TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

July 20, 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	)	Docket Nos. 50-327
Tennessee Valley Authority	)	50-328

Please refer to your letter to H. G. Parris dated April 26, 1983 concerning the Safety Evaluation Report (SER) for Environmental Qualification of Safety-Related Electrical Equipment at the Sequoyah Nuclear Plant (SQNP). Previous correspondence regarding this letter was submitted from L. M. Mills to you on May 12 and June 2, 1983.

Your letter requested for items in NRC Categories I.B, II.A, and IV, as identified in the Technical Evaluation Report (TER), that TVA reverify the justification for continued operation (JCO) for any qualification deficiencies documented in Section 5 of the TER and provide JCO for any equipment not previously provided. JCOs for NRC Categories I.B, II.A, and IV are contained in Enclosure 1 with a summary table listing the TER item numbers for this submittal. A final submittal for the remaining items will be submitted near July 29, 1983.

Also provided as Enclosure 2 are JCOs for equipment which is not fully qualified and which was not reviewed in the SQNP SER/TER due to changes in TVA's environmental qualification program since the submittal of reports on which the SER/TER was based.

On May 20, 1983, TVA provided a submittal on the environmental qualification of safety-related equipment in accordance with the 10 CFR Part 50.49 final rule. As a result of deficiencies noted in the SER/TER for the TER item numbers identified in Enclosure 1, instrument Nos. 1, 2-LCV-3-174 and -175 identified in the 10 CFR Part 50.49 response have had their status changed from IV to III.

TVA has complied with paragraph (a) and (b) of 10 CFR 50.49 for all our previous submittals of TVA's Electrical Equipment Environmental Qualification Report by our compliance with NUREG-0588 and its supplements with the exception of part (3) of paragraph (b) that requires certain post-accident monitoring equipment be covered by the rule with specific guidance coming from Regulatory Guide 1.97 (Rev. 2). TVA responded to the requirements of Regulatory Guide 1.97 (Rev. 2) in our letter dated March 15, 1982. Any additions and/or upgrades required to comply with Regulatory Guide 1.97 (Rev. 2) will be evaluated for environmental qualification requirements in accordance with the proposed integrated schedule provided in the letter from L. M. Mills to you dated April 15, 1983, which was TVA's response to Generic Letter 82-33. While the table submitted by

A048
1/1

TVA in response to 10 CFR 50.49 does not specifically contain Regulatory Guide 1.97 (Rev. 2) PAM, it does include display instrumentation required under NRC NUREG-0588 and its supplements which is required for accident mitigation.

In addition, your letter requested TVA to discuss the methods TVA used to identify the nonsafety-related electrical equipment whose failure could prevent satisfactory accomplishment of a required safety function(s) as covered by paragraph 10 CFR 50.49(b)(2).

TVA has performed a systematic evaluation of the environmental effects resulting from high energy pipe break, inside and outside containment upon nonsafety-related systems. This evaluation is documented in the Sequoyah FSAR Section 7.6, which provided information in response to IE Information Notice 79-22 on environmental qualification of control system. The evaluation discussed the method used to identify potential adverse system interaction and the required operator action to ensure safe shutdown. The evaluation concluded that a safe shutdown can be achieved at SQNP even if a postulated accident is compounded by environmentally-induced inappropriate control system actuation.

If you have any questions concerning this matter, please get in touch with K. P. Parr at FTS 858-2685.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

D S Kammer

D. S. Kammer
Nuclear Engineer

Sworn to and subscribed before me
this 20th day of July 1983

Paulette H. White

Notary Public
My Commission Expires 9-5-84

Enclosures (2)
cc: U.S. Nuclear Regulatory Commission (Enclosures)
Region II
Attn: Mr. James P. O'Reilly Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

ENCLOSURE 1

SEQUOYAH NUCLEAR PLANTS

Equipment Requiring Justification for Continued Operation

Units 1 and 2

TER Item No.

47 (unit 2 only)
48
78
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89 (unit 2 only)
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146
147
153
156
160
179 (unit 2 only)

TER Equipment Item Nos. 47 and 48

Cutler Hammer Model 10250 T

Status I

Resolution of Deficiency

TER item Nos. 47 and 48 concern Cutler-Ha[illegible] model 10250T handswitches located inside containment and in several areas of the auxiliary building. The switches inside containment are inoperable during plant operation. The TER states that documented evidence of qualification is inadequate because environmental effects on the switch cam and the washer used in sealing the switch when mounted to an enclosure were not considered.

In our response to the SER, we analyzed the switch components whose failure we believed would most likely affect the performance of the switch, namely the cam and contact block. Both these components are composed of mineral filled phenolic, as is the switch operator. The washers, which are Buna N rubber, are the only components of the switch which are not metal or phenolic. We do not believe that even total degradation of the washer would allow sufficient moisture to enter the enclosure and affect switch performance. Also, Buna N has good resistance to heat aging and is suitable for continuous use at 300° F, per the Insulation Directory/Encyclopedia, Number 7, dated June/July 1968. The most severe temperature environment experienced by the switches in a safety-related application is 307°F, but only for one minute before dropping below 300°. The material also retains at least 50 percent of its physical properties (tensile strength and elongation) at radiation levels up to 8×10^8 rads gamma, per "The Use of Plastics and Elastomers in Nuclear Radiation," dated October 1970 by W. W. Parkinson and O. Sisman. The most severe total radiation environment experienced by the switches in a safety-related application is 5×10^7 rads.

Based on the above, we believe the switches are qualified for use in their intended areas of operation.

033164.06

TER EQUIPMENT ITEM NO. 78

American Insulated Wire (TVA Type SROAJ Cable)

Status I

Resolution of Deficiency

TER item No. 78 states that qualification of this equipment has not been established. The TER further states that sufficient information has not been provided to establish adequate similarity between the cable installed and the cable tested. The test report referenced was for General Electric but the installed cable was American Insulated Wire.

The explanation is as follows:

AIW used GE silicone compound SE-725 to manufacture the silicone insulated cable for contract 822502. AIW also manufactured the silicone cable which GE submitted to the Franklin Research Center for testing, covered by report F-C5119, dated May 1979. AIW used the GE SE-725 silicone compound to make the specimens identified in Table 1 of report F-C5119 as C5119-1666A and C5119-1669A. The cables made by AIW for contract 822502 and for GE's test at Franklin Research Center are identical.

The supporting letters are:

TVA to AIW dated April 3, 1980 (EEB 800403 933)

GE to TVA dated March 26, 1980 (EEB 800401 011)

AIW to TVA dated March 21, 1980 (EEB 800325 009)

GE to TVA dated March 14, 1980 (EEB 800319 008)

Based on the above, it is concluded that the cable is qualified.

013166.03

TER Equipment Item No. 79

Rockbestos TVA type SROAJ and SROAJH cables

Status 1

Resolution of Deficiency

TER item No. 79 states that sufficient information has not been provided to establish that the equipment described on the SCEW sheets (EQS-EEB-CBL-2) is the same equipment described in the referenced qualification data.

