurance that the fire brigade would be able to extinguish a fire before it develops to the point of preventing a safe plant shutdown. Furthermore, the staff finds acceptable the compressed cork used in the seismic expansion joints located at the ceiling of the west penetration room, for each of the three units, because the cork does not decrease the level of fire protection. Therefore, the staff concludes that Duke's fire protection features meet the underlying purpose of the rule because they provide an equivalent level of fire protection as would literal compliance with Appendix R.

2. Reactor Buildings - Separation Distance Between Safety Circuits and Non-Safety Circuits

Duke requested an exemption from the technical requirements of Section III.G.2.d of Appendix R for two cases where either the distance between redundant instruments is less than 20 feet or where the distance between reduandant components necessary for achieving hot shutdown is 20 feet, but intervening combustibles exist between them.

In the first case, Duke stated that the pressurizer level transmitter in the Unit 1 reactor building is separated by about 15 feet from the balance of plant instruments although there are no intervening combustibles. In the second case, Duke states that although they are separated by more than 20 feet, the primary and alternate trains of instrumentation have intervening combustibles between them.

In evaluating the exemption request, the staff considered the specific configuration of the cases. In the first case, although there are no intervening combustibles between them, the two instruments are separated by only 15 feet. Futhermore, in the rest of the area, the combustible loading, which consists primarily of cable, is low. To reduce the probability of a fire from transient combustibles, Duke has incorporated administrative controls to limit transient combustibles and inspections to detect any combustibles before starting the unit after an outage. Also, reactor buildings are huge structures whose appreciable volume dissipates the heat from a fire.

In the second case where the primary and alternate trains of instrumentation, i.e., cables, valves and instruments of the safe shutdown system, are located in two different areas within each reactor building, the trains are separated by more than 20 feet. However, there are also intervening combustibles between them. Although their concentration is low, the intervening combustibles consist of cable trays traversing the reactor building (RB). Because the cable insulation contained within the trays is comparable to IEEE-383 qualified cable, the cable insulation will burn slowly with an initially low rate of heat release.

Thus, for the first case of pressurizer level instrumentation, the staff finds that the low combustible loadings and large RB volume provide reasonable assurance that the fire brigade would be able to extinguish a fire before it develops to the point of preventing a safe plant shutdown. In the second, the distance between redundant and alternate standby shutdown equipment, combined with the low rate of fire propagation through the trays, provides reasonable

assurance that the fire brigade will extinguish the fire before it affects redundant trains of instrumentation. Therefore, the staff concludes that Duke's fire protection features within the RB meet the underlying purpose of the rule because they provide an equivalent level of fire protection as would literal compliance with Appendix R.

3. Pipe Tunnel Access Area

Duke requested an exemption from the technical requirements of Section III.G.2.a of Appendix R because the pipe tunnel access area holding the standby shutdown system cables located in the pipe tunnel access area does not have a 3-hour, fire-rated barrier separating it from the east penetration room above.

In evaluating the exemption request, the staff considered the amount of combustible loading and manual fire suppression.

First, the combustible loading in the pipe tunnel access is low. If a fire were to occur, it would develop slowly. Also, the fire propagation path between the standby shutdown system cables and the east penetration room is circuitous, consisting of several unrated barriers and open areas. Second, the fire brigade may use the portable extinguishers, manual hose stations, or a fire hose supplied from the fire hydrant to extinguish the fire.

Thus, the staff finds that the low combustible loading and manual fire suppression provide reasonable assurance that the fire will not propagate between the pipe tunnel access area and the east penetration room above.

Therefore, the staff concludes that the existing separation between the pipe tunnel access area and the east penetration room provides a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R.

4. East and West Penetration Rooms

Duke requested an exemption from the technical requirements of Section III.G.2.a of Appendix R for pipe penetrations through the floor and ceilings of the penetration rooms.

