TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

August 28, 1981

RECEIVED
SEP 09 1981
U.S. NUCLEAR REGULATORY COMMISSION

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

Dear Ms. Adensam:

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

Enclosed for NRC review are TVA's responses to NRC concerns resulting from the NRC Fire Protection Review conducted at the Watts Bar Nuclear Plant on July 20-24, 1981. It is our understanding that these concerns will be discussed at the fire protection meeting scheduled for September 2, 1981 in Bethesda, Maryland.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Regulation and Safety

Sworn to and subscribed before me
this 28th day of August 1981

Bryant M. Lowery
Notary Public
My Commission Expires 4/4/82

Enclosure

B002
S 1/1

8109100315 810828
PDR ADOCK 05000390
F PDR

ENCLOSURE
WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
RESPONSES TO NRC FIRE PROTECTION SITE VISIT CONCERNS

Item No. 1

Askarel insulated transformers are located in various areas of the plant without being located in a separate cut-off room. Also, in the immediate area of these transformers are various redundant safety-related cable trays and/or conduit. We are concerned that an explosion of the Askarel transformer would damage these cable trays and conduits necessary for safe shutdown. It is our position that one of the redundant trains be relocated to outside the zone of influence should an explosion develop at a transformer. The following locations contain these transformers:

1. ERCW intake structure, elevation 711'
2. Auxiliary building, elevation 692' east and west ends
3. Auxiliary building, elevation 772', room A-10, mechanical equipment room
4. Auxiliary building, elevation 737' coordinates r and A3

We are concerned that a single exposure fire hazard may affect redundant shutdown systems necessary to achieve safe cold shutdown.

TVA Response

A review of industry experiences and discussions with the transformer manufacturer have indicated no incidents of violent explosions of askarel-filled transformers. TVA has had no case histories of a violent explosive failure of this type of transformer.

TVA has had two askarel-filled transformers fail where the heat was sufficient to melt the connection from the bushing to the low voltage (480-volt) winding, immersed in askarel, with no adverse effects. The melted connections were replaced and the transformers returned to service.

Askarel is nonflammable and will not produce secondary explosions which are responsible for much of the damage associated with a transformer explosion.

TVA has provided various safety features (i.e., curbs, sprinklers, detection) for the transformer installations. These installations are adequate based on the performance history of askarel-filled transformers.

Item No. 2

In accordance with section 9.5.1, Branch Technical Position ASB 9.5 -1, position c.4.a(1) of NRC Standard Review Plan and section III.G of new Appendix R to 10 CPR Part 50, it is the staff's position that cabeling, equipment, and/or conduit be separated from its redundant division by one of the following means:

1. Bywalls, floors, and ceilings having a 3-hour fire rating.
2. Alternate method of shutdown for the area.
3. One-hour fire rated barrier (capable of maintaining circuit integrity for 1 hour) for cable trays and/or conduit on one division that are within 20 feet of each other.

In addition, an automatic suppression system is required for number 3 and may be required for number 2.

The following areas were identified, as a result of the site visit, as areas containing redundant interactions. Provide documentation that these interactions were analyzed in the fire protection interaction analysis.

A. Auxiliary Building - elevation 737 feet:
   1. East and west ends of building
   2. A3 and U

B. Auxiliary Building - elevation 692 feet:
   1. Outside steam-driven auxiliary feedwater pumproom at local control panel

C. Auxiliary Building - elevation 713 feet:
   1. At the east end of building

D. Reactor Building - all elevation in the annulus area

E. Auxiliary Building - elevation 757 feet:
   1. Room A-5, 480V shutdown board 1B, coordinates A2, A3, and 9
   2. Room A-4, in northwest corner
   3. Throughout room A-2, and 6.9kV and 480V shutdown board, room A

F. Auxiliary Building - elevation 772 feet:
   1. Room A-10, mechanical equipment room
   2. Room A-2, 480V board room 1B along the north wall, coordinate S.

TVA Response

TVA has provided a previous response to NRC question 1 in the Watts Bar fire protection submittal of September 1980 to the NRC for the corrective actions dealing with cable rerouting and fire barriers for those circuits required for safe plant shutdown in the event of fire.

The Watts Bar fire protection interaction analysis has employed the same separation requirements as those imposed upon Sequoyah Nuclear Plant by the NRC staff. These requirements are as follows:

1. Relocate one or both division of circuits required to achieve and maintain safe plant shutdown, in the event of fire, to maintain a minimum of 20 feet separation between divisions, or

2. Provide a 1/2-hour rated barrier such as 1 inch of mineral wool separating one safety-related train from the other or from a common exposure fire, and

3. Provide area automatic sprinkler systems for protection against exposure fire at the interactions.

The September 1980 response to NRC question 1 identifies circuits and areas where the above modifications are to be implemented.

Implementation of these modifications will provide literal compliance with the staff's above stated position; i.e., section 9.5.1 of BTP 9.5-1, position c.4.a (1) of the NRC Standard Review Plan, and section III.G of Appendix R to 10 CFR Part 50 with the exception that 1/2-hour fire rated barriers for Cable trays or conduit within 20 feet of each other are provided in lieu of 1-hour fire rated barriers.

TVA believes the 1/2-hour fire rated barrier separation to be adequate protection for those identified circuits not separated by 20 feet. The 1/2-hour circuit protection provides more than ample response time for the plant fire brigade to respond, control and/or extinguish a fire in any area of the plant assuming the installed automatic suppression systems fail to operate as designed. Each operating TVA nuclear plant develops fire emergency prefire plans and conducts regular unannounced fire drills to verify the effectiveness of the plans.

Similar plans will be developed and drills conducted for Watts Bar.

Modifications required to upgrade the circuit fire separation from 1/2-hour to 1 hour are unwarranted and will not significantly improve the overall fire safety of the plant.

A. Auxiliary Building, Elevation 737 Feet

1. The train B diesel generator conduit duct bank and both trains of the ERCW conduit duct banks pass through the area near the east wall of the auxiliary building from the elevation 713 feet below. TVA has identified this interaction area in figures 10-5 and 10-6 of the September 1980 Watts Bar fire protection response. TVA has previously analyzed and addressed the ERCW circuit protection requirements and will provide protection as is stated in Table 1.4 of the September response.