The explanation is as follows:

Rockbestos used the same silicone rubber insulating compound on the cables furnished to TVA and the qualification reports. This is documented in the TVA contract files either by letters from the vendor or as part of the contract acceptance. The cables on this TER were furnished by Rockbestos on four separate contracts WB87235, 824308, 823428, and WB821729.

The supporting documents are:

WB821729 TVA to Rockbestos dated April 24, 1978 (EEB 780426 912)

WB821729 Rockbestos to TVA dated May 9, 1979 (EEB 790517 025)

WB821729 TVA to Rockbestos dated June 26, 1978 (EEB 780621 901)

824308 Contract acceptance dated June 30, 1978 (QAS 780706 524)

WB87235 Rockbestos to TVA dated August 17, 1978 (EEB 780824 006)

823428 Rockbestos to TVA dated June 13, 1978, made part of contract acceptance dated July 27, 1978 (QAS 780803 534)

TER EQUIPMENT ITEM NO. 80

Anaconda-Continental (TVA Type SROAJ and SROAJ-H Cables)

Status I

Resolution of Deficiency

TER item No. 80 states that qualification of this equipment has not been established and the pre-aging data was not evaluated for the plant conditions.

The resolution is as follows:

Report F-C2935 should not have been included in the NUREG-0588 - NRC SER and will be removed from EQS EEB-CBL-3.

Anaconda Continental Report No. 79117 is the applicable report and insulation material CC-2193 (the tested specimens) is the same material as that provided on contracts 85861, 83999, 85112, and 825018. See the list of supporting letters and memorandums below:

R. M. Stewart to M. N. Sprouse, January 5, 1973 (No MEDS No.)

Contract 85861 dated August 1, 1974

F. W. Chandler to W. S. Wilson dated July 18, 1974

TVA to Anaconda-Continental dated May 11, 1979 (EEB 790514 915)

Anaconda-Continental to TVA May 4, 1979 (EEB 790507 010)

F. W. Chandler to T. L. Aaron dated July 5, 1979 (EEB 790706 934)

T. L. Aaron to F. W. Chandler dated May 31, 1979 (EEB 790605 051)

The TVA cable types, SROAJ and SROAJ-H, single and multiconductor, have silicone rubber insulation, glass-braid jacket over each single, and asbestos braid overall. Type SROAJ-H, mark WPH-1, has a 200°C rating and type SROAJ, has a 125°C rating.

An analysis of the data of report 79117 shows that samples were aged 7 days at 210°C and 28 days at 210°. Using the Arrhenius plots, an analysis indicates a temperature range of 130°C to 145°C for 40 years. So we have conservatively rated the cable for 125°C for 40 years. The 200°C rated cable has specific high temperature applications, such as the pressurizer heater. Using the Arrhenius technique, an analysis for this specific application, indicates the cable will perform at 150°C for 40 years. Conservatively a 200°C rating for 5 years has been assigned for this application. A representative sample of these 200°C cables will be tested (Hi-Pot & MEGGER) at the end of approximately 5 years(to coincide with a refueling outage). An evaluation of the cable will then be made to determine if replacement is required.

Based on the above, it is concluded that the cables are qualified.

TER EQUIPMENT ITEM NO. 81

The Anaconda Company, XLPE

Status I

Resolution of Deficiency

TER item No. 81 states that sufficient information was not provided to establish that the equipment described on the SCEP sheet (EQS Sheet No. EEB-CBL-4) is the same as the equipment described in the qualification test report.

The following cable descriptions are for the cables referred to on EQS Sheet No. EEB-CBL-4 (WVA and WVC):

WVA - One twisted pair, No. 16AWG Class B, stranded, tinned annealed cooper conductors, 25-mil nominal flame resistant cross-linked ethylene propylene rubber insulation (FREP), silicone glass tape with 10 percent overlap, 18AWG tinned copper drain wire, 2-mil aluminum/ mylar tape, and 30-mil nominal chorinated polyethylene jacket (CPE), nominal outside diameter of 0.312 inches.

WVC - Same construction as above except 4 conductors with nominal outside diameter of 0.359 inches.

The above cable is covered by cable specimens 26.4 and 26.5 of the qualification test report submitted for contract No. 87232. These cables are qualified by IEEE 383 Table 1, Representative Cable for Type Tests.

The support letters are:

TVA to Anaconda Company dated May 10, 1978 (EEB 780511 945)
Anaconda (telex) to TVA dated May 2, 1978 (EEB 780503 014)

033168.02

TER EQUIPMENT ITEM NO. 82

The Rockbestos Company, XLPE

Status I

Resolution of Deficiency

TER item No. 82 states that sufficient information was not provided to establish that the equipment described on the SCEW sheet (EQS Sheet No. EEB-CBL-5) is the same as the equipment described in the qualification test report.

The following cable descriptions are for the cables referred to on EQS Sheet No. EEB-CBL-5 (WVA):

WVA - One twisted pair, No. 16 AWG Class B stranded, tinned annealed copper conductors, 25-mil nominal flame resistant cross-linked polyethylene insulation, 18 AWG tinned copper drain wire, 2-mil aluminum/mylar tape, 30-mil nominal chlorosulfonated polyethylene jacket, nominal outside diameter of 0.352 inches.

The qualification test was done on a signal conductor #16 AWG with 20-mils nominal of flame resistant cross-linked polyethylene insulation. This sample represents a more severe test profile than does the use of a shielded, jacketed cable furnished on the contract. This cable is qualified by IEEE 383 Table 1, Representative Cable for Type Tests.

The supporting letters are:

TVA to letter to Rockbestos dated September 23, 1977 (EEB 770930 008),
Rockbestos letter to TVA dated March 7, 1978 (EEB 780314 010)
TVA letter to Rockbestos dated March 29, 1978 (EEB 780331 923).

063174.07

TER Equipment Item No. 83

ITT Suprenant Division TVA Type WVA(XLPE)

Status 1

Resolution of Deficiency

TER item No. 83 states that sufficient information has not been provided to establish adequate similarity between the cable installed and the cable tested.

The explanation is as follows:

The cable supplied on this contract is TVA-type WVA which is a two-conductor, No. 16 AWG, twisted, shielded, jacketed, signal cable. The cable is covered on EQS-EEB-CBL-6. The test reports applicable to this cable are Isomedix Test Report 375-02 dated March 1975 and Franklin Institute Research Laboratories Report F-C3961 dated October 1974. Both reports included samples which are exactly the same construction as supplied on this contract. The crosslink polyolefin insulating compound used on the contract is the same as those tested.

The support document is:

ITT Suprenant Division to TVA dated November 20, 1978 (EEB 781128 002).