The licensee stated that "Armaflex" and "Rubatex" insulating materials are used to seal pipe penetrations through the floor and ceilings of the east and west rooms. Armaflex is described in the Oconee Nuclear Station Fire Protection Safety Evaluation Report dated August 11, 1978, and has a flame spread rating of 50. Rubatex is a similar material with a flame spread of 25.

The licensee has stated that due to the presence of this insulating material at pipe penetrations, an exemption is required from the specific technical requirements of Section III.G.2.a of Appendix R.

By letter dated April 21, 1987, Duke stated that the west penetration room and cask decontamination rooms are considered a single fire area. Therefore, the exemption request applies only to the ceilings of the west penetration room.

The pipe penetrations through the ceiling of the west penetration room do not comply with the technical requirements of Section III.G.2.a of Appendix R because of the pipe insulation materials installed. The insulating materials used are known as Armaflex and Rubatex.

The west penetration room contains only one train of equipment necessary to achieve safe shutdown. The penetration room is constructed of reinforced concrete and has a ceiling height of approximately 25 feet. The predominant combustible within the room is cable insulation.

Smoke detectors are provided for the west penetration room. These detectors alarm in the main control room. If a fire occurs, it should be detected in its early stages and alarmed in the main control room. The fire brigade will be dispatched to the area to extinguish the fire using the portable extinguishers and manual host stations provided.

By letter dated May 11, 1984, information concerning Rubatex was submitted to the staff as part of the licensing review for the Catawba Nuclear Station. The staff has accepted the use of this material as described in Supplement 3 to the Catawba Nuclear Station Safety Evaluation Report (SSER 3) dated July 1984. The Rubatex insulation has a Flame Spread Index of 25, a Smoke Development Index of 100 (maximum), and a Fuel Contribution Index of 30.

For the Oconee Nuclear Station, "Armaflex", a similar material with a flame spread index of 50 or less, was submitted to the staff for review by Duke's letter dated January 25, 1978. The use of this material in an arrangement similar to that used in the ceiling of the west penetration room was accepted as described in the Oconee Fire Protection Safety Evaluation Report dated August 11, 1978.

Because of the limited combustibility of the insulation material, it is unlikely that a fire would propagate through the penetration seals from one fire area to the other. Should a fire occur in the penetration room, it would be detected in its incipient stage. The alarms from the detectors annunciate in the control room where the fire brigade would be dispatched to extinguish the fire manually.

Based on the above evaluation, previous acceptance of the insulating material, and the staff review of site conditions, the staff concludes that the piping penetrations at the ceiling of the west penetration room, provide reasonable assurance that a fire would not propagate through the barrier and, therefore, provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R.

5. Reactor Building Walls

Duke requested an exemption from the technical requirements of Section III.G.2.a of Appendix R to the extent that three-hour, fire-rated pipe penetrations are not provided within the reactor building wall contiguous to the penetration rooms.

Duke has stated that the mechanical pipe penetrations in the reactor building walls are not fire rated. The reactor building walls serve as fire barriers separating redundant trains of cables in the east and west penetration rooms. Because of the presence of these unrated penetrations, the reactor building walls do not conform with the technical requirements of Section III.G.2.a of Appendix R to 10 CFR Part 50.

The containment penetration design for pipe containing less than 150°F process fluids consists of a sleeved opening with a steel housing assembly anchored to the reactor building wall, with a pipe cap attached to the pipe for containment integrity. Penetrations for higher temperature process piping are similar in design but have insulation between the process pipe and the wall sleeve.

The mechanical pipe penetration design was observed during the plant Appendix R inspection during the week of January 26-30, 1987, to be similar to penetration designs used at other facilities. The penetrations have been designed to meet multiple containment integrity criteria.

