TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

October 12, 1983

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of the Application of) Docket Nos. 50-390
Tennessee Valley Authority) 50-391

By your letter dated March 25, 1983 to H. G. Parris, TVA was requested to provide additional information concerning Watts Bar Nuclear Plant compliance with 10 CFR 50, Appendix R. The enclosed information addresses the following NRC concerns:

Concern No. 1 - Color-coded line drawings which demonstrate compliance with section III.G and III.L of Appendix R.

Concern No. 2 - Potential discrepancy between "stated" design and "as built" configuration.

Concern No. 3 - Degree of separation for equipment inside containment.

Concern No. 4 - Cables covered with fire retardent coatings are considered intervening combustibles.

Concern No. 5 - Total area detection and suppression.

If you have any questions concerning this matter, please get in touch with D. P. Ormsby at FTS 858-2682.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

D S Kammer

D. S. Kammer
Nuclear Engineer

Sworn to and subscribed before me
this 12th day of October 1983
Paulette N. White
Notary Public
My Commission Expires 9-5-84

cc: See page 2

B002
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Enclosure
cc: U.S. Nuclear Regulatory Commission (Enclosure)
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

ENCLOSURE
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2

FIRE PROTECTION

NRC CONCERN NO. 1

Provide the information that will best illustrate and verify the means by which the requirements of Section III.G and III.L are satisfied (such as color coded line-drawings or listings of cabling, controls and components associated with the systems needed for hot and cold shutdown that would be affected by fire in each of the designated fire areas, and the available redundant or alternate counterpart.)

TVA RESPONSE

The following sets of color coded line drawings were forwarded directly to the NRC project manager for Watts Bar Nuclear Plant on October 12, 1983.

Figure RCSPC-1 through 12
Figure RCSIC-1 through 10
Figure SGIC-1 through 7
Figure SSPC-1 through 7
Figure PC-1 through 24

(Lists were included with these figures to assist the NRC staff in correlating color coded cables and conduits to their functions.)

NRC CONCERN NO. 2

There is a potential discrepancy between 'stated' design, and the 'as built' configuration.

TVA RESPONSE

TVA will take the following actions regarding potential discrepancies resulting from the use of 'as designed' documentation in the safe shutdown analysis instead of using 'as constructed' documentation.

Inside Containment -- TVA performed an on-site inspection of all required safe shutdown circuits inside containment. This inspection compared the design versus installed configuration of the conduits and junction boxes used to route the cables for the pressurizer heater power circuits and the essential pressurizer/steam generator instrumentation circuits. No significant differences were identified between the 'as designed' and 'as constructed' configurations.

Outside Containment -- Due to the large number of circuits involved with the safe shutdown analysis, TVA will perform an on-site inspection of approximately 10 percent of the required safe shutdown circuits that are routed in conduit. Cables routed in trays will not be included in the inspection because the cable routing program and installation verification procedures ensure that the cables in trays are routed as shown on the design documents. TVA will inspect a randomly selected sample of the safe shutdown circuits that are routed in conduit. If significant deviations are found between the 'as designed' and 'as constructed' configurations of these circuits, a complete on-site inspection will be implemented. TVA will complete the 10 percent inspection by October 15, 1983.

NRC CONCERN NO.3

Provide information that will document the degree of separation provided for redundant safe shutdown equipment located inside containment.

TVA RESPONSE

Color coded drawings, Figure PC-1 through 24, show the routing of redundant safe shutdown circuits and location of major equipment. The following discussion provides information that documents the degree of separation between redundant safe shutdown equipment located inside primary containment.

Exception

Section III.G.2 requires that one of the following fire protection means shall be provided inside noninerted containments:

a. Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of 20 or more feet with no intervening combustibles.

b. Installation of fire detectors and an automatic fire suppression system in the fire area.

c. Separation of cables and equipment and associated non-safety related circuits of redundant trains by a non-combustible radiant energy shield.

Literal compliance with these separation requirements inside primary containment has not been provided.

Justification:

1. Physical Considerations

The only significant fixed combustibles inside primary containment consist of the following:

a. 265 gallons of lube oil for each of four reactor coolant pumps.

b. 8949 cubic feet of polyurethane foam insulation and 7570 pounds of associated rubber seals surrounding the ice beds.

c. 26 cubic feet of cable insulation in four cable trays.