   The train A diesel generator conduit duct bank passes through the area of the west wall of the building above elevation 737 feet. No other redundant safety circuits required for plant shutdown in the event of fire passthrough in this area. All interactions in this area have been evaluated and determined to be acceptable divisional interactions, not required for the safe shutdown of the plant in the event of fire.

2. TVA has identified this interaction area in Figure 0-5 of the September 1980 Watts Bar fire protection submittal. TVA has analyzed the interactions in this area and determined that none of the redundant safety-related circuits required for safe plant shutdown in event of fire are routed within this area.

B. Auxiliary Building Elevation 692'

1. Local Control Panel L-381 is completed compartmentized with sheet metal barriers providing isolation between train A and train B circuitry of the turbine driven auxiliary feedwater pump system. Separate conduit entries have been provided for external interconnecting cabling isolation.

   Although A postulated exposure fire could affect the functions of this panel, all functions of panel L-381 are confined to the turbine driven auxiliary feedwater pump system.

   As previously stated in the TVA analysis of the steam generator inventory control requirements as submitted in the Watts Bar fire protection submittal of September 1980, no single postulated fire could affect the train A and train B functions of both the motor driven or the turbine driven auxiliary feedwater systems.

C. Auxliary Building Elevation 713'

1. The train B diesel generator conduit duct bank and both trains of the ERCW conduit duct banks penetrate the east wall of the auxiliary building above elevation 713.0. All train cabling routed to these external structures are contained within these conduits.

   TVA has previously analyzed and addressed the ERCW pump and strainer circuit protection requirement and will provide protection as is stated in the Watts Bar protection submittal of September 1980, table 1.4. All other interactions in this area have been evaluated and determined as acceptable interactions not required for safe shutdown. All exposed cabling in this area is, or will be, coated with fire retardant mastic material. This area is also protected by an extensive ionizations smoke detection system, and a fixed preaction water sprinkler system.

D. Reactor Building, All Elevations in the Annulus Area

All exposed cabling within the reactor building annulus will be coated with a fire retardant mastic material. In addtion, smoke detection systems and automatic preaction water sprinkler systems have been provided for all areas containing divisional interactions.

The annulus area is not normally occupied during plant operation and access to the area is strictly controlled. No equipment requiring the introduction of significant combustibles during maintenance operations is located within the annulus. The area is extremely confined which further precludes the unauthorized transportation or storage of any significant quantity of combustible materials.

Based on the above stated provisions, the strict administrative controls, and the configuration of the area, TVA has concluded that adequate measures have been taken to preclude the possibility of damage to more than one division of equipment or circuits required for safe plant shutdown in the event of fire in the annulus.

E. Auxiliary Building, Elevation 757'

Division interactions within rooms A-5, A-4, and A-2 of the auxiliary building are identified on figures 10-8 and 10-9 of the Watts Bar fire protection submittal of September 1980. No redundant circuits essential to safe shutdown in the event of fire are routed through these plant areas. All divisional interactions within these rooms have been evaluated and determined to be acceptable and not required for safe shutdown of the plant in the event of fire as determined by the shutdown logic diagram.

F. Auxiliary Building, Elevation 772'

Divisional interactions within the Mechanical Equipment Room A-10, and Reactor Vent and MOV Board room, A-2 are identified on figures 10-11 and 10-12 of the Watts Bar Fire Protection submittal of September 1980. No redundant circuits essential to safe shutdown in the event of fire are routed through these plant areas. All divisional interactions within these rooms have been evaluated and determined to be acceptable and not required for safe plant shutdown in the event of fire as determined by the shutdown logic diagram.

Item No. 3

Due to the criticality of the control room to operations and safe shutdown, utmost precautions should be taken to prevent a fire incident which would cause either simultaneous damages to redundant division or evacuation due to heat and smoke. The provision of alternate shutdown means for the control room lessens the criticality but not sufficiently to justify the introduction of combustibles into the room. It is our position that to meet Section D.1d of Appendix A to BTP 9.5-1 that all interior finishes (dropped ceilings and carpeting) be noncombustible or listed by a nationally recognized testing laboratory, such as Factory Mutual or Underwriters Laboratory, Incorporated for flamespread, smoke, and fuel of 25 or less in its use configuration ASTM E-84, 'Surface Burning Characteristics of Building Materials.'

TVA Response

TVA has agreed to replace the dropped ceiling panels in the main control room 755.0-C12, with a UL listed material meeting the requirements of BTP ASB 9.5-1 for noncombustibility. (Refer to L. M. Mills letter to A. Schwencer dated April 30, 1981.)

The nonapproved luminous ceiling panels will be replaced with a system consisting of a combination of noncombustible aluminum parabolic louver panels and UL-listed vinyl dust covers. The dust covers will be secured to the top of the louver panels using mechanical fasteners, the louver panels will, in turn, be secured to the existing suspension system with mechanical fasteners that secure from below the ceiling.

The dust cover is constructed of high-impact vinyl formed into a single translucent sheet 0.015-inch thick (type B15) with a NFPA Class 'A' rating for interior finish material. The panel is manufactured by Piolite Plastic Company, Gloucester, Massachusetts. The panel has been tested in accordance with the American Society of Testing and Materials Standard Method Test (ASTM) E84-50T, and found to exhibit the following:

1. Flame spread classification of 15.

2. Smoke density classification of 101-200.

3. Fuel contribution was not determinable.

This information is contained in two test reports dated January 4, 1957, prepared by Underwriters Laboratory (UL) on UL Card No. R3818A.

The aluminum parabolic louvers, Paralume 1 (manufactured by Norton Industries, Cleveland, Ohio), and the existing suspension system are both noncombustible.

There is no safety related equipment or cabling located above the suspended ceiling, and ductwork insulation has a UL flame spread rating of less than 25.

It is TVA's position that the proposed ceiling configuration fully complies with the requirements of Section D.1d of Appendix A to BTP 9.5-1 based on

the definition of noncombustible materials as given in section 4 of BTP ASB 9.5-1, revision 1. The ceiling configuration structural base and supports are noncombustible and the vinyl dust covers are less than 1/16-inch thick with a flame spread rating less than 50.

The proposed MCR ceiling system is essentially the same as that for Sequoyah Nuclear Plant which has been reviewed and approved by the NRC. The ceiling system for Watts Bar Nuclear Plant will be installed before unit 1 fuel loading.