The combustible loadings near the penetration are low; therefore, a fire of significant magnitude or duration should not occur near the penetrations. If a fire does occur, it is probable that the substantial construction of the piping penetrations, combined with the large room volumes on either side of the penetrations, will prevent fire propagation through the containment boundary. It is, therefore, concluded that the existing unrated containment mechanical pipe penetrations provide reasonable assurance that a fire will not propagate through the barrier and are, therefore, an acceptable deviation from the technical requirements of Section III.G.2.a of Appendix R.

Based on the above evaluation, the existing mechanical pipe penetrations in the reactor building walls provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R and provide reasonable assurance that the fire will not propagate through the containment boundaries.

6. 10 CFR 50.12 Determination

Pursuant to 10 CFR 50.12(a)(2), the Commission will not consider granting an exemption unless special circumstances are present. Special circumstances are present when 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.

The underlying purpose of Section III.G is to provide adequate protection of redundant components of safety-related equipment by limiting damage in the event of a fire at one safety-related component location so the performance of the other redundant safety-related component is not affected. As described in the evaluation section of each exemption request, the staff has concluded that the existing fire protection systems provide equivalent protection to that which would be provided by meeting the literal separation requirements of Section III.G of Appendix R.

In summary, the staff has concluded that the alternative fire protection provided in support of the exemptions meets the fire protection which would otherwise occur if literal compliance with the separation requirements of Appendix R were required. Therefore, the staff concludes that special circumstances exist for the licensee's requested exemptions in that imposition of the literal requirements of the regulation in these particular circumstances is not necessary to achieve the underlying purpose of Appendix R to 10 CFR Part 50.

IV.

Accordingly, the Commission has determined, pursuant to 10 CFR 50.12(a), that (1) an exemption as described in Section III. is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security, and (2) in this case, special circumstances are present as described in Section III. Therefore, the Commission hereby grants an exemption from the requirements of Section III.G. of Appendix R to 10 CFR Part 50 as decribed in Section III. above.

Pursuant to 10 CFR 51.32, the Commission has determined that the issuance of this exemption will have no significant impact on the environment (53 FR 50139).

This Exemption is effective upon issuance.

Dated at Rockville, Maryland this 21st day of August 1989.

FOR THE NUCLEAR REGULATORY COMMISSION

/s/

Steven A. Varga, Director
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

PDII-3	PDII-3	PDII-3	OGC	ADP2:DRPR:NRR	D:DRPR
MRood	LWiens:cb	DMatthews		GLanias	SVarga
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This Exemption is effective upon issuance.

Dated at Rockville, Maryland this 21st day of August 1989.

FOR THE NUCLEAR REGULATORY COMMISSION

Steven A. Varga, Director
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Encl 2

1.0 INTRODUCTION

PURPOSE OF REVIEW

This Technical Evaluation Report (TER) documents an independent review of exemption requests to the requirements of Appendix R to 10CFR50 for various areas at the Oconee Nuclear Station (Docket Nos. 50-269, 50-270, and 50-287), submitted by Duke Power Company (the Licensee). The evaluation was performed:

1. To assess if each exemption request demonstrates an equivalent level of overall protection of plant safe shutdown capability following a disabling fire event and,

2. To determine the bases for acceptance or denial of each exemption request.

GENERIC BACKGROUND

General Design Criterion 3 (GDC 3), "Fire Protection," of Appendix A to 10CFR50 requires that structures, systems and components important to safety be designed and located to minimize, consistent with other safety requirements, the probability and effects of fires and explosions. Noncombustible and heat resistant materials are required to be used whenever practical.

GDC 3 also requires that fire detection and suppression systems of appropriate capacity and capability be provided and designed to minimize the adverse effects of fires on structures, systems and components important to safety.. Fire fighting systems should be designed to ensure that their failure, rupture or inadvertent operation does not significantly impair the safety capabilities of structures, systems and components important to safety.