The lube oil in the reactor coolant pumps is the only significant fire source in the vicinity of safe shutdown circuits (see marked drawings Figure PC-4). Redundant fire protection features have been provided to address this concern. The reactor coolant pumps have been provided with an oil collection system which meets the requirements of 10 CFR 50 Appendix R, Section III.O. In addition, a closed head fixed water spray system actuated by fire detectors has been provided for each reactor coolant pump. To improve the response time of these fire protection systems, a heat collection hood has been installed approximately six feet above each pump (see item 38 and Figure 38-5 in Watts Bar Nuclear Plant Fire Protection Submittal dated September 1980 submitted by letter from L. M. Mills to A. Schwencer dated September 9, 1980). It is TVA's opinion that with the redundant fire protection features the lube oil in the reactor coolant pumps is not a threat to safe shutdown capability.

The foam insulation is encased in metal panels and the rubber seals are located in the joints between the panels. The panels surround the ice bed except at the lower inlet doors below the ice bed and at the intermediate deck doors above the ice bed (see Figures IC-1 thru 10) (These figures were forwarded directly to the NRC project manager on October 12, 1983). These doors are hollow metal construction and filled with non-combustible bagged insulation. The panels are separated from the areas of the Reactor Building that contain redundant safe shutdown circuits, except at the lower inlet doors, by reinforced concrete walls that are equivalent to three hour fire rated construction. All of the safe shutdown circuits are routed in conduit and are below the ice bed (see Figures PC-1 thru PC-24). The highly improbable event of a fire in the ice bed foam is not a threat to the redundant safe shutdown circuits.

Sandia Laboratories conducted a series of tests (reference 4) on fire retardant coatings and barriers. In one test a twin propane burner, centered 4.75 inches beneath a cable tray, was turned on for five minutes. If a fully developed cable tray fire was not achieved after applying this

ignition source for five minutes, additional five minute burn cycles were repeated at five minute intervals, up to a maximum of six cycles. In the test involving solid bottom trays containing IEEE-383 qualified cables, no fire developed after six burn cycles. The cable trays inside primary containment (see marked up drawings Figure PC-11 and 23) are solid bottom trays with sheet metal covers and the cables meet the flame-retardant requirements of IEEE-383, 1974. Based on the Sandia tests, it is clear that the insulation on the cables in the cable trays inside primary containment do not constitute a source of combustible materials for a fire and do not pose a threat to the safe shutdown circuits inside primary containment.

Transient combustibles are excluded administratively during power operation. In the event of a breakdown of administrative procedures and transient combustibles were left inside containment from an outage, the high ceilings and large room volumes would dissipate the thermal energy released by a transient combustibles fire. This is based on data from Sandia Labs 20-foot separation tests, Underwriter Labs replication tests, and the fire that occurred in 1975 at Browns Ferry (see TVA response to NRC Concern No. 4), which indicates that high ceilings and large room volumes reduce the thermal environment of a fire. The lower containment area of the Reactor Building, which contains the reactor coolant pumps, has a ceiling height of 51.5 feet, ceiling area of 5600 square feet, and a room volume of 288,000 cubic feet. This room volume is 10 times larger than the largest room used in the Sandia Lab 20-foot separation test and is comparable to the room volume of the area where the fire occurred in 1975 at Browns Ferry. The ceiling height is twice the height of the area where the fire occurred at Browns Ferry and the UL replication test and 2 1/2 times the height of the largest room used in the Sandia Labs 20-foot separation tests.

2. Conclusions

This information is sufficient to show that safe shutdown can be achieved with a fire inside primary containment. TVA requests an exemption from the literal separation requirements of 10 CFR 50, Appendix R, Section III.G.2 for safe shutdown circuits inside noninerted primary containments.

NRC CONCERN NO.4

Cables covered with fire retardant coatings represent intervening combustibles.

TVA RESPONSE

It is TVA's opinion that the Vimasco 2B coated cables do not pose an intervening combustible threat to redundant safe shutdown circuits. TVA requests the following exemption:

Exception

Section III.G.2b requires separation of redundant safe shutdown circuits by horizontal distance of more than 20 feet with no intervening combustibles. The Auxiliary Building has open ladder type cable trays located between redundant circuits that will be separated by 20 or more feet. Insulation on cables in these trays is not considered an intervening combustible.