063168.03

TER Equipment Item No. 84

Brand Rex Company cable, XLPE

Status I

Resolution of Deficiency

TER item No. 84 states that sufficient information was not provided to establish that the equipment described on the SCEW is the same as the equipment described in the referenced qualification report (Franklin Institute Report F-C4113).

The cable referenced on EQS EEB-CBL-7 (TVA ID No. WVC) was purchased from the Brand Rex Company on contract No. 77P5-822000 and is described as follows: four No. 16 AWG stranded, twisted, finned copper conductors, each insulated with 24 mils average (20 mils minimum) flame retardant cross-linked polyethylene (XLPE) material, with an overall shield, with an overall jacket material of 34-mil chlorosulfonated polyethylene (hypalon). This cable is represented on the qualification report referenced above by samples 3 and 4. The report was approved via TVA's letter to Brand Rex dated June 9, 1978 (EEB 780607 928). We are soliciting certification from the vendor.

053171.01

TER Equipment Item No. 89

The Okonite Company - TVA type EPSJ (Mark WNE)

Status I

Resolution of Deficiency

TER item No. 89 states that sufficient information has not been provided to establish adequate similarity between the cable installed and the cable tested.

The explanation is as follows:

The cable is TVA type EPSJ Mark WNE which is a 1/c, No. 400 MCM, ethylene propylene rubber insulated, chlorosulfonated polyethylene jacketed cable rated at 8kV. The cable is covered on EQS-EEB-CBL-12.

The LOCA test report submitted was not necessarily intended to apply to a given contract. The report covered a representative cross section of the EP cables actually installed at the plant. The test results show that generically the EP will service up to a 12-minute, 385°F temperature transient after receiving up to 2×10^8 rads of gamma radiation and pass a post-LOCA test. It is our engineering judgment that the report indicate that if a generic EP compound will meet the more demanding LOCA qualification then it will easily survive the HELB environment they are located in.

TER EQUIPMENT ITEM NO. 90

American Insulated Wire Corporation, General Electric Wire and Cable, The Okonite Company, Essex

TVA Type PXJ

Status 1

Resolution of Deficiency

TER item No. 90 states that sufficient information has not been provided to establish adequate similarity between the cable installed and the cable tested.

The explanation is as follows:

The cable is TVA type PXJ which is a single conductor cable with flame-retardant crosslinked polyethylene insulation (FRXLPE). The cables are covered on EQS-EEB-CBL-13.

The five LOCA test reports submitted were not necessarily intended to apply to a given vendor on a specific contract. The reports cover a representative cross section of the FRXLPE cables actually installed at the plant. The test results show that generically FRXLPE will survive up to a 12 minute, 385°F temperature transient after receiving up to 2×10^8 rads of gamma radiation and pass a post-LOCA test. It is our enginering judgment that the reports indicate that if a generic compound FRXLPE will meet the more demanding LOCA qualification then it will easily survive the HELB environment they are located in.

013168.06

TER Equipment Item No. 91

Okonite, Belden, Rockbestos, Eaton Corporation, Samuel Moore, Anacona-Continental, ITT Surprenant, Times Wire & Cable, Boston Insulated Wire, TVA Type XLPE.

Status I

Resolution of Deficiency

TER item 91 states that sufficient information has not been provided to establish adequate similarity between the cable installed and the cable tested.

The explantion is as follows:

The cable is TVA type XLPE which is multiconductor insulated signal cable; the individual conductors are insulated with flame retardant crosslinked polyethylene (FRXLPE) or flame retardant ethylene propylene rubber - FREPR. The cable is covered on EQS-EEB-CBL-16.

The nine LOCA test reports submitted were not necessarily intended to apply to a given vendor on a specific contract. The reports cover a representative cross section of the FRXLPE and FREPR cables actually installed at the plant. The test results show that generically FRXLPE and FREPR will survive up to 385°F temperature transient after receiving 2×10^8 rads of gamma radiation and pass a post-LOCA test. It is our engineering judgment that the reports indicate that if a generic compound FRXLPE and FREPR will meet the more demanding LOCA qualification then it will easily survive the HELB environment they are located in.

TER Equipment Item No. 92

TEFZEL-insulated cable by various manufacturers

Status I

Resolution of Deficiency

TER item No. 92 states that sufficient information was not provided to establish that the equipment described on the SCEW is the same as the equipment described in the referenced qualification report. The TER also states that establishing similarity of raw materials for different cables is unacceptable proof of environmental qualification, and that type testing of actual cables must be done.

The cables furnished by Anaconda (contract 85838), Carolina (826505), Teledyne (825280), and Times (84555) are all insulated with TEFZEL, which is Dupton's tradename for their ETFE fluoropolymer material. This material is more than just a raw material used by cable manufacturers. This material is essentially a final product which is merely extruded over copper wire to create the cables. Nothing is added to the material that changes its basic properties (flame retardancy, etc.). Since the extruded TEFZEL used by each of the cable manufacturers meets the requirements of MIL-W-22759, it can be assumed that the cables are composed of basically the same materials and that they will all perform alike under like environmental conditions.

Because of the above, we believe that qualification of all the TEFZEL-insulated cables by means of similarity to Okonite-produced cables is a rational and justifiable method of qualification.

TER EQUIPMENT ITEM NO. 94

American Insulated Wire Corporation, Essex

TVA Type PXMJ

Status 1

Resolution of Deficiency

TER item No. 94 states that sufficient information has not been provided to establish adequate similarily between the cable installed and the cable tested.

The explanation is as follows:

The cable is TVA type PXMJ which is a multiconductor cable, with flame-retardant crosslinked polyethylene insulation (FRXLPE) on the individual conductors. The cables are covered on EQS-EEB-CBL-14.

The five LOCA test reports submitted were not necessarily intended to apply to a given vendor on a specific contract. The reports cover a representative cross section of the FRXLPE cables actually installed at the plant. The test results show that generically FRXLPE will survive up to a 12 minute, 385°F temperature transient after receiving up to 2×10^8 rads of gamma radiation and pass a post LOCA test. It is our engineering judgment that the reports indicate that if a generic compound FRXLPE will meet the more demanding LOCA qualification then it will easily survive the HELB environment they are located in.

013168.06

TER Equipment Item No. 97

General Electric types EB-5, EB-25, and CR-151B; Westinghouse Style No. 80520 Series; Cutler-Hammer type 10987.

Status I

Resolution of Deficiency

TER item No. 97 concerns terminal blocks of the above types which are located inside and outside containment. The TER states that qualification of this equipment has not been established because of inadequate qualification documentation.

The terminal blocks are comprised of single piece molded, cellulose filled phenolic material with washer-head binding screws for circuit wire connections. They are rated for 30 amperes and 600 volts (7500-volt breakdown voltage). All terminal blocks are mounted in sealed, gasketed enclosures that provide isolation from submergence, humidity, and other adverse conditions of the surrounding environment.