Either the staff guidance contained in Branch Technical Position (BTP) CMEB 9.5-1 of NUREG 0800, "Standard Review Plan," or the combination of staff guidance contained in Appendix A to BTP APCSB 9.5-1 and the technical requirements set forth in Appendix R to 10CFR50 define the essential elements of an acceptable fire protection program at nuclear power plants for demonstrating compliance with GDC 3. The purpose of the fire protection program is to ensure the capability to shut down the reactor and to maintain it in a safe shutdown condition and to minimize radioactive releases to the environment in the event of a fire. The above guidance implements the philosophy of defense-in-depth protection against the hazards of fire and its associated effects on safety-related equipment.

Licensees must detail their fire protection program in the Final Safety Analysis Report (FSAR), including plant design features, organization, and administrative controls. The FSAR must include a Fire Hazards Analysis (FHA), which describes plant design and equipment on an area-by-area basis. The FHA should identify fire area boundaries and demonstrate that a fire in any given area will not prevent the plant from safely shutting down. Where any plant design feature deviates from regulatory guidance, it must be identified and demonstrated that the deviation does not adversely affect plant safety.

PLANT-SPECIFIC BACKGROUND

By letters dated November 11 and October 24, 1983, and August 14, 1984, the Duke Power Company (the Licensee) requested exemptions from Sections III.G and III.J of Appendix R to 10CFR50 for the Oconee Nuclear Station.

By letter dated February 28, 1985, the Licensee provided additional information to clarify the previously submitted exemption requests. Further, the Licensee stated that two of the previously submitted exemption requests would be withdrawn based on the successful fire testing of associated fire barriers.

In a letter dated September 30, 1985, the Licensee presented the fire test data, its favorable evaluation, and their formal request to withdraw Exemption Requests No's. 1 and 2 contained in the November 11, 1983, letter. This Technical Evaluation Report reviews the remaining exemption requests.

By letter dated November 14, 1986, the staff requested further information regarding the subject remaining exemption requests. An initial response to the requests was provided by the licensee in a letter dated December 23, 1986, which requested a meeting with the staff. This meeting was held during the Appendix R inspection at the Oconee Nuclear Station during the week of January 26 - 30, 1987, during which the exemption requests were observed in the field by the staff. Based on the results of the meeting, the licensee provided the additional information requested by the staff in a letter dated April 21, 1987.

2.0 EVALUATION

2.1 AUXILIARY AND REACTOR BUILDINGS, EXPANSION JOINTS

2.1.1 Exemption Requested

An exemption was requested from the specific technical requirements of Section III.G.2.a of Appendix R to the extent that 3-hour fire rated seismic expansion joints are not provided in 3-hour fire rated floor and wall assemblies separating safe shutdown equipment and associated circuits.

2.1.2 Discussion

By letter dated November 11, 1983, the licensee identified that the seismic expansion joints in the fire barriers which abut the Auxiliary Building and the Reactor Building do not meet the requirements of Section III.G.2.a of Appendix R due to compressed cork installed as filler material in the joints. Since the compressed cork expansion joint is not a 3-hour fire rated assembly, the licensee performed an evaluation to determine the acceptability of the existing joint for use in a fire rated barrier. Based on the successful results of the evaluation, the licensee requested an exemption from the specific requirements of Section III.G.2.a of Appendix R for the subject expansion joints.

On January 3, 1986, a conference call was held with the licensee to discuss the submitted exemption request. During the conference call, additional information regarding the seismic expansion joints was requested to assist the staff in performing their review. The additional information was provided by a licensee's letter dated February 28, 1985.

By letter dated November 14, 1986, the staff requested further information regarding the subject exemption request. An initial response to the request was provided by a letter dated December 23, 1986, which requested a meeting with the staff. This meeting was held during the Appendix R inspection at the Oconee Nuclear Station during the week of January 26 - 30, 1987, during which the expansion joint conditions were observed by the staff. Based on the results of the meeting, the licensee provided the additional information requested by the staff in a letter dated April 21, 1987.