TVA shall install carpeting in the main control room at the Watts Bar Nuclear Plant. The carpet shall be tested in accordance with the American Society of Testing and Materials Standard Method of Test E 84-76a, 'Surface Burning Characteristics of Building Materials,' and will exhibit the following:

1. Flame spread classification of 25.

2. Fuel contribution classification of 30.

3. Smoke density classification of 130.

In addition, the carpet will be 'A Class' rating as specified by the National Fire Protection Association No. 101, 'Life Safety Code,' Section 6-2114.

Carpeting with these qualifications has been installed, reviewed and approved by the NRC at Sequoyah Nuclear Plant. This carpeting for the Watts Bar Nuclear Plant will be installed before unit 1 fuel loading.

Item No. 4

Hose stations are provided for the lower levels of the intake pumping station; however, these hose stations cannot reach the upper elevations. It is our position that to meet the guideline at Section E, 3, d of Appendix A to BTP 9.5-1 that the present standpipe be extended and additional interior manual hose station be provided such that all areas are protected by at least one hose station. Standpipes with hose connections should be equipped with a maximum of 100 ft. of 1-1/2 in. woven jacket-lined fire hose and suitable nozzles. The system should meet the guidelines of NFPA 14, 'Standpipe and Hose Systems' for sizing, spacing and pipe supports.

TVA Response

Additional manual hose stations will be provided at the upper elevation of the intake pump station. The hose stations will be located in accordance with NFPA 14 so as to be readily accessible to ensure full hose coverage of all areas with no more than 100 feet of 1-1/2 inch fire hose. This installation shall be complete before fuel loading for unit 1.

Item No. 5

On elevation 742' of the Diesel Generator Building on the east wall of the CO_2 storage tank room, a large duct pierces the wall near the ceiling into the unit 1A-A emergency diesel generator. This is a 3-hour fire-rated wall. It is our position to meet the guidelines of Section D, I, J of Appendix A to BTP 9.5-1 that a 3-hour fire-rated damper be installed, according to NFPA 80 'Fire Doors and Windows' to properly protect the opening.

TVA Response

TVA Design provides for a fire damper in the duct penetrating the wall between the CO_2 storage tank room and the diesel generator exhaust intake room 1A-A in the diesel generator building (see TVA drawing 17W910-1). Due to inaccessability of the damper, the NRC staff review team was not able to determine that the damper is installed. TVA personnel have since verified the damper is in fact installed in accordance with the above referenced TVA drawing.

Item No. 6

At present, 1-1/2 hour fixed emergency seal beam lighting is provided incorporating smaller capacity bulbs such that approximately 8 hour duration is provided. We find this arrangement unacceptable since the distance of light in a given area is also reduced. It is our position to meet the guideline of Section D.5 of Appendix A to BTP 9.5-1, that fixed emergency sealed beam units with individual 8 hour minimum battery power supplies be provided in areas that must be manned for safe shutdown and for access and egress routes to and from all fire areas. Safe shutdown areas include those required to be manned if the control room must be evacuated.

TVA Response

The fixed self-contained emergency lighting units purchased for Watts Bar Nuclear Plant have a nameplate indicating a rating of 1-1/2 hours when supplying four 25-watt PAR-36 lamps. Each unit is also capable of supplying one 25-watt PAR-36 lamp for 8 hours. The units installed at Watts Bar utilize two 10-watt PAR-36 halogen cycle lamps which allow the batteries to be upgraded to 8-hour capacity. A comparison of the 150 foot candle distribution curve for the 10-watt lamp (see General Electric curve 381-A-1487, figure 6-1) with the distribution curve of the standard 25-watt lamp (see General Electric curve 381-A-1208, figure 6-2) indicates that the two 10-watt lamps produce approximately the same illumination level as two of the 25-watt lamps.

The emergency lighting system at Watts Bar Nuclear Plant is essentially the same as that for Sequoyah Nuclear Plant. A recent SNP Special Test No. 7, 'Simulated Loss of All Onsite and Offsite AC Power' (L. M. Mills letter to Ms. Adensen dated June 5, 1981) was conducted for the purpose of verifying that critical plant operation can be performed using emergency lighting. The results of the test were satisfactory.

It is TVA's position that the emergency lighting system is adequate for the intended service.