The phenolic material of the blocks retains 50 to 100 percent of its physical properties (tensile strength and elongation) at gamma radiation doses up to 5×10^8 rads(1), and has a deflection temperature of 360° F(2) at 66 psia with a maximum recommended service temprature of 350°F(2). These ratings envelope the environmental conditions in all areas of the plant in which the terminal blocks perform safety-related functions. Also, the terminal blocks have been aged to simulate a 40-year life at 158°F prior to an accident qualification test.(3) Results of these tests showed that they were not affected by aging.

Based on the above, we conclude that the terminal blocks are qualified for use in their service environments for 40 years.

1. Radiation data from "The Use of Plastics and Elastomers in Nuclear Radiation," dated October 1970 by Parkinson and O. Sisman.

2. Temperature and pressure data from Materials Engineering, 1981 Materials Selector, Volume 92(b), dated December 1980.

3. Aging data from QSR 010-A-01 of Wyle Report No. 17742, dated October 20, 1982, "Environmental Qualification Assessment Program."

033164.06

TER Item Nos. 135, 179

Manufacturer/Model No.

Namco Controls/Model EA 170

Status I

Resolution of Deficiencies

1. Limit switches 2-ZS-30-46, -47, and -48 are located in the reactor building (Annulus Elev. 823). Limit switches associated with 1, 2-FCV-90-107, -111, -113, and -117 are located in the reactor building (Annulus Elev 718). Limit switches are required to operate for five minutes after the start of an accident and not to fail detrminental to plant safety for periods of up to 100 days thereafter[1] (depending on which accident occurs).

2. Limit switches 2-ZS-30-46, -47, and -48 and those associated with 1, 2-FCV-90-107, -111, -113, and -117 are subject to LOCA/HELB conditions. They are required to operate in the following environment:[2]

	Normal	Accident
Temperature	110°F	150°F (Figure 1)
Pressure	ATM	ATM
Relative Humidity	80%	100%
Radiation	2×10^7 Rads (40-Yr TID)	5×10^7 Rads
Spray/Flooding	N/A	N/A

3. Limit switches associated with FCV-12-79 are located in the auxiliary building (Elev 690/A1 General Spaces). Limit switches are required to operate for five minutes after the start of an accident and not to fail determinetal to plant safety for periods of up to 100 days thereafter[3] (depending on which accident occurs).

4. Limit switches associated with FCV-12-79 are subject to LOCA/HELB conditions. They are required to operate in the following environment[4].

1 Required operating time reevaluated - EN DES calculations, System 30 (NEB 830228 221), System 90 (NEB 830228 227).

2 SQN/WBN Environmental Data Drawing 47E235-47

3 Required operating time reevaluated - EN DES Calculations (NEB 830208 218).

4 SQN/WBN Environmental Drawings 47E235-55, -58.

	Normal	Accident
Temperature	104°F	113°F
Pressure	ATM	ATM
Relative Humidity	80%	100%
Radiation	2×10^2 Rads (40-Yr TID)	$< 1 \times 10^4$ Rads
Spray/Flooding	N/A	N/A

5. The manufacturer's specifications for the EA170 limit switches are:

Temperature	194°F
Pressure	ATM
Relative Humidity	100%
Radiation	2.4×10^8 Rads

6. The Namco Model EA-170 limit switch has been thermally aged, irradiated, and mechanically and seismically tested. No LOCA test was performed. The test criteria and results are documented in "Qualification of Namco Controls Limit Switch Model EA-170-XX302 to IEEE Standard 344 ('75) and Parts I and II of IEEE Standard 382 ('72)", Revision 1, dated July 24, 1978.

   The tests consisted of:

   a. Heat aging for 200 hours at 200°F.

   b. Mechanical aging for 100,000 actuation cycles under electrical load.

   c. Irradiation to a level of 204 megarads.

   d. Seismic testing to a maximum of 9.52g's.

7. Namco, by analysis (see Attachment 1) has estimated the qualified life to be 20 years, assuming the contacts are cleaned every two years and relubrication is done every five years.

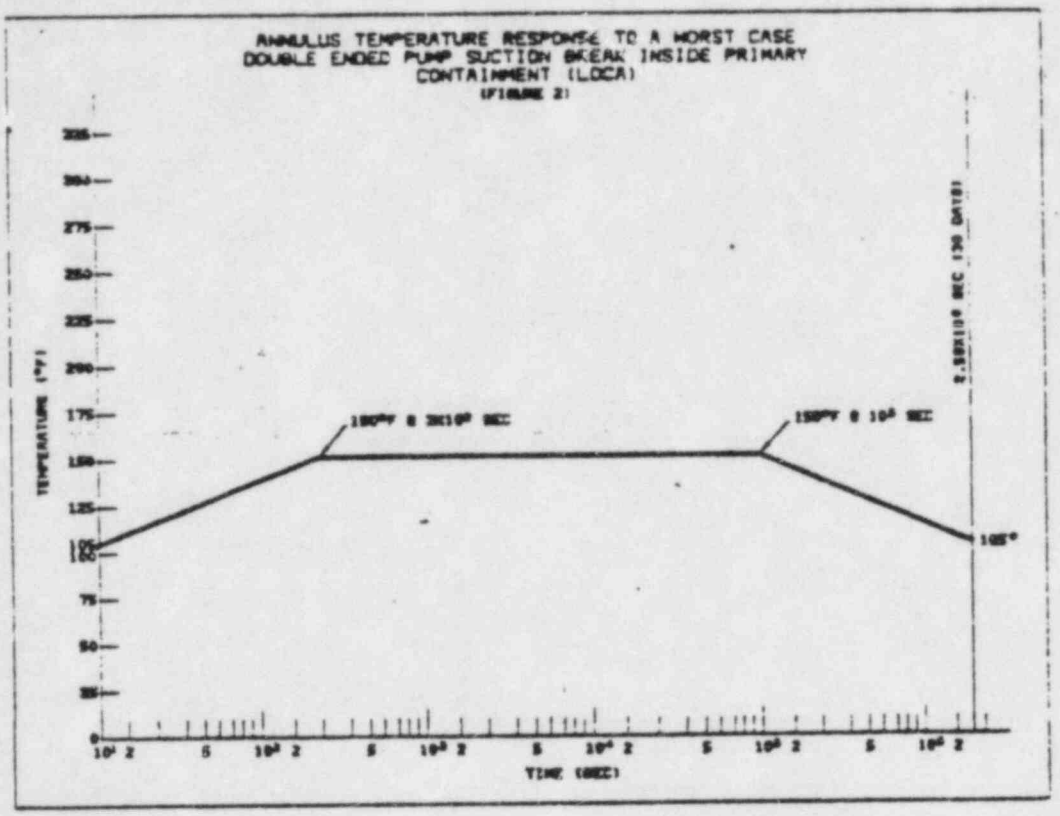
8. The normal and accident conditions to which the limit switches are exposed are within the manufacturer's specifications and less severe than the conditions to which the switch has been tested.