In the April 21, 1987, letter, the licensee clarified that the expansion joint exemption request is only for the compressed cork between the Auxiliary Building and Reactor Building at the ceiling of the West Penetration Room for each unit. The West Penetration Room for each unit at elevation 809' of the Auxiliary Building is combined with the Cask Decontamination Room at elevation 796' to form a single fire area. One side of the fire area is bounded by the Reactor Building walls.

Compressed cork is installed within the seismic expansion joints located between the Auxiliary Building floor slabs and the Reactor Building walls. A 3-hour fire resistive wall assembly has been constructed to separate the East and West Penetration Rooms. Cork is embedded in the concrete slabs above and below the wall assembly adjacent to the Reactor Building wall. The typical width of the exposed compressed cork is three inches.

The penetration rooms are constructed of reinforced concrete and have a ceiling height of approximately 25 feet. The predominant combustible within the penetration rooms is cable insulation resulting in an approximate combustible loading of 91,000 btu per square foot. There are no fixed combustibles in close proximity to the seismic expansion joints in the wall separating the East and West Penetration Rooms.

Smoke detectors are provided for the East and West Penetration rooms. General area fire suppression is not provided. Portable extinguishers and manual hose stations are provided for manual fire suppression.

2.1.3 Evaluation

The seismic expansion joints between the Auxiliary Building and Reactor Building at the ceiling at the West Penetration Room for each unit does not comply with the technical requirements of Section III.G.2.a of Appendix R due to the installation of compressed cork which has not been tested for a 3-hour fire resistance rating.

The West Penetration Rooms contain only one train of equipment necessary to achieve safe shutdown. If the fire were to occur, the redundant safe shutdown equipment would not be affected. The area above the East and West Penetration rooms contains air handling equipment. The combustible loading of the area is low consisting primarily of cable insulation for fan motors and lights. There are no fixed combustibles installed in close proximity to the exposed cork. Due to the low combustible loading, there is reasonable assurance that a fire would not propagate through the expansion joints from this area to the East and West Penetration Rooms and damage redundant safe shutdown equipment.

Smoke detectors are provided throughout the East and West Penetration Rooms. These detectors alarm in the main control room. If a fire occurs, it should be detected in its early stages and alarm in the main control room. The fire brigade will be dispatched to the area to extinguish the fire using the portable extinguishers and manual hose stations provided.

Until the fire is extinguished, the spatial separation of the installed combustibles to the exposed cork and the separation of safe shutdown equipment provide sufficient protection to ensure the ability to achieve and maintain safe shutdown.

2.1.4 Conclusion

Based on the above evaluation and the staff's review of site conditions, it is concluded that the low combustible loading, the automatic fire detection, the passive protection provided by the fire area boundaries and the separation of safe shutdown equipment provides reasonable assurance that the fire brigade could extinguish a fire before it develops to the point of preventing a safe plant shutdown. In our judgement, the installation of the compressed cork seismic expansion joints does not decrease the level of fire protection currently provided. Therefore, the compressed cork seismic expansion joints currently provided at the ceiling of the West Penetration Room for each unit are acceptable.

2.2 REACTOR BUILDINGS

2.2.1 Exemption Requested

An exemption was requested from the specific technical requirements of Section III.G.2.d of Appendix R to the extent that it requires separation of redundant safe shutdown components and circuits by 20 feet of horizontal distance free of intervening combustibles or fire hazards.

2.2.2 Discussion

By letter dated April 30, 1981, the licensee provided an evaluation of the cable separation inside each unit's Reactor Building. In that submittal, one instance was identified where less than 20 feet of horizontal separation existed between safe shutdown circuits.

In a letter dated November 11, 1983, the licensee requested an exemption from the requirements of Section III.G.2.d of Appendix R to the extent that it requires 20 feet of horizontal distance free from intervening combustibles between safety circuits and non-safety circuits inside each Reactor Building.

Pursuant to staff requests, the licensee provided additional information to assist the staff in reviewing these exemption requests by letters dated February 28, 1985, and April 21, 1987.