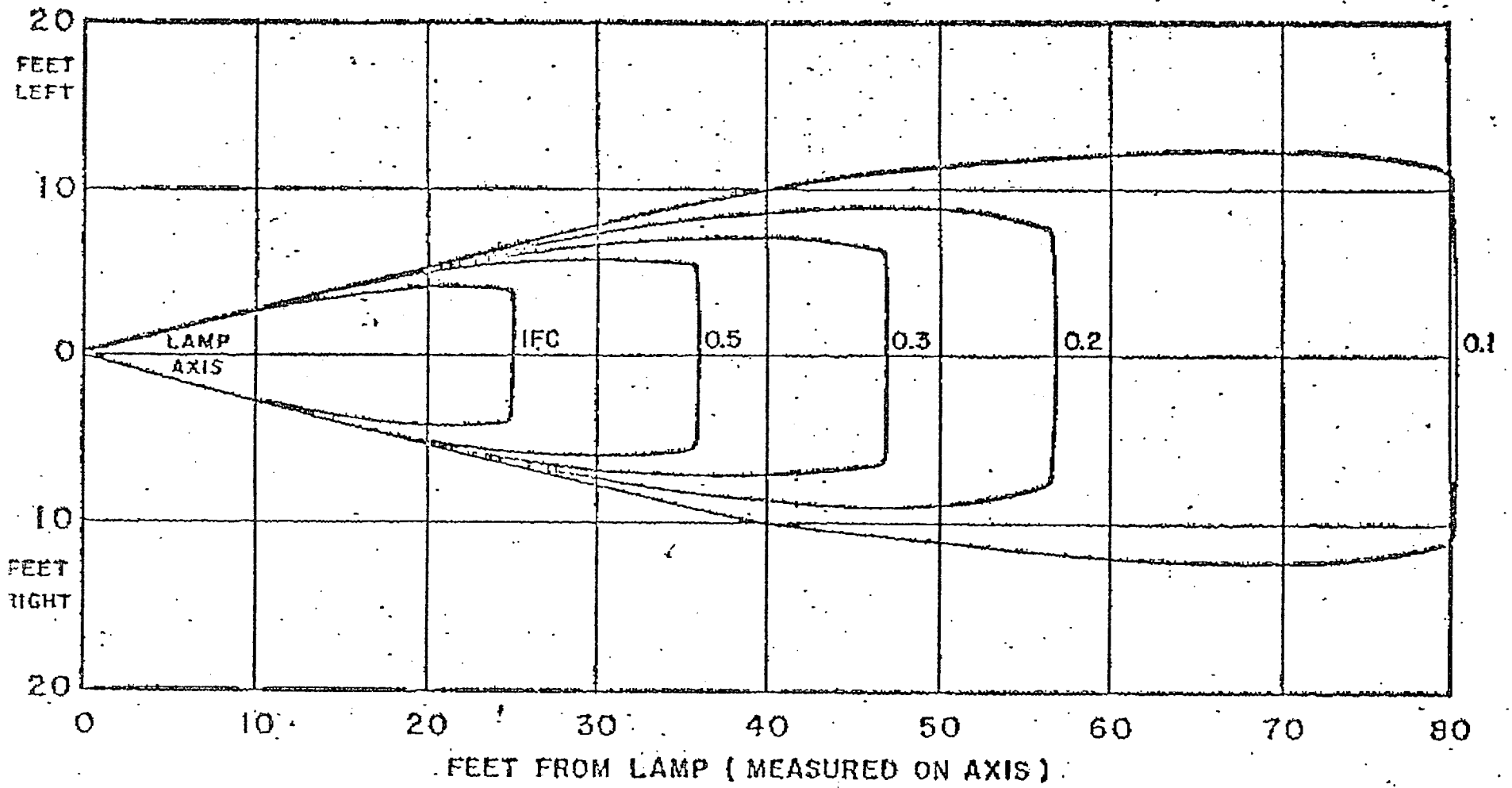


FIGURE 6-1

HORIZONTAL ISOFOOTCANDLE DISTRIBUTION CURVES FOR TYPICAL GE LP. NO. H7552 AT 6 VOLTS, 10W

DATE MARCH 20, 1970
SCALE 1" = 10'
DRAWN BY ATS
APPROVED BY [illegible]

GENERAL ELECTRIC
MINIATURE LAMP DEPARTMENT
NELA PARK · CLEVELAND [illegible] · OHIO

381-A-1467

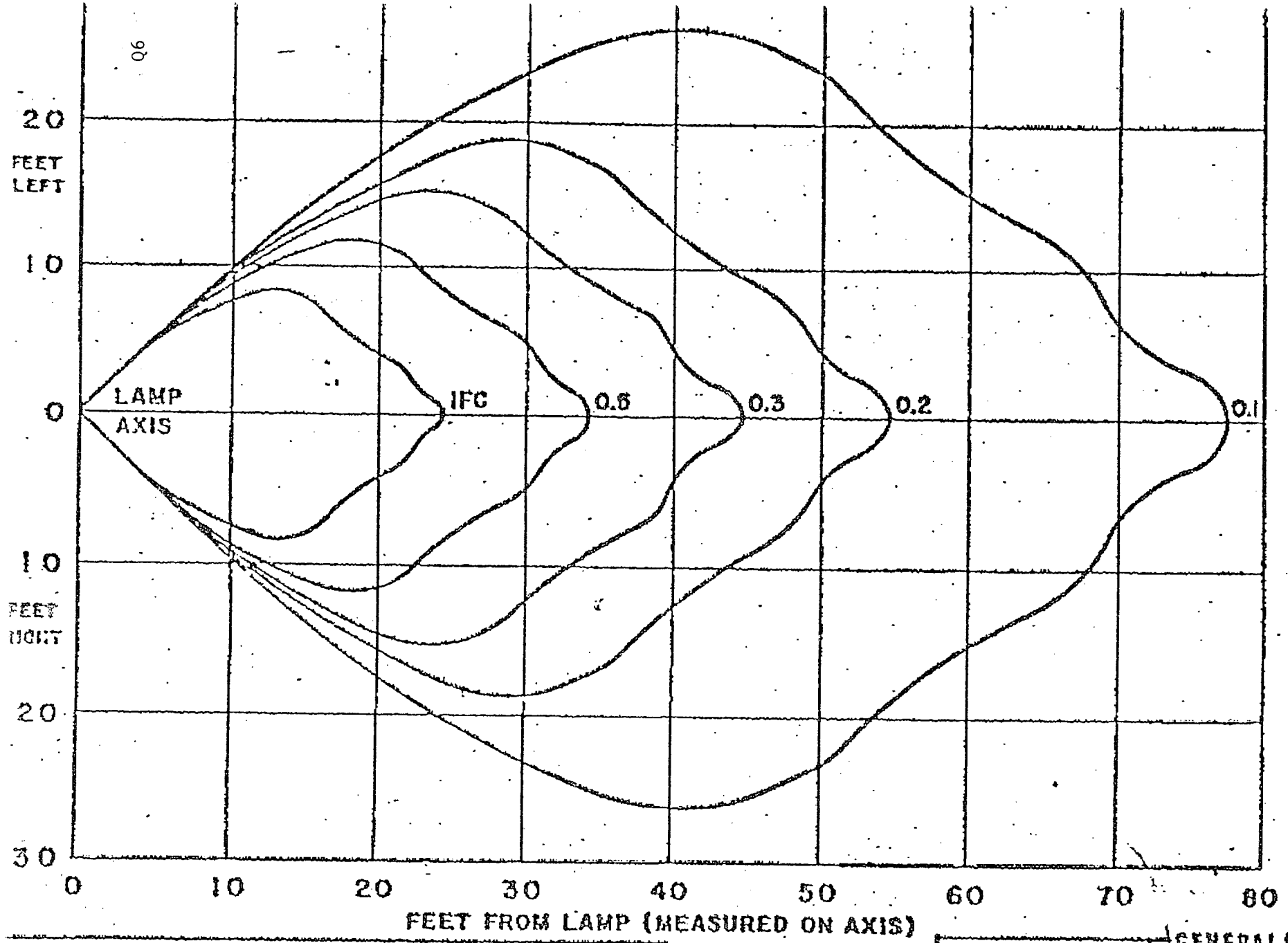


FIGURE 6-2

HORIZONTAL ISOFOOTCANDLE DISTRIBUTION CURVES FOR TYPICAL G.E. L.P. NO. 4510 AT 6.0 VOLTS

DATE APRIL 25, 1972
SCALE 1" = 10"
DRAWN BY ATS
APPROVED BY

GENERAL ELECTRIC
MINIATURE LAMP DEPARTMENT
NELA PARK · CLEVELAND · OHIO

381-A-1208

Item 6

Item No. 7

The diesel generator building has a single feed from the underground fire main into the building feeding a pre-action sprinkler system and manual hose station. We are concerned that a single active failure or crack in a moderate-energy line can impair both the primary and backup fire suppression systems. In order to meet the guidelines of Section E-3 of Appendix A to BTP 9.5-1, it is our position that a second feed from the underground be provided for the diesel generator building such that no single failure can impair both the primary and secondary feeds.