The limit switches perform their safety-related function within five minutes following an accident. Once the limit switches have operated, contact transfer must reoccur for limit switches to fail detrimental to plant safety. Limit switches have been seismically qualified and shorting due to environmental conditions is highly improbable.

The above information shows that the limit switches are fully qualified for operation in their environments, per NUREG-0588 Guidelines.

063166.03

TER Item No. 135
Figure 1



November 9, 1979

Estimation Of Service Life Of EA170-XX302 Limit Switches For Class 1E Use, Outside Of The Containment Area Of Nuclear Power Plants

TER Item No. 135
Attachment 1

Qualification Report Dated 3/17/78 & 7/24/78
Switch P/No. EA170-11302 Rev. E Through G.

The purpose of this presentation is to show that the service life of the EA170 series limit switch exceeds 20 years, under normal service conditions.

The Namco Controls' Qualification Test Procedure included three types of aging; thermal aging, mechanical aging and radiation aging.

As a result of an Engineering study the components of the switch were classified into three groups: elastomeric seals, other non-metallic components and metallic components.

The metallic components, such as, zinc alloy housings, steel alloy covers, steel alloy shafts and fasteners are not affected by the thermal conditions of service or test.

Non-metallic components; the contact carriers and blocks are made from thermoset plastics which has been supplied, by our vendor, to the industry for over fifteen years. This thermoset plastic is listed by UL with an index of 130 C, the average endurance time being 100,000 hours (12 years) for this temperature. Extrapolation of the regression curve provides an estimated life of greater than 50 years. The lubricant manufacturer was unable to provide thermal aging characteristics for the synthetic lubricants used, however; our experience indicates the proper application of the proper amount is more critical than the thermal aging characteristics of the lubricant.

Relubrication of the switch on a five year cycle would extend the life of the switch beyond the 20 year estimate.

Elastomeric seals, the cover gasket material is a methyl vinyl (VMQ) type silicone rubber, generic aging information for this type of material indicates that minimal physical changes occur after exposure to temperatures of 150 C (320 F) for less than one year (1) (2). Catalog data from the two leading manufacturers of silicone rubber states a service life of from 10 to 20 years at 150 C and when conservatively projected indicates a service life of greater than 90 years at 90 C (3).

The shaft seal is a viton o'ring, generic aging information on this type of material indicates that no change in durometer occurs after 11 months at 148° C and other physical characteristics actually improved (the o'ring is considered as a static seal). Indefinite service life is obtained under these conditions (4).

The EA170-XX302 series switches have a maximum rated temperature of 90° C. Service temperatures for outside the containment area (as proposed in IEEE 382 Drafts) range from 40° C to 60° C.

It is impractical to thermally age the switch assembly at a high enough temperature or long enough duration of time to cause a significant change in the three groups of materials and still simulate the long service life at low temperature without causing unusual outgassing and physical changes.

Therefore, the switch was heat soaked at 200° F for 200 hours to stabilize all the components.

The data search also disclosed that the radiation threshold of damage for viton and silicone rubber is as low as 1×10^7 Rads for some compounds (1) (4). The radiation aging, of the qualification test procedure, is 20.4×10^7 Rads. (1)

Therefore, it can be concluded that the elastomeric seals were at or beyond the condition of "end of life", as required by IEEE 323 (5). Before the switch was subjected to seismic conditions.

Based upon the above data we can consider the estimated service life of the EA170-XX302 series switches to be approximately 20 years, assuming the contacts are cleaned every two years and relubrication is carried out every five years.

References:

(1) General Electric Company
Technical Data Book S-1E
Silicone Rubber Technical Information

(2) Dow Corning Corporation
Designing with Silastic Silicone Rubber
Bulletin 17-158, Date: 10/72

(3) E. I. DuPont De Nemours & Co. (Inc.)
Elastomer Chemical Department
Wilmington, Delaware
Upgrading Seal Performance with DuPont Viton
Catalog A98591

(1) 40 YEARS OF RADIATION 4×10^6 RADS
ACCIDENT RADIATION 20×10^6 RADS
GRS 5/16/80

(4) E. I. DuPont De Nemours & Co. (Inc.)
Elastomer Chemical Department
Wilmington, Delaware
The Engineering Properties of Viton
Catalog A65053, 4/69

(5) IEEE 323-1974, Section 6.3.3 Aging
Std. For Qualifying Class IE Equipment for
Nuclear Power Generating Stations

TER Item No. 137

Manufacturer/Model No.

Namco Controls/Model EA 180

Status I

Resolution of Deficiencies

1. Connections/Interfaces

Teflon tape is not used as a thread sealant at the interface conduit connection to the limit switch housing.

Liquid tight flexible conduit with a synethetic jacket (Anaconda Company, Brass Division, "Sealtite Type UA" or Equivalent) and approved liquidtight connectors are used to interface the rigid conduit system with the limit switches. The limit switch housing has American Standard Taper Pipe Threads (NPT) which assures a tight connection.

2. Qualified Life (Post Accident)

Limit switches are required to operate for five minutes after the start of an accident and not to fail determinental to plant safety for periods of up to 100 days thereafter[1](depending on which accident occurs).

The manufacture's LOCA test profile (figure 1) more than satisfies the requirements of the actual MSLB/LOCA Profile (figure 2). In addition, the LOCA test extends out to 722 hours (30 days) at 200°F which is a more severe environment than denoted by the latter portions of the actual LOCA profile.

The limit switches perform their safety-related function within five minutes following an accident. Once the limit switches have operated, contact transfer must reoccur to allow premature opening of isolation valve upon reset of containment isolation signal. Limit switches have been seismically qualified and shorting of contacts due to moisture/ spray is highly improbable due to sealing of conduit connection.

Based on Engineering judgment, the above information justifies qualification of limit switches for their accident and post-accident environment.