The exemption request for the Reactor Buildings involves two specific arrangements; the separaton of redundant pressurizer level instruments by less than 20 feet and the existance of intervening combustibles between redundant systems and equipment necessary to achieve hot shutdown separated by 20 feet of horizontal distance.

In the Unit 1 Reactor Building, the pressurizer level transmitter is separated from the balance of plant instruments by approximately 15 feet with no intervening combustibles. The combustible loading in the area which consists primarily of cable concentrations is low. Adminstrative control of transient combustibles, including inspections at the conclusion of each outage prior to unit start-up, reduces the probability of a fire involving transient combustibles. Reactor Building areas are generally open with appreciable volume to dissipate the heat from a fire.

In general, primary and alternate trains of instrumentation are located in two different areas within each containment. Cables, valves and instruments associated with the standby shutdown system are generally located on the west side of the Reactor Building below elevation 796'. There are intervening combustibles between redundant systems which consist of cable trays traversing the Reactor Building east to west. The cable concentrations are generally low consisting of one or two cable trays per location. The licensee has stated that the cable is comparable to IEEE-383 qualified cable.

2.2.3 Evaluation

Separation of redundant systems and equipment within the Reactor Building does not comply with technical requirements of Section III.G.2.d of Appendix R because intervening combustibles, specifically cables in trays, exist between primary and alternate trains of plant instrumentation that is separated by more than 20 feet of horizontal distance.

The quantity of intervening cable trays is low; consisting of one or two trays. The cable insulation contained within the trays is comparable to IEEE-383 qualified cable. If a fire were to occur within the trays, we expect it to develop slowly with an initially low rate of heat release.

The standby shutdown system equipment is generally located on the west side of the Reactor Building separated from the redundant components. The distance between redundant and

alternate instruments, combined with the low fire propagation rate expected for a fire within the trays provides reasonable assurance that a fire will be controlled or extinguished by the fire brigade prior to affecting redundant trains of instrumentation.

At the Appendix R inspection at Oconee during the week of January 26 - 30, 1987, the staff reviewed the intervening combustible configurations within the Reactor Building. Based on this review, the staff concurs with the licensee's evaluation that there is reasonable assurance that a fire would not propagate between redundant required instrumentation.

2.2.4 Conclusion

Based on the above evaluation and the review of site conditions, it is concluded that the existing fire protection features within the Reactor Buildings provide a level of fire protection equivalent to the technical requirements of Section III.G.2.d of Appendix R and provide reasonable assurance that a fire within the containments will not prevent the plant from safely shutting down due to the loss of primary and alternate trains of instrumentation.

2.3 PIPE TUNNEL ACCESS AREA

2.3.1 Exemption Requested

An exemption was requested from the technical requirements of Section III.G.2.a of Appendix R to the extent that a 3-hour fire rated barrier is not provided between safe shutdown cables.

2.3.2 Discussion

In a letter dated August 14, 1984, the licensee requested an exemption request from the requirements of Section III.G.2.a of Appendix R to the extent that it requires a 3-hour fire rated barrier between the East Penetration Room on elevation 809' and the standby shutdown system cables in the pipe tunnel access area on elevation 796'. Additional information to facilitate the staff's review of the exemption request was provided by licensee letters dated February 28, 1985, and April 21, 1987.

The principal concern with a fire in the pipe tunnel access area is the lack of a 3-hour fire barrier between standby shutdown system cables and redundant circuits in the East Penetration Room. The licensee's evaluation of the lack of

this 3-hour fire barrier indicates a circuitous path for a fire to propagate between redundant circuits. In addition, there is no equipment associated with shutdown functions which intervene the standby shutdown system cables and the East Penetration Room.

Portable extinguishers and manual hose stations or a fire hose supplied from the fire hydrant are available for use by the fire brigade to extinguish a fire in the area.