TVA Response

TVA will provide an additional fire water feed to the fire water suppression systems for the diesel generator building. This modification will insure that any single impairment in the building fire protection system will not cause the loss of both the primary fixed automatic suppression and the backup manual fire hose fire protection capability to the corridor area.

Item No. 8

In the diesel generator building on elevation 792', the lube oil storage room is enclosed in 3-hour fire rated construction except that the 3-hour fire doors are in the open position and close only upon melting of the thermal link above the door or by discharge of the CO_2 system for the room. It is our concern that fire may spread to adjacent areas before the closing of the fire doors or that some obstruction in the doorway may keep the fire door from closing completely. In order to meet Section 8-j of Appendix A to BTP 9.5-1, it is our position that these doors be normally kept closed and locked or alarmed with alarm and annunciation in the control room.

TVA Response

Normally open, 3-hour rated sliding fire doors D7A and D8A, are provided for the diesel generator lube oil storage room. The doors are actuated either by thermally actuated links or by a lube oil storage room CO_2 system release. A CO_2 initiation in the room is annunciated in the main control room. This system is essentially the same as that provided at Sequoyah Nuclear Plant which has been reviewed and approved by the NRC. It is TVA's position that the doors and their release system, as designed, satisfy all applicable NFPA codes and provide sufficient redundancy and alarm features to assure door closure in the event of a fire.

Item No. 9

On elevation 760' of the diesel generator building, each switchgear room is separated from each other by 3-hour fire-rated construction. It is our concern that the doors separating these rooms are nonlabeled. It is our position to meet the guidelines of Section D-j of Appendix A to BTP 9.5-1, that these doors be 3-hour fire doors including frames and hardware that have been tested and approved by a nationally recognized laboratory.

TVA Response

Fire door assemblies between the electrical board rooms in the diesel generator building (Door Nos. D22, D24, D27, and D30) were purchased to specifications requiring UL labels. These doors, however, do not have UL labels attached to the assembly.

TVA will provide documentation on the approved rating of the doors or make a commitment to replace them with UL-labeled fire door assemblies.

Item No. 10

On elevation 741' of the intake pumping station at the bottom of the south wall of the essential raw cooling water pump room, two open scuppers are located at the floor level (one in each room). This wall is a 3-hour fire rated. It is our position that to meet the guidelines of Section D-j of Appendix A to BTP 9.5-1, that these scruppers be protected to achieve a 3-hour fire rating.

TVA Response

The scupper openings penetrating the fire wall between the ERCW pump rooms and traveling screen rooms, are provided for drainage of rain water from the open pump rooms to the pump well.

The slope of the floor deck at elevation 741.0 is such that an oil spill from any one train of ERCW pumps does not have a direct route to the other train of pumps. The deck is sloped to the openings in the south wall (ERCW Pump Room side) so that a postulated oil spin will flow to the scuppers pass thru, and immediately drop into the noncritical traveling screen wells in the traveling screen and screen wash pump room. The wall separating the ERCW pump rooms and traveling screen rooms is intended to provide radiant heat protection from an exposure fire. The roof of the intake pumping station deck is constructed of wide flange beams provided for missile protection. However, the roof design permits free air flow between the beams such that, in the event of fire, heat will not stratify or bank down from the ceiling, thereby minimizing the temperature rise within the room.

It is, therefore, TVA's position that the wall separating both trains of ERCW pumps from the adjacent traveling screens and screen wash pump room is adequate to prevent the spread of fire such that more than one train of ERCW pumps would not be jeopardized in a fire.

Item No. 11

In the control building on elevation 755' in the relay room on the north wall a large duct pierces the wall near the ceiling into the auxiliary building. This is a 3-hour fire-rated wall. It is our position to meet the guidelines of Section D.I.j of Appendix A to BTP 9.5-1 that a 3-hour fire-rated damper be installed according to NFPA 80 'Fire Doors and Windows' to properly protect the opening.

TVA Response

TVA design includes fire dampers in the penetrating ductwork between the auxiliary building elevation 757.0 and the control building relay room elevation 755' (COL C10/Q). These dampers are shown on TVA drawing 47W930-2. At the time of the NRC site visit, these dampers had been installed.

Item No. 12

The main control room, elevation 755', in the control building has a dropped suspended ceiling. Since this is a critical area, it is essential that any fire be detected quickly to prevent potential fire exposure to safety-related equipment. In order to meet the guidelines of Section D.1-f of Appendix A to BTP 9.5-1, it is our position that automatic smoke detectors be provided above the suspended ceiling with alarm and annunciation in the control room.

TVA Response

The area above the suspended ceiling in the Watts Bar Nuclear Plant control room contains only electrical conduit runs for lights and the fire detection system and HVAC insulated ductwork. The ductwork insulation has a UL flame spread rating of less than 25, based on ASTM E-84 test. There is no other exposed cabling or other equipment above the suspended ceiling. The present detection system is installed at the suspended ceiling grid for detection service to the main control room.

It is TVA's position that the present automatic smoke detection system meets the intent of the guidelines of Section D, 1-F of Appendix A to BTP 9.5-1 and provides adequate detection capability for the main control room. The detection system for Watts Bar Nuclear Plant main control room is essentially the same as that installed at Sequoyah Nuclear Plant which has been reviewed and approved by the NRC.

Item No. 13

We are concerned that the routing of the hydrogen piping system is through safety-related areas and as such a fire or explosion may affect safety related systems or equipment. It is our position that to meet the quidelines of Section D.2.b of Appendix A to BTP 9.5-1, all hydrogen piping routed through safety-related areas should be relocated or the present piping sleeved and vented to a safe location.