Background Information

Cable trays between redundant circuits could provide a possible path for fire propagation and the cable insulation may contribute to a fire's thermal plume. However, it is TVA's position that, even with intervening cable trays, safe shutdown capability can be assured by the following features:

a. Separation of redundant circuits by either 20 or more feet spacial separation or enclosing one redundant circuit in a one-hour fire-rated wrap until 20-foot spacial separation is achieved.

b. Detection and automatic fixed suppression systems that provide total coverage in all rooms that contain the redundant circuits. A second level of suppression capability will be provided by a well-trained fire brigade with portable extinguishers and fire hoses.

c. High ceilings, large room volumes, and the coating of all exposed cables in trays with Vimasco 2B to minimize the effects of a fire-generated heat plume.

TVA's position on the adequacy of these features is based on having no significant in-situ fire hazards present except for the cable insulation in the cable trays and small quantities of lube oil in equipment. It is also supported by actual fire data and results of recent fire tests.

During the investigation into the 1975 fire at Browns Ferry Nuclear Plant (reference 1), TVA collected data which showed that large room volumes and high ceilings were sufficient to dissipate the thermal plume from a cable tray fire that involved uncoated cables which were not qualified to IEEE 383, 1974 flame test requirements. It also demonstrated that the damage from a fire of this type will spread very slowly in a large room.

A full-scale replication test conducted by Underwriters Laboratories (UL) (reference 2) demonstrated that an exposure fire located on the floor would have little impact on coated cables located near the ceiling in a large room.

The data from the Sandia Laboratories investigation of 20-foot separation (reference 3) showed that for certain conditions a thermal environment exceeding the temperature or heat flux limitations of the cables located 20-feet from a source fire with a moderate fuel load can be reached. The room size was small compared to most areas of a nuclear plant that contain redundant equipment or circuits. As the room size was increased, the heat flux and temperature decreased. The reduction of the thermal environment observed when the room geometry was increased lends support to our position that high ceilings and large room volumes contribute to produce a lower environmental temperature for a given rate of heat release from a fire.

Finally, full-scale fire propagation tests conducted by Sandia Laboratories (reference 4) provided pertinent data on the effects of cable coatings. The results of these tests indicate that the coated cables used in the Auxiliary Building are unlikely to ignite unless they are located immediately above a severe exposure fire. Considering the fixed combustibles present, such an exposure fire is very improbable.

To summarize the pertinent data from the Browns Ferry fire:

a. The fire occurred in an area which contained a large concentration of cable trays. The cables were not IEEE 383 qualified and were not coated with a flame retardant coating.

b. The fire burned for over seven hours and only propagated approximately 50 feet. This equates to an average rate of propagation of approximately seven feet per hour.

c. The fire occurred in a room with a 26-foot ceiling height, 11,900 square-foot ceiling area, and 309,000 cubic foot room volume.

d. A temperature zone of the fire, determined by physical evidence, extended a maximum distance of 10 feet horizontally from the edge of the burning cable trays. Temperatures outside the zone did not exceed 300°F.

e. Fire detection and automatic suppression systems were not provided in the area at the time of the fire.

To summarize the applicable UL test results:

a. The experimental configuration was constructed to replicate the room configuration, cable trays, conduits, and fire protection features for the same area in the Browns Ferry Reactor Building where the fire in 1975 occurred. This area was selected for the test because of its heavy concentration of cables in a variety of configurations. The fire source for the test was five gallons of heptane.

b. Damage to coated cables in the vertical trays, which were routed from the floor to horizontal trays located near the ceiling, ranged from none to a maximum height of less than 7 feet above the floor.

c. Coated and uncoated cables in the horizontal trays at the ceiling level were undamaged.

d. The fire did not propagate from the vertical trays to the horizontal trays.

e. Cables in vertical conduits located approximately one foot from the vertical trays were undamaged even after being engulfed in the flames of the exposure fire.

f. The ceiling temperature stabilized after two minutes at approximately 200°F.