3. Limit switches are not subject to submergence.

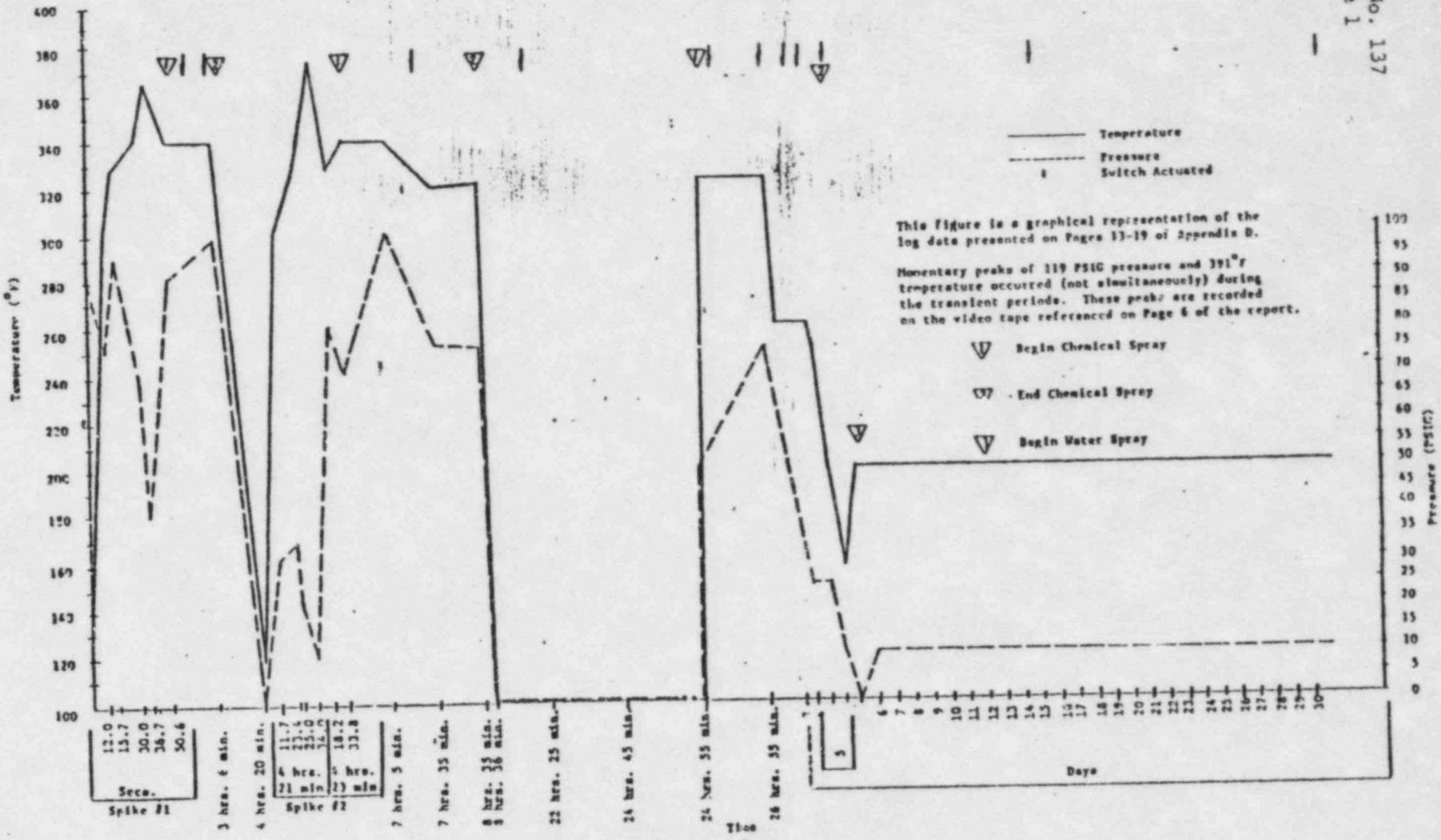
1. Required operating time reevaluated.

063166.03

TER Item No. 137
Figure 1

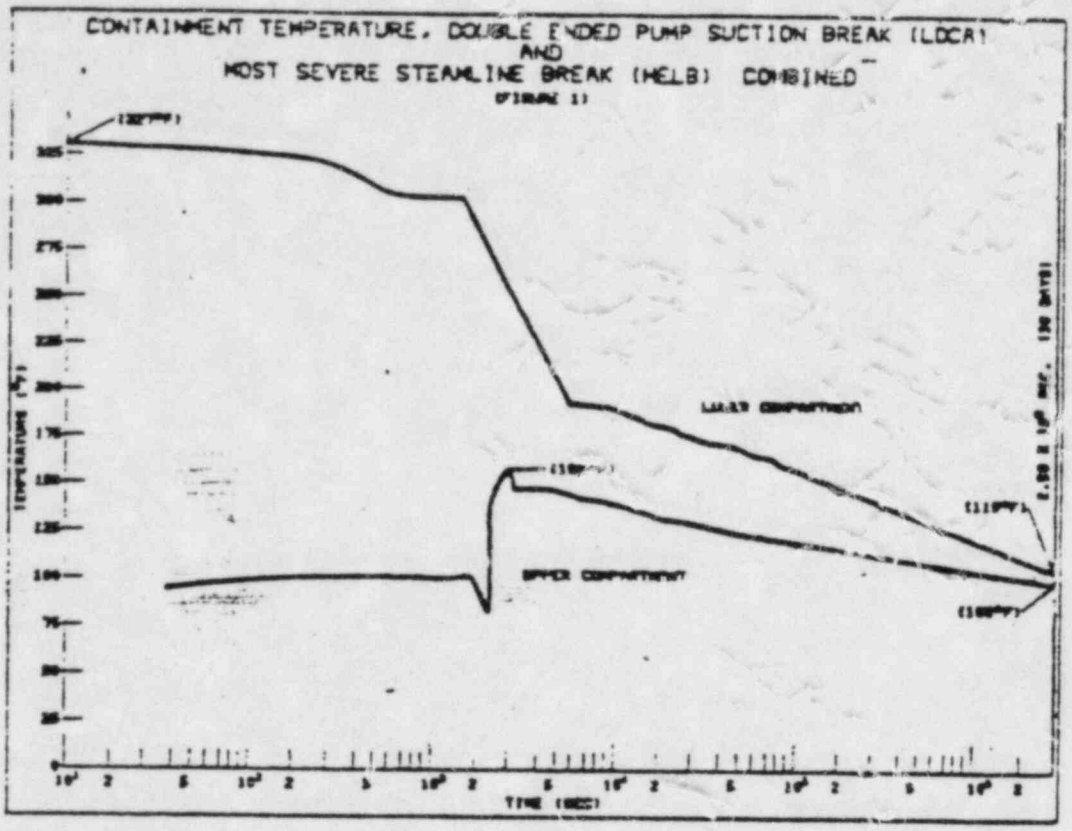
FIGURE 3

TEST CHAMBER PROFILE FOR ACCIDENT ENVIRONMENT SIMULATION
(As Recorded)



41-10

TER Item No. 137
Figure 2



TER Item No. 139

Manufacturer/Model No.

Namco Controls/Model EA 180

Status IV

Resolution of Deficiencies

Limit switches associated with FCV-62-72, -73, -74, FCV-77-16 and FCV-87-7, -8 are subject to submergence during accident conditions. The control logic for the isolation valves is being revised to delete limit switches from the control circuit and provide seal-in signal by means of electrical relays.

TER Item No. 146, 147

Manufacturer/Model No.

Namco Controls/Model EA 740 - Limit Switches
on FCV-77-127

Namco Controls/Model EA700 - Limit Switches
on FCV-77-128

Status

I - Limit Switches on FCV-77-127
IV - Limit Switches on FCV-77-128

Resolution of Deficiencies and/or Justification
for Continued Operation

I. TER Item No. 146 Limit Switches Associated with FCV-77-127

1. Connections/Interfaces

Teflon tape is not used as a thread sealant at the interface conduit connection to the limit switch housing.