TVA Response

A one-inch hydrogen line is routed through the auxiliary building at elevation 713.0 from the A15 wall to the volume control tanks (one for each unit). Two isolation valves are installed in the hydrogen supply line outside the auxiliary building.

One valve is located in a cabinet at the secondary hydrogen control station and the second valve is located outside the A15 wall. These valves close automatically when the downstream flow rate reaches 50 scfm. Normal flow demand to the volume control tanks is 35 scfm. A complete pipe failure of the hydrogen supply line would provide a flow in excess of 50 scfm and the isolation valves would close.

Any leakage less than 50 scfm will be diffused and carried away by the auxiliary building ventilation system. This minimizes the possibility of an explosion by keeping any hydrogen concentrations below the lower explosive limit of four percent by volume. The area containing the hydrogen lines in the auxiliary building, including the volume control tanks, is protected by a preaction sprinkler system.

To further insure against failure, the one-inch hydrogen line is seismically supported and qualified and is of all welded construction. It is designed for a maximum of 1000 psig with an active system working pressure of 100 psig.

The previous safe shutdown analysis was performed to determine if the line routing is such that fire emanating from the line and fed by a maximum of 50 scfm of hydrogen could damage safety-related equipment or cables. As a result of this analysis, control cables to the reciprocating charging pumps were relocated. This will insure that either the reciprocating charging pumps or the centrifugal charging pumps are available for safe shutdown should a fire occur in the area of the hydrogen line.

The relocation of the reciprocating charging pump control cables was denoted in the previous TVA Watts Bar fire protection submittal of September 1980 on Table 1.3. At the time of the NRC inspection, these cables had not been physically relocated. These cables will be relocated before unit 1 fuel loading.

The hydrogen system described above and in FSAR section 9.3.4 performs an essential function in the CVCS system and as such cannot be removed totally from the auxiliary building. It is TVA's position that the design and installation of the system is adequate.

Item No. 14

Some of the one and one-half hour fire-rated dampers are not installed according to the manufacturers instruction or NFPA 80 'Fire Doors and Windows.' It is our position that these installations be upgraded to an acceptable level to meet the guidelines of D, I, J of Appendix A to BTP 9.5-1. Provide documentation of such modifications.

TVA Response

Approximately 30 percent of the fire-rated dampers have not been installed in ventilation ducts in strict compliance with UL 555 or the manufacturer's instructions. Typical installation details for the deviating dampers are shown in figures 12.b(ii)-1 through 12.b(ii)-4 of the TVA Watts Bar Fire Protection Submittal of September 1980. We have reviewed the deviations and concluded that they do not invalidate the fire resistive rating of the damper installations.

Fire protection modifications involving fire dampers in ventilation ducts at Watts Bars Nuclear Plant are essentially the same as those implemented for Sequoyah Nuclear Plant which have been reviewed and approved by the NRC.

Item No. 15

Throughout the auxiliary building, elevation 713' and 737' numerous cable trays, conduit and equipment obstruct the overhead sprinkler discharge. We are concerned that a fire on the floor elevation may not be protected by the overhead sprinkler system. It is our position that to meet the guidelines of Section E, 3.c of Appendix A to BTP 9.5-1 that sprinkler heads be either relocated or additional heads installed to enable complete sprinkler coverage on the floor below. Automatic sprinkler systems should conform to the guidelines or appropriate standards such as NFPA 13 'Standard for the Installation of Sprinkler System' and NFPA 15, 'Standard for Water Spray Fixed Systems.'

TVA Response

TVA will provide additional sprinkler heads, or existing heads shall be relocated, in order to clear overhead obstructions and obtain minimum interference patterns where possible so that floor areas are adequately covered in the corridor area of the auxiliary building elevations 713.0 and 737.0. This installation will be complete before unit 1 fuel load.

Item No. 16

The main redundant safety-related control room consoles, located in the control room elevation 755, Control Building, extend down into the cable spreading room approximately 4 feet. This extension is cutoff from the cable spreading room by a three hour fire-rated barrier. Our concern is that access to the lower portion is limited with access by a small steel ladder. It would be extremely difficult to locate and extinguish a fire should it develop in one of these cabinets. Alternate shutdown is provided for the control room. In order to meet the guidelines of Section D. 2.j of Appendix A to BTP 9.5-1, it is our position that an automatic total flooding halon gas system be provided for each console where such a condition exists.

TVA Response

Automatic smoke detection is provided within the control room consoles to provide the earliest possible indication of a fire. Portable halon and pressurized water fire extinguishers are provided within the main control room and manual fire hose backup capability is provided immediately outside the room in accordance with the requirements of BTP 9.5-1, Appendix A.

The control room consoles contain only low-voltage cable, which minimizes the possibility of internally generated fires. The consoles are provided with full access doors on the rear of the panels which afford access to the lower recessed portions of the consoles with an extinguisher or fire hose nozzle.

It is TVA's position that a fixed gaseous suppression system is not necessary nor desirable for the main control room consoles. A gaseous system would not be particularly effective against a deep-seated fire. In order to make a gaseous system effective, excessive concentrations of the gaseous agent would be required (15-20 percent compared to the normal 16 percent by volume) and could result in the unnecessary evacuation of the Main Control Room.

With early detection capability in the control room consoles, a fire can be detected and extinguished manually in the incipient stage with minimal effect on equipment and electrical circuits.

In the unlikely event that a fire occurs that develops beyond the capability of the extinguishing equipment, the main control room can be abandoned and reactor shutdown accomplished from the backup control room located in the auxiliary building.

This design is essentially the same as that provided at Sequoyah Nuclear Plant which has been reviewed and approved by the NRC.

Item No. 17

Throughout the safe shutdown analysis there is no mention that loss of offsite power was considered. In order to meet the guidelines of Section A-2 of Appendix A to BTP 9.5-1, it is our position that documentation be provided to insure that loss of offsite power was considered in the analysis.

TVA Response

All equipment which is relied upon to achieve safe plant shutdown in the event of fire is capable of being powered from the onsite emergency diesel generators. Therefore, the loss of offsite power has no adverse effect on the results of the Watts Bar Nuclear Plant safe shutdown analysis.