To summarize the applicable data from the Sandia 20-foot separation tests:

a. The baseline compartment in which the tests were conducted was a room 25 feet long, 14 feet wide, and 10 feet high. Two vertical trays were at one end of the room and two horizontal trays near the ceiling were at the other end of the room. The fire source was 10 gallons of heptane located on the floor directly under the vertical trays.

b. Increasing compartment size had two primary effects on the hot layer temperature. As the compartment dimensions were increased, the wall areas for convective and radiative losses also increased, which caused a reduction in the net heat transfer into the hot layer region. An increase in the size of the compartment caused the hot layer to occupy a larger volume. The increased thermal capacitance of the hot layer in conjunction with the increased thermal losses to the walls produces a lower environmental temperature for a fixed rate of heat release from a fire.

c. From the compartment geometry analysis it was observed that the most severe thermal environment was produced with the baseline (smallest) compartment. As compartment geometry was increased, lower temperature environments and consequently lower temperatures in the simulated cable trays were observed.

d. The largest room in the test had a 20-foot ceiling and a room volume of 28,000 cubic feet. The maximum temperature recorded in the target trays in this room was 250°F and the hot layer temperature was 280°F.

To summarize the pertinent data from the Sandia Lab report on cable coatings and fire barriers:

a. The report describes the results of a series of tests on fire retardant coatings and provides a basis for measuring the effectiveness of coatings in preventing initiation or propagation of fires.

b. Two cable trays were placed horizontally with one tray 10.5 inches above the other. A twin propane burner was placed 4.75 inches below the bottom tray in one test. A 3-foot by 1.5-foot pan with two gallons of no. 2 diesel fuel was placed 4.75 inches below the bottom tray in another test.

c. The results showed that all coatings and barriers offer a measure of additional protection.

d. No propagation to the second tray was observed in any of the two tray tests where IEEE-383 qualified cables were used.

It is TVA's position that this data can be extrapolated to certain areas in Watts Bar Nuclear Plant and will address the major concerns created by intervening cable trays:

a. The potential fire propagation path between redundant shutdown circuits is reduced by the addition of Vimasco 2B to the cables in trays in the Auxiliary Building.

b. The contribution of the cable insulation to a fire's heat plume is minimized by large room volume, high ceilings, and Vimasco 2B coating on the cables.

In addition to these features, the total protection package also includes the following:

a. Fixed suppresion systems actuated automatically by fire detection systems.

b. An NFPA class II standpipe system.

c. Portable extinguishers.

In the following sections the specific situations that exist at Watts Bar Nuclear Plant are correlated to the information in this section. This will provide sufficient justification for granting exemptions to those items listed in Table I.

Justification

1. Safe Shutdown Equipment and Cables

Table 1 and the referenced drawings document the location and function of redundant circuits and equipment required for safe shutdown and the intervening combustibles included within the scope of this exemption request.

The following information is provided in Table I:

a. Item Number -- A sequential number used for reference purposes.

b. Shutdown Logic Diagram Key Number -- A number corresponding to a keyed note on the shutdown logic diagram (Figure 1-1 of Watts Bar Nuclear Plant Fire Protection Submittal dated September 1980)

c. System -- The system being utilized for safe shutdown.

d. Equipment -- The equipment required for utilization of the identified system.

e. Cables -- The cables required for operation of the identified equipment.

f. Color Coded Separation Drawing Number(s) -- The drawing number(s) which shows the equipment location, routing of identified cables, and configuration of the cable trays which consititute intervening combustibles.

g. A solid black line is used to separate blocks of information associated with a required function. Within these blocks, required equipment and cables are separated from their redundant counterparts by dashed lines.

2. Physical Considerations

a. Item 1 -- The walls around room 757.0-A10 are reinforced concrete equivalent to at least 1 1/2-hour fire rated construction (see Figure 1-5 of Watts Bar Fire Protection Submittal dated September 1980). Room 757.0-A10 has a ceiling of 25-feet, a ceiling area of 2600 square feet, and a volume of 65,000 cubic feet. This room volume is over twice as large as the largest test room used in the Sandia Labs 20-foot separation tests. The combustible loading for this area is 27,000 Btu/ft^2, and is due to the insulation on the cables. The cables in the trays are coated with Vimasco 2B and the entire room is protected by a pre-action suppression system actuated by cross-zoned ionization smoke detectors. The distance between the redundant circuits is 23 feet. Only one tray spans the space between the redundant circuits (see Figure RCSPC-7 for routing of redundant circuits and configuration of intervening cable trays). The room is provided with a class II standpipe and hose system designed in accordance with NFPA 14 and portable extinguishers installed in accordance with NFPA 10.