Liquid tight flexible conduit with a synethetic jacket (Anaconda Company, Brass Division, "Sealtite Type UA" or Equivalent) and approved liquidtight connectors are used to interface the rigid conduit system with the limit switches. The limit switch housing has American Standard Taper Pipe Threads (NPT) which assures a tight connection.

2. Thermal Aging/Basis; Qualified Life

Thermal aging is being addressed on a basis of a surveillance and maintenance program instead of mathematical analysis as denoted in license submittal EEB-1018.

A materials breakdown of limit switches shows the presence of age subsceptable materials; EPR and NPR in cover gaskets and seals and a thermoset plastic (glass filled polyester) making up the switch

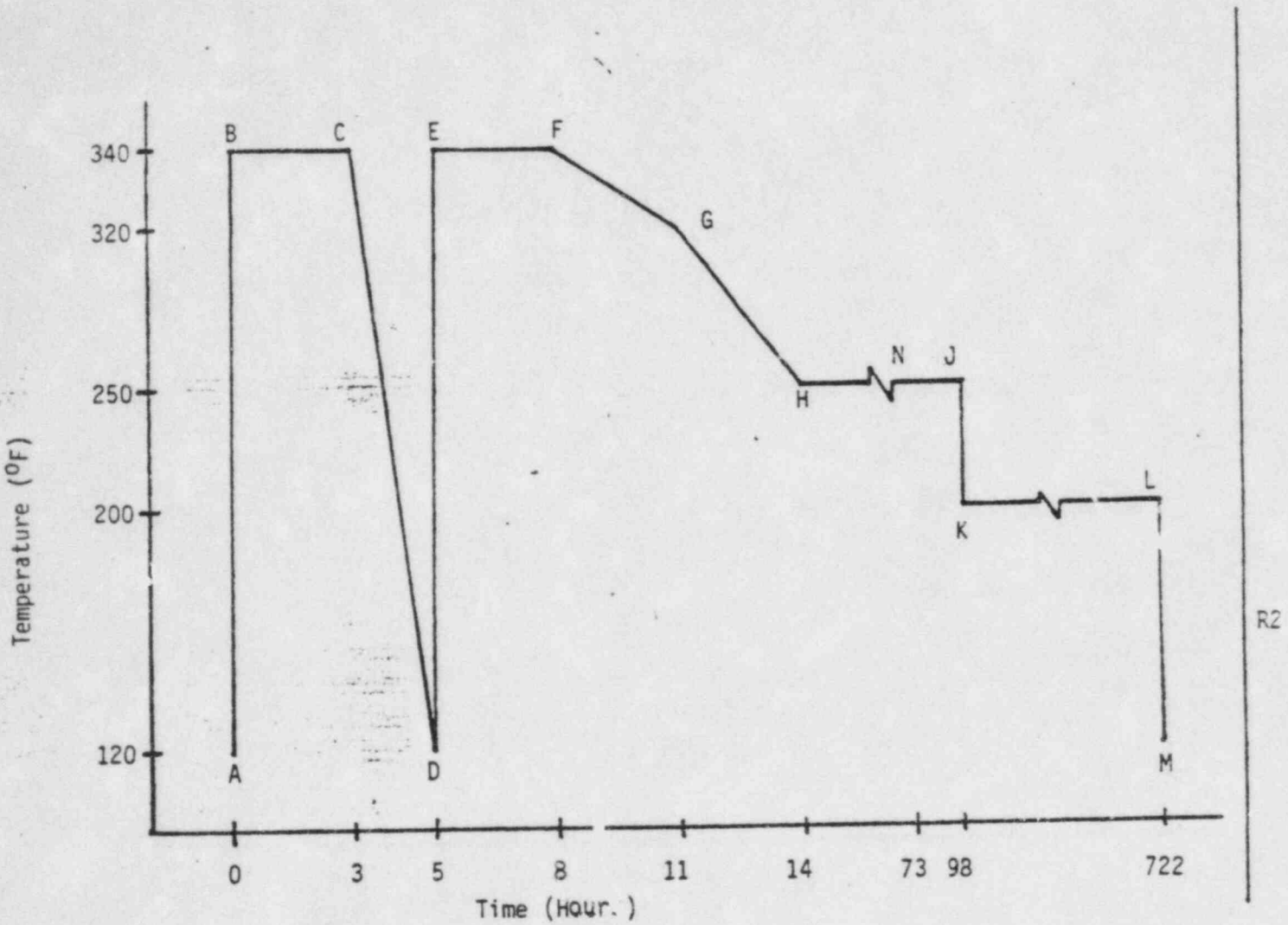


Figure 1. LOCA Simulation Test Profile

terminal block and contact carrier. Namco addressed the potential for aging in these materials in their qualification testing. No noticeable determintal effects were found after completion of qualification testing.

TVA will, however, monitor these switches for detrimental aging effects with TVA's established maintenance program that operates in accordance with TVA's Nuclear-Operation Quality Assurance Manual (N-(N-OQAM) (designed to meet the requirements of Appendix B 10CFR50) and ANSI-18-1976.

3. Qualified Life (Post-Accident)

Limit switches are required to operate for five minutes after the start of an accident and not to fail determinental to plant safety for periods of up to 100 days thereafter[1](depending on which accident occurs).

The manufacture's LOCA test profile (figure 1)more than satisfies the requirements of the actual MSLB/LOCA Profile (figure 2). In addition, the LOCA test extends out to 722 hours (30 days) at 200°F which is a more severe environment than denoted by the latter portions of the actual LOCA profile.

The limit switches perform their safety-related function within five minutes following an accident. Once the limit switches have operated, contact transfer must reoccur to allow premature opening of isolation valve upon reset of containment isolation signal. Limit switches have been seismically qualified and shorting of contacts due to moisture/spray is highly improbable due to sealing of conduit connection.

Based on Engineering judgment, the above information justifies qualification of limit switches for their accident and post-accident environment.

1. Required operating time reevaluated.

II. TER Item No. 147 Limit Switches Associated With FCV-77-128

1. Limit switches are located in the auxiliary building (690/A28, A29; Pipe Chase). They are required to operate for five minutes after the start of a LOCA/HELB inside containment and not to fail in a manner detrimental to plant safety for 100 days thereafter[1].

2. The switches are subject to LOCA and HELB (Volume 17) conditions. They are required to operate and not to fail in the following environment[2]:

	Normal	Abnormal	Accident
Temperature	104°F	110°F	110°F
Pressure	ATM	ATM	N/A
Relative Humidity	80%	90%	N/A
Radiation	3.5×10^5 Rads (40-Yr TID)	N/A	$< 1 \times 10^4$ Rads (LOCA)
Spray/Flooding	N/A	N/A	N/A

3. The manufacturer's specifications for the model EA700 Limit Switch are:

Temperature	194°F
Pressure	ATM
Relative Humidity	NEMA 4 Enclosure
Radiation	Not specified

4. See generic position 4.1.5 for radiation.

5. The normal and accident conditions with exception of radiation to which the limit switches are exposed are within the manufacturer's specifications for these devices. Radiation for an installed interim period is negligible and considered not detrimental to the safety function of these devices as they will be replaced as specified in paragraph 6 below.