Item No. 18

At the time of the site visit, the oil collection system for the reactor coolant pump had not yet been installed. We are concerned that the oil collection system be designed, engineered and installed that failure will not lead to fire during normal or design basis accident conditions and that there is reasonable assurance that the system will withstand the Safe Shutdown Earthquake. The system should be capable of collecting lube oil from all potential pressurized and unpressurized leakage sites. Leakage shall be collected and drained to a vented closed container that can hold the entire lube oil inventory. A flame arrester is required in the vent if the flash point characteristics of the oil present the hazard of fire flashback. Leakage points to be protected should include lift pump and piping, overflow lines, lube oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines, and lube oil reservoirs where such features exist. The drain line shall be large enough to accommodate the largest potential oil leak. Provide documentation that the system being installed meets the above criteria as well as provide the necessary drawings showing the design of the system.

TVA Response

TVA has provided the NRC with construction drawings of the oil collection system for the reactor coolant pump as part of TVA's September 1980 fire protection submittal in response to NRC Question 38. Reference to figure numbers in the following discussion pertain to material included in the earlier submittal.

The oil containment and collection system for the reactor coolant pumps includes enclosing the RCP oil lift pump and providing an oil collection basin at the access platform elevation of each pump to collect and drain away any combustible liquid and/or suppression system discharge. Details of the oil lift pump enclosure are shown in Figure 38-1.

Details of the reactor coolant pump collection basin are shown in Figures 38-2, 38-3, and 38-4.

The oil containment and collection system for the reactor coolant pumps is seismically supported and qualified to provide reasonable assurance that it will not fail during the safe shutdown earthquake in a matter which could damage nuclear safety related equipment to a degree that they cannot perform their intented function.

Any discharge is drained from the collection basin into the closed and vented containment floor and equipment drain sump located inside primary containment. A flame arrester will be provided for the vent before fuel loading for unit 1.

A description of the containment floor and equipment drain sump is provided in the Watts Bar Nuclear Plant FSAR section 9.3.3. A flow diagram of the drainage system is shown in the FSAR, Figure 9.3-7.

Each reactor coolant pump is provided with a heat collection hood structure located approximately six feet above the pump to reduce the response time of thermal detectors and thermal actuated water spray nozzles. (Refer to Figure 38-5 for the arrangement of the heat collector hood.)

Neither the heat collector hood above, nor the collection system below the reactor coolant pump motor will jeopardize the ventilation air flow to the reactor coolant pump motor.

Item No. 19

At present each local fire alarm control panel is hard-wired to its power supply. We are concerned that a ground or open on this power supply circuit will leave one or more fire alarm control panels without power, thereby eliminating all fire detection for the area. Also communication between the microprocessor in the control room and these fire alarm control panels, located at various locations throughout the plant, is provided by a digital data modems.

We are also concerned that an alarm condition from fire detectors to the local fire alarm control panel activates circuits in the FACP for the control of automatic suppression system in the area on unsupervised circuits. In order to meet the guidelines of Section E.1 of Appendix A to BTP 9.5-1, it is our position that:

1. A four-hour battery supply be provided for each local fire alarm control panel.

2. Each fire alarm control panel should have its own modem located in or adjacent to the fire alarm control panel.

3. All control functions from local FACPs to valves, etc., should be on supervised circuits.

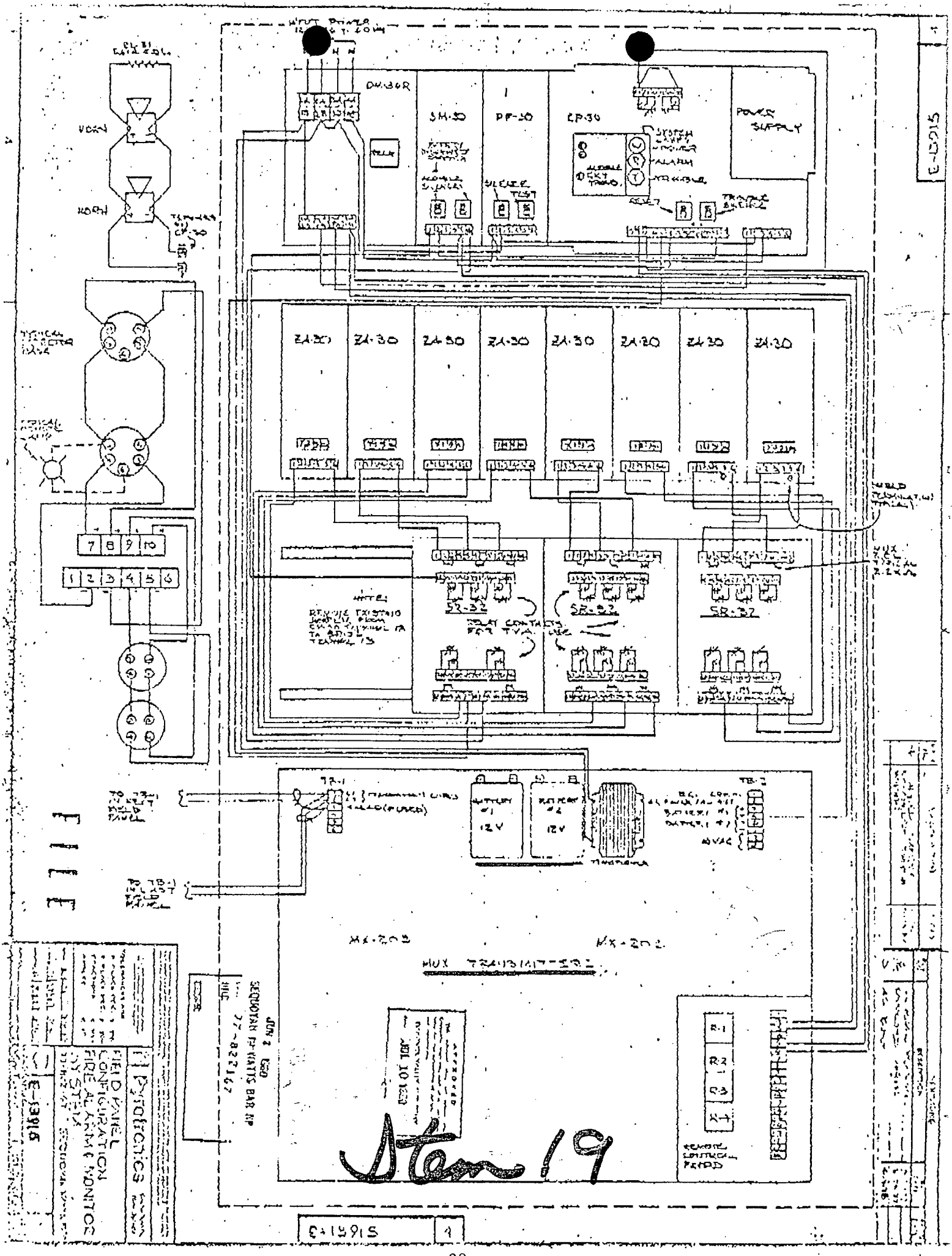
<u>TVA Response</u>

1. A vendor supplied four-hour battery supply electrical source is provided in each local fire alarm panel. The attached vendor drawing (Pyrotronics E-13915) shows the location of the four-hour battery installation. This system for standby power supply to the detection system is designed in accordance with NFPA 72D and complies with the requirements of Appendix A to BTP 9.5-1.

2. Each fire alarm local control panel does have its own MUX transmitter (Modem) located in the panel. The attached vendor drawing (Pyrotronics E-13915) shows the location of the transmitters.

3. In lieu of supervising all control functions from local panels to fire protection devices, TVA commits to perform surveillance testing of these circuits every six months. The Watts Bar Plant technical specifications will reflect this commitment.

The fire detection system design and surveillance testing requirements at Watts Bar Nuclear Plant are essentially the same as that for Sequoyah Nuclear Plant which has been reviewed and approved by the NRC.



HORN
HORN
SM-30
PF-30
CP-30
POWER SUPPLY
ZA-30
ZA-30
ZA-30
ZA-30
ZA-30
ZA-30
ZA-30
ZA-30
SR-32
SR-32
SR-32
7 8 9 10
1 2 3 4 5 6
TB-1
TB-2
12V
12V
MX-203
MX-202
MUX TRANSMITTER
R-1
R-2
R-3
R-4
Pyrotechnics
FIELD PANEL CONFIGURATION FIRE ALARM & MONITOR SYSTEM
E-13915
Stem 19

Item No. 20

As a result of the site visit, numerous areas were noticed where black urethane insulation was being used around pipes and/or equipment. We are concerned that such a material may be extremely flammable. It is our position that in order to meet the quidelines of Section D,1,d of Appendix A to BTP 9.5-1, all such insulating material should be noncombustible. A noncombustible material is a material which in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion or release flammable vapors, when subjected to fire or heat. Materials reported as noncombustible, when tested in accordance with the Standard Method of Test for Noncombustibility of Elementary Materials, ASTM E-136, shall be considered noncombustible materials.

TVA Response

The black thermal insulation material used on piping at Watts Bar Nuclear Plant is not a urethane material and is not 'extremely flammable.' It is a vinyl-nitrile rubber material in the form of sheets or tubing. As indicated in TVA's response to NRC question 12, of the September 1980 Fire Protection Submittal (refer to letter L. M. Mills to A. Schwencer dated September 9, 1980), the thermal insulation material for chilled water piping at Watts Bar Nuclear Plant meets the criteria of Section C.4.a(4), BTP ASB 9.5-1, Revision 1 for flame spread.

A sample of the thermal insulation material supplied by Rubatex Corporation Bedford, Virginia has been tested by an independent laboratory according to ASTM E-84, standard method of testing of 'Surface Characteristics of Building Materials.' The results of the test indicated that the material has a flame spread rating of 25. In addition, the material meets the Underwriters Laboratories 94 flammability classification under 94-5V (refer to U. L. approval card No. E55475).

Insulation is required for chilled water piping and chiller equipment and various other piping systems to prevent frosting and/or condensation. Without the insulation, the resultant dripping of condensation could pose a safety problem for certain delicate electrical equipment located beneath such pipe runs.

The majority of other insulation materials do not exhibit the necessary vapor barrier characteristics provided by Rubatex.

It is TVA's position that this material meets the intent of the requirements of section D, 1, d of Appendix A to BTP 9.5-1.

Guide QMFZ2, February 26, 1974 E55475.
Component—Plastics.

Rubatex Corp.,
Bedford, Va. 24523

Material Designation	Color	Density Range, PCF	Minimum Thickness, In.	UL94 Flammability Classification
Vinylchloride rubber material in the form of sheets or tubing.				
180-V	Black	6.0-8.0	⅛	94-5V

Marking: Company name and material designation on container or wrapper.

See General Information Card of above guide designation.

For use only in equipment where the acceptability of the combination is determined by Underwriters Laboratories Inc.

Report: December 3, 1973.

This card replaces E55475 dated Nov. 30, 1973.
This card is issued by Underwriters Laboratories Inc. ©

Item 20

Item No. 21

On elevation 757' of the auxiliary building in Room A1, Auxiliary Control Room, all four of the Auxiliary Control Instrument Rooms communicate to the Auxiliary Control Room via doors. We are concerned that a flammable liquid exposure fire may spread into two adjacent instrument rooms. It is our position that curbs be provided for each instrument room to prohibit any flammable liquid from entering the room from under the door. Each instrument room also has a curtain type fire damper opening located near the floor surface. We are concerned that any material stacked adjacent to the damper may inhibit its motion and prevent its function. It is our position that a fixed wire mesh screen be provided on both sides of the fire damper in each instrument room to assure its proper function.

TVA Response

The auxiliary control instrument room doors are UL labeled three hour fire-rated. These doors swing out into the auxiliary control room to afford easy egress from the instrument rooms. Curbs four inches high, as shown on TVA drawing 46W401-7 in detail 1-7, are to be installed at each doorway. These curbs will effectively seal against the floor, doorframes, and doors to prevent any transient flammable liquid exposure fire from traveling from room to room under the doors.

This design is essentially the same as that implemented at Sequoyah Nuclear Plant which has been reviewed and approved by the NRC.

The auxiliary control instrument room ventilation penetrations are equipped with fire dampers and grillework as shown on TVA drawing 47W920-26 part plan elevation 757.0. This grillework as shown is installed on the outside wall of the instrument room in the auxiliary control room.

TVA will install wire mesh screens on the inside face of these damper penetrations to insure that no foreign objects or material can inhibit the motion of the damper and prevent its correct function. This modification shall be accomplished before unit 1 fuel loading.