b. Item 2 -- The walls around room 737.0-A10 are reinforced concrete equivalent to at least 1 1/2-hour fire rated construction (see Figure 1-4 of Watts Bar Fire Protection Submittal dated September 1980). Room 757.0-A10 has a ceiling height of 19-feet, a ceiling area of 22,200 square ft, and a volume of 422,000 cubic feet . This room is 15 times larger than the largest test room used in the Sandia Lab 20-foot separation tests and over one-third larger than the area of the Browns Ferry Reactor Building where the fire occurred in 1975. See Figure SGIC-2 for routing of redundant circuits, configuration of intervening cable trays, and location of equipment that contains lube oil. The combustible loading for this room is 46,900 Btu/ft^2 and is due to the lube oil in the various water chillers (1200 Btu/ft^2) and the insulation on the cables (45,700 Btu/ft^2). The cables are coated with Vimasco 2B and the entire room is protected with a pre-action suppression system actuated by cross-zoned ionization smoke detectors. The distance between the redundant circuits is 32 feet. The room is also provided with a class II standpipe and hose system designed in accordance with NFPA 14 and portable extinguishers installed in accordance with NFPA 10.

c. Item 3 -- The walls around rooms 692.0-A1 and 713.0-A1 are reinforced concrete equivalent to at least 1 1/2 hour fire-rated construction (see Figures 1-2 and 1-3 of Watts Bar Fire Protection Submittal date September 1980). Room 692.0-A1 has a ceiling height of 20 feet, a ceiling area of 11,700 square feet and a room volume of 234,000 cubic feet. Room 713.0-A1 has a ceiling height of 23 feet, a ceiling area of 17,000 square feet , and a room volume of 391,000 cubic feet These room volumes are approximately 8 and 14 times larger than the largest test room used in the Sandia Labs 20-foot separation tests and are comparable in size to the room in which the 1975 fire occurred at Browns Ferry. See Figure RCSIC-1, 2 for routing of redundant circuits, configuration of intervening cable trays, and location of equipment containing lube oil. The combustible loading for room 692.0-A1 is 13,000 Btu/ft^2. The insulation on the cables is the only fixed combustible in room 692.0-A1 and the cables in the trays are coated with Vimasco 2B. The fixed combustibles in room 713.0-A1 consist of 66 gallons of lube oil in the two auxiliary feedwater pumps and the four component cooling water pumps, and the insulation on the cables. The lube oil contribution to the fuel loading is approximately 300 Btu/ft^2 and the insulation on the cables is 18,600 Btu/ft^2. The cables in the trays are coated with Vimasco 2B. Both rooms are protected with pre-action suppression systems actuated by cross-zoned ionization smoke detectors. The distance between the redundant circuits is 28 feet in room 692.0-A1 and 21 feet in room 713.0-A1. The positive displacement charging pump and room cooler circuits are in conduit in both rooms. Both rooms are also provided with class II standpipe and hose systems designed in accordance with NFPA 14 and portable extinguishers installed in accordance with NFPA 10.

d. Item 4 -- The walls around room 737.0-A1 are reinforced concrete equivalent to at least 1 1/2-hour fire rated construction (see Figure 1-4 of Watts Bar Fire Protection Submittal dated September 1980). Room 737.0-A1 has a ceiling height of 19-feet, a ceiling area of 22,200 square feet, and a volume of 422,000 square feet. This room is 15 times larger than the largest test room used in the Sandia Lab 20-foot seperation tests and over one third larger than the area of the Browns Ferry Reactor Building where the 1975 fire occurred. The fixed combustibles in this room consist of 224 gallons of lube oil in 14 water and ventilation chiller units and the insulation on the cables.

See Figure RCSIC-5 for routing of redundant circuits, configuration of intervening cable trays, and location of equipment containing lube oil. The combustible loading is 46,900 Btu/ft^2 of which 1200 Btu/ft^2 is from the lube oil and 45,700 Btu/ft^2 is from the insulation. The cables in the trays are coated with Vimasco 2B and the room is protected with a pre-action suppression system actuated by cross-zoned ionization detectors. The distance between the redundant circuits is 24 feet. The room is also provided with a class II standpipe and hose system designed in accordance with NFPA 14 and portable extinguishers installed in accordance with NFPA 10.