2.3.3 Evaluation

The pipe tunnel access area on elevation 796' does not comply with the technical requirements of Section III.G.2.a of Appendix R because a 3-hour rated fire barrier does not exist between standby shutdown system cables and redundant circuits in the East Penetration Room.

The licensee's evaluation concludes that the combustible loading in the pipe tunnel access area is low. If a fire were to occur, it is expected that it would develop slowly. The fire propagation path between the standby shutdown system cables and the East Penetration Room is circuitous consisting of several unrated barriers and open areas.

During the Appendix R inspection at Oconee, the staff reviewed the pipe tunnel access area. Based on this review, the staff concluded that there is reasonable assurance that a fire would not propagate between the standby shutdown facility cables in the pipe tunnel access area and the East Penetration Room.

2.3.4 Conclusion

Based on the above evaluation and required site inspection, there is reasonable assurance that a fire will not propagate between the pipe tunnel access area and the East Penetration Room. Therefore, it is concluded that the existing separation between the pipe tunnel access area and the East Penetration Room provides a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R.

2.4 EAST AND WEST PENETRATION ROOMS

2.4.1 Exemption Requested

An exemption was requested from the technical requirements of Section III.G.2.a of Appendix R for pipe penetrations through the floor and ceilings of the penetration rooms.

2.4.2 Discussion

The licensee has stated that "Armaflex" and "Rubatex" insulating materials are used to seal pipe penetrations through the floor and ceilings of the East and West Penetration Rooms. "Armaflex" is described in the Oconee Nuclear Station Fire Protection Safety Evaluation Report dated August 11, 1978, and has a flame spread rating of 50. "Rubatex" is a similar material with a flame spread of 25.

The licensee has stated that due to the presence of this insulating material at pipe penetrations, an exemption is required from the specific technical requirements of Section III.G.2.a of Appendix R.

By letter dated April 27, 1987, the licensee stated that the West Penetration Room and Cask Decontamination Rooms are considered a single fire area. Therefore, the exemption request only applies to the ceilings of the West Penetration Rooms.

2.4.3 Evaluation

The pipe penetrations through the ceiling of the West Penetration Rooms do not comply with the technical requirements of Section III.G.2.a of Appendix R because of the pipe insulation materials installed. The insulating materials used are known as "Armaflex" and "Rubatex".

The West Penetration Rooms contain only one train of equipment necessary to achieve safe shutdown. The penetration room is constructed of reinforced concrete and has a ceiling height of approximately 25 feet. The predominate combustible within the room is cable insulation.

Smoke detectors are provide for the West Penetration Room. These detectors alarm in the main control room. If a fire occurs, it should be detected in its early stages and alarmed in the main control room. The fire brigade will be dispatched to the area to extinguish the fire using the portable extinguishers and manual hose stations provided.

By letter dated May 11, 1984, information concerning "Rubatex" was submitted to the staff as part of the licensing review for the Catawba Nuclear Station (Docket Nos. 50-413 and 50-414). The staff accepted the use of this material as described in the Catawba Nuclear Station Supplemental Safety Evaluation Report No. 3 (SSER 3) dated July, 1984. The "Rubatex" insulation has a Flame Spread Index of 25, and Smoke Development Index of 100 (maximum), and a Fuel Contribution Index of 30.

For the Oconee Nuclear Station "Armaflex", a similar material with a flame spread index of 50 or less was submitted to the staff for review by licensee's letter dated January 25, 1978. The use of this material in an arrangement similar to that used in the ceiling of the West Penetration Room was accepted as described in the Oconee Fire Protection Safety Evaluation Report dated August 11, 1979.

Because of the limited combustibility of the insulation material, it is unlikely that a fire would propagate through the penetration seals from one fire area to the other. Should a fire occur in the penetration room, it would be detected in its incipient stage. The alarms from the detectors annunciate in the control room where the fire brigade would be dispatched to extinguish the fire manually.