6. The above information shows that the limit switches will function properly as required and are therefore qualified for an interim period. However, due to the lack of documentation required by NUREG-0588, TVA will replace these devices in accordance with 10CFR50.49 requirements.

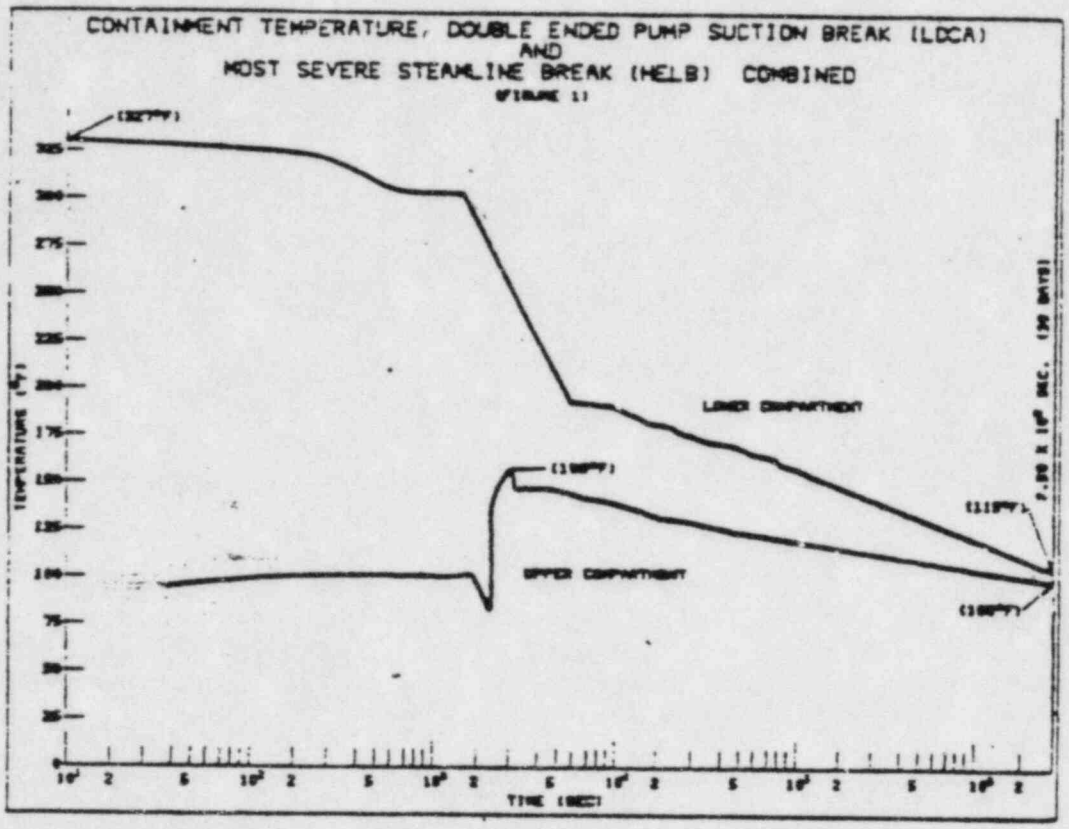
1. Required operating time reevaluated.

2. See SQN/WBN environmental data drawing 47E235-64.

063166.03

TER Item No. 146

Figure 2



TER Item No. 153

Manufacturer/Model No.

Fenwal Model 27120-50

Status III

Resolution of Deficiency

It is TVA's position that the justification for continued operation provided by EQS No. EEB-1022 for temperature switches TS-12-91A through -99A and TS-12-91B through -99B is adequate (see page 3A of TER item No. 153).

TER Item No. 156

Manufacturer/Model No.

Fenwal Model T675A

Status N/A

Resolution of Deficiencies

The safety function of the temperature switches 1, 2-TS-74-43, -44, -45, and -46 has been reviewed and they are now classifed as category C devices' per NUREG-0588 guidelines. Failure of these switches during any accident and in any mode is acceptable, and environmental qualification for harsh environments is not required.

1. EN DES Calculation NEB 830208 224

TER Item No. 160

Manufacturer/Model No.

Foxboro/Model E13 DM (MCA)

Status I

Resolution of Deficiencies

Information (proprietary) documenting the Environmental Qualification of Foxboro Model E13DM (MCA) transmitters was transmitted by letter No. NS-PLC-5023, dated April 26, 1978 (see attachment) from Westinghouse Electric Corporation Power Systems to E. G. Case, Acting Director, Office of Nuclear Reactor Regulation, US Nuclear Regulatory Commission.

063166.03

[redacted] Power System

[redacted]

April 21, 1978

[redacted]

[redacted]

Mr. Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue
Bethesda, Maryland 20014

8202050352

Dear Mr. Case:

AMERICAN ELECTRIC POWER PROJECTS
DONALD C. COOK UNIT 2 (DOCKET 50-316)
Environmental Qualification Status

Enclosed are:

1. Twenty-five (25) copies of Supplemental Information on Environmental Qualification of Safety Related Foxboro Instruments (Proprietary).

2. Forty (40) copies of Supplemental Information on Environmental Qualification of Safety Related Foxboro Instruments (Non-Proprietary).

3. Twenty-five (25) copies of Westinghouse Test Plan for Barton Instruments (Proprietary).

4. Forty (40) copies of Westinghouse Test Plan for Barton Instruments (Non-Proprietary).

Also enclosed are:

1. One (1) copy of Application for Withholding, AW-78-10, (Non-Proprietary).

2. One (1) copy of Application for Withholding and Affidavit (Non-Proprietary), AW-76-39

This submittal documents information provided to the staff at a meeting on April 5, 1978, concerning Item 3.1 of Amendment 2 of the Donald C. Cook Unit 2 Operating License. Part 1 of Enclosures 1 and 2 discuss the Foxboro transmitters utilized in the steam flow function. As a result of the staff's review of the currently installed instruments, a modification to the instruments is proposed which will provide additional

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AVAIL

TER ITEM NO: 160

assurance that the instrument will function, as required, under applicable postulated accident conditions. Part 2 of Enclosures 1 and 2 documents the information presented to the staff concerning the environmental qualification of the installed Foxboro instruments used to monitor pressurizer pressure. Part 3 of Enclosures 1 and 2 describe the results of Westinghouse tests on three identical Foxboro differential pressure transmitters. This testing is used to support the conclusions of Parts 1 and 2. Enclosures 3 and 4 document information presented to the staff concerning the Westinghouse verification testing of Barton transmitters.

By a separate letter, American