3. Conclusions

The ceiling height, ceiling area, and room volume of the rooms where redundant circuits are separated by 20 or more feet are listed below:

Room Number	Ceiling Height (ft)	Ceiling Area (ft^2)	Room Volume (ft^3)
692.0-A1	20	11,700	234,000
713.0-A1	23	17,000	391,000
737.0-A1	19	22,200	422,000
757.0-A10	25	2,600	65,000

The smallest of these rooms contains more than twice the volume as the largest room used in the Sandia 20-foot separation tests and has a higher ceiling. The other room volumes are comparable to the volume of the room at Browns Ferry where the fire occurred in 1975.

The results of both series of Sandia Lab fire retardant coatings tests indicate that the coated cables used in the Auxiliary Building at Watts Bar are unlikely to ignite unless they are located immediately above a severe exposure fire. Such an exposure fire is not likely due to the low fixed combustibles and the administrative control of transient combustibles.

Therefore, the intervening combustibles at Watts Bar do not pose a threat to safe shutdown capability and the previously described combination of passive and active fire protection features provide a level of protection that is equivalent to the requirements of 10 CFR 50, Appendix R, Section III.G. The information presented provides sufficient justification for granting an exemption for those items listed in Table I.

NRC CONCERN NO.5

Provide information that will identify locations containing redundant safe shutdown equipment that are not provided with total area detection and suppression systems.

TVA RESPONSE

The following information identifies the elevations of the Watts Bar Auxiliary Building containing redundant safe shutdown equipment that are not provided with total area detection and suppression systems and presents justification for not providing total area detection and suppression.

Exception

Section III.G.2 requires that fire detectors and automatic fire suppression systems be provided in areas containing redundant safe shutdown equipment that are separated by less than 3-hour fire-rated construction. The following rooms on elevation 692.0 (see Figure 1-2 in Watts Bar Nuclear Plant Fire Protection Submittal dated September 1980) do not have detection and suppression systems. They are adjacent to rooms containing redundant equipment and are separated from the adjacent rooms by nonrated construction.

Room Number	Name
676.0-A2	Hold-Up Tank Room A
676.0-A3	Hold-Up Tank Room B
692.0-A2	Valve Gallery
692.0-A3	Gas Decay Tank Room
692.0-A5	Gas Decay Tank Rooom
692.0-A27	Concentrate Filters
692.0-A29	Gas stripper and Boric Acid Evaporator Package Room B
692.0-A30	Gas stripper and Boric Acid Evaporator Package room A
692.0-A31	Spare

Justification

The above-referenced rooms are separated from the control building by 3-hour fire-rated construction and from the rest of the Auxiliary Building elevation 692.0 by reinforced concrete or reinforced masonry block walls which are equivalent to at least a 1 1/2-hour barrier. However, penetrations through the walls of the rooms have not been provided with fire-rated doors, dampers, seals, etc. The rooms contain only non-safety related tanks or equipment. There are no appreciable amounts of in-situ combustibles present. The combustible loading of these rooms is less than 1000 Btu/ft^2 and presents no exposure fire hazard to safety related equipment or circuits in the adjacent rooms.

The rooms of the Auxiliary Building adjacent to the above referenced rooms are protected by a pre-action suppression system actuated by cross-zoned ionization smoke detectors and the combustible loading in these rooms is only 13,000 Btu/ft^2. The cables in the cable trays are coated with Vimasco 2B, a flame retardant coating. Class II standpipe and hose systems designed in accordance with NFPA 14 and portable extinguishers installed in accordance with NFPA 10 are also provided.

Considering the low combustible loading and provision of enclosures for the rooms in question, the contents of the rooms do not pose a significant exposure fire hazard to safe shutdown cables or equipment in the Auxiliary Building and the addition of fire detectors and automatic suppression systems in these rooms would not significantly increase the level of fire protection of elevation 692.0 in the Auxiliary Building. Therefore, TVA requests an exemption from the total area coverage requirement of Section III.G.2 of 10 CFR 50, Appendix R.