2.4.4 Conclusion

Based on the above evaluation, prior acceptance of the insulating material and the staff review of site conditions, it is concluded that the piping penetrations at the ceiling of the West Penetration Rooms, provide reasonable assurance that a fire would not propagate through the barrier and therefore, provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R.

2.5 REACTOR BUILDING WALLS

2.5.1 Exemption Requested

An exemption was requested from the technical requirements of Section III.G.2.a of Appendix R to the extent that 3-hour fire rated pipe penetrations are not provided within the Reactor Building wall contiguous to the penetration rooms.

2.5.2 Discussion

The licensee has stated that the mechanical pipe penetrations in the Reactor Building walls are not fire rated. The Reactor Building walls serve as fire barriers separating redundant trains of cables in the East and West Penetration Rooms. Due to the presence of these unrated penetrations, the Reactor Building walls do not conform with the technical requirements of Section III.G.2.a of Appendix R to 10 CFR 50.

The containment penetration design for pipe containing less than 150°F process fluids consists of a sleeved opening with a steel housing assembly anchored to the Reactor Building wall, with a pipe cap attached to the pipe for containment integrity. Penetrations for higher temperature process piping are similar in design but have insulation between the process pipe and the wall sleeve.

2.5.3 Evaluation

The mechanical pipe penetration design was observed during the plant Appendix R inspection during the week of Janurary 26 - 30, 1987, to be similar to penetration designs used at other facilities. The penetrations have been designed to meet multiple containment intregrity criteria.

The combustible loadings near the penetration are low; therefore, a fire of significant magnitude or duration should not occur proximate to the penetrations. If a fire does occur, it is probable that the substantial construction of the piping penetrations, combined with the large room volumes on either side of the penetrations, will prevent fire propagation through the containment boundary. It is therefore concluded that the existing unrated containment mechanical pipe penetrations provide reasonable assurance that a fire will not propagate through the barrier and are, therefore, an acceptable deviation from the technical requirements of Section III.G.2.a of Appendix R.

2.5.4 Conclusion

Based on the above evaluation, the existing mechanical pipe penetrations in the Reactor Building walls provide a level of fire protection equivalent to the technical requirements of Section III.G.2.a of Appendix R, and provide reasonable assurance that the fire will not propagate through the containment boundaries.

3.0 SUMMARY

These section is provided to consolidate the results of the evaluation contained in Section 2.0 concerning the exemptions requested by the Licensee from the requirements of Section III.G of Appendix R to 10CFR50 for the Oconee Nuclear Station. It is not meant as a substitute for the specific conclusions reached in the various subsections of Section 2.0 to which the reader is referred.

Based on the evaluation and site inspection of the exemptions, the existing fire protection for the following areas provides a level of fire protection equivalent to the technical requirements of Section III.G of Appendix R to the extent discussed; therefore, the following exemptions from the requirements of Section III.G can be granted.

1. Auxilary and Reactor Buildings, Seismic Expansion Joints.

   Use of unrated seismic joints between fire areas containing safety related equipment. See Section 2.1 for additional information.

2. Reactor Buildings, Separation Distance Between Safety Circuits and Non-safety Circuits.

   Lack of 20 foot separation between redundant pressurizer level instruments and the existance of intervening combustibles between redundant systems and equipment. See Section 2.2 for additional information.

3. Pipe Tunnel Access Area

   Use of unrated boundaries between fire areas containing safety related equipment. See Section 2.3 for additional information.

4. East and West Penetration Rooms

   Use of combustible pipe insulation in penetration seals separating fire areas. See Section 2.4 for additional information.

5. Reactor Building Walls

   Unrated containment mechanical penetrations. See Section 2.5 for additional information.

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Also enclosed, for your information, is a copy of the Technical Evaluation Report SAIC-87/3111, written by SAIC.

A copy of the exemption has been forwarded to the Office of the Federal Register for publication.

Sincerely,

Original Signed By:
David B. Matthews
David B. Matthews, Director
Project Directorate II-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Exemption
2. TER

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