Exception

Section III.G.2 requires that fire detectors and automatic fire suppression systems be provided in areas containing redundant safe shutdown equipment that are separated by less than 3-hour fire-rated construction. The following rooms on elevation 713.0 (see Figure 1-3 in Watts Bar Nuclear Plant Fire Protection Submittal dated September 1980) do not have detection and suppression systems. They are adjacent to rooms containing redundant equipment and are separated from the adjacent rooms by nonrated construction.

Room Number	Name
713.0-A9, A18	Valve Gallery and Seal Water Filters, Reactor Coolant Filters, Cation Demineralizers, and Mixed Bed Demineralizers
713.0-A10, A17	Seal Water Heat Exchangers

	1A, 2A
713.0-A11, A12, A15, A16	Heat Exchangers 1B, 1A, 2A, 2B
713.0-A23	Valve Gallery and Boric Acid Tanks and Ion Exchangers and Filters, Spent Fuel Pit Demineralizers and Filters, Evaporator Condensate Demineralizers and Filters
713.0-A24, A25, A26	Waste Gas Compressors and Valve Gallery

Justification

The above-referenced rooms are separated from the Control Building by 3-hour fire-rated construction and from the rest of the Auxiliary Building elevation 713.0 by reinforced concrete or reinforced masonry block walls which are equivalent to at least a 1 1/2-hour barrier. However, penetrations through the walls of the rooms have not been provided with fire-rated doors, dampers, seals, etc. The rooms contain non-safety related equipment. There are no appreciable amounts of in-situ combustibles present in the rooms. The combustible loading of these rooms is less than 1000 Btu/ft^2 and present no exposure fire hazard to safe shutdown equipment or circuits in adjacent rooms.

The rooms of the Auxiliary Building adjacent to the above-referenced rooms are protected by a pre-action suppression system actuated by cross-zoned ionization smoke detectors and the combustible loading in these rooms is only 18,600 Btu/ft^2. The cables in the cable trays are coated with Vimasco 2B, a flame retardant coating. Class II standpipe and hose systems designed in accordance with NFPA 14 and portable extinguishers installed in accordance with NFPA 10 are also provided.

Considering the low combustible loading and provision of enclosures for the rooms in question, the contents of the rooms do not pose a significant exposure fire hazard to safe shutdown cables or equipment in the Auxiliary Building and the addition of fire detectors and automatic suppression systems in these rooms would not significantly increase the level of fire protection of elevation 713.0 in the Auxiliary Building. Therefore, TVA requests an exemption from the total area coverage requirement of Section III.G.2 of 10CFR50, Appendix R.

Exception

Section III.G.2 requires that fire detectors and automatic fire suppression systems be provided in areas containing redundant safe shutdown equipment that are separated by less than 3-hour fire-rated construction. The following rooms on elevation 737.0 (see Figure 1-4 in Watts Bar Nuclear Plant Fire Protection Submittal dated September 1980) do not have detection and suppression systems. They are adjacent to rooms containing redundant equipment and are separated from the adjacent rooms by nonrated construction.

Room Number	Name
713.0-A11, A12, A15, A16	Heat Exchangers 1B, 1A, 2A, 2B
737.0-A7, A8	Let Down Heat Exchangers

Justification

The above-referenced rooms are separated from the Control Building by 3-hour fire-rated construction and from the rest of the Auxiliary Building elevation 737.0 by reinforced concrete or reinforced masonry block walls which are equivalent to at least 1 1/2-hour barrier. However, penetrations through the walls of the rooms have not been provided with fire-rated doors, dampers, seals, etc. The rooms contain only non-safety related equipment. There are no appreciable amounts of in-situ combustibles present in the rooms. The combustible loading of these rooms is less than 1000 Btu/ft^2 and present no exposure fire hazard to safe shutdown equipment or circuits in adjacent rooms.

The rooms of the Auxiliary Building adjacent to the above-referenced rooms are protected by a pre-action suppression system actuated by cross-zoned ionization smoke detectors and the combustible loading in these rooms is 41,330 Btu/ft^2. The cables in the cable trays are coated with Vimasco 2B, a flame retardant coating. Class II standpipe and hose systems designed in accordance with NFPA 14 and portable extinguishers installed in accordance with NFPA 10 are also provided.

Considering the low combustible loading and provision of enclosures for the rooms in question, the contents of the rooms do not pose a significant exposure fire hazard to safe shutdown cables or equipment in the Auxiliary Building and the addition of fire detectors and automatic suppression systems in these rooms would not significantly increase the level of fire protection of elevation 737.0 in the Auxiliary Building. Therefore, TVA requests an exemption from the total area coverage requirement of Section III.G.2 of 10CFR50, Appendix R.

Exception

Section III.G.2 requires that fire detectors and automatic fire suppression systems be provided in areas containing redundant safe shutdown equipment that are separated by less than 3-hour fire-rated construction. Rooms 772.0-A2 and 772.0-A15 (see Figure 1-6 in Watts Bar Nuclear Plant Fire Protection Submittal dated September 1980) contain redundant vital battery inverters and chargers and the Train B reactor vent and MOV boards for units 1 and 2 respectively. The areas between column lines A6-A8/Q-R and A8-A10/Q-R are not covered by a sprinkler system.

Justification

Rooms 772.0-A2 and 772.0-A15 are separated from each other and other areas of the Auxiliary Building elevation 772.0 by reinforced concrete walls which are equivalent to at least a 1 1/2-hour barrier. This is an adequate level of separation considering the combustible loading of the two rooms as shown below.

Room Number	Combustible Material	Quantity of Combustible (ft^3)	Fire Load (Btu/ft^2)
772.0-A2 (total fire area)	Insulation	80.5	34,600
772.0-A15 (total fire area)	Insulation	91.2	39,200
A6-A8/Q-R (portion of fire area containing inverter/charger II)	Insulation	2.66	1,145
A8-A10/Q-R (portion of fire area containing inverter/charger III)	Insulation	2.66	1,145

Note: Combustible load computed using 85 lbs/ft^3 and 14,000 Btu/lb.

The only in-situ combustible located in the inverter/charger area is the insulation on the cables in one vertical cable tray located at column lines A8-R in each room. A pre-action suppression system actuated by cross-zoned ionization smoke detectors covers the remainder of each room. The smoke detection system also extends back into the inverter/charger areas. The cables in the cable trays are coated with Vimasco 2B. Class II standpipe and hose systems designed in accordance with NFPA 14 and portable extinguishers installed in accordance with NFPA 10 are also provided in the rooms.

The addition of sprinklers in the inverter/charger II and III areas would not significantly increase the fire protection capability in these areas. Therefore, TVA requests an exemption from the total area coverage requirement of Section III.G.2 of 10 CFR 50 Appendix R.

References

1. Tennessee Valley Authority, Fire at Browns Ferry Nuclear Plant, March 22, 1975, Final Report of Preliminary Investigating Committee -- May 7, 1975.

2. L. J. Przyzbyla, Replication Experiments for Fire Protection Systems, Experiment 1, July 17, 1981. (Draft report)

3. D. D. Cline, W. A. VonRiesemann, J. M. Chavez, Investigation of Twenty-Foot Separation Distance as a Fire Protection Method as specified in 10CFR50, Appendix R, June 1983 (Draft report).

4. L. J. Klamerus, A Preliminary Report on Fire Protection Research Program Fire Barriers and Fire Research Retardant Coatings Tests, September 1978.

TABLE I

SAFE SHUTDOWN EQUIPMENT AND CABLES

Item	Shutdown Logic Diagram Key No.	System	Equipment	Cables	Color Coded Separation Drawing
1	28	Pressurizer Heaters	Backup Group 1A-A Power Cables	1PL4627A thru 1PL4633A	Figure RCSPC-7
			Backup Group 1B-B Power Cables	1PL4677B thru 1PL4683B	
2	11,14,15	Auxiliary Feedwater	Turbine Driven Pump A Control	1SG220A, 1SG240A	Figure SGIC-2
			Turbine Driven Pump B Control	1SG221B, 1SG241B	
3	1,3,18	Charging Pumps	Positive Displacement Pump and Room Cooler	1PL5025, 1PL5026 1PL3021, 1PL3023	Figure RCSIC -1, 2
			Centrifugal Pump A, Lube Oil Pump, and Room cooler	1PP550A, 1PP552A 1PL3001A, 1PL6145A 1PL6149A	
4	1,3	Essential Raw Cooling Water	ERCW Pump A	1PP675A, 1PP687A	Figure RCSIC-5
			ERCW Pump B	1PP700B, 1PP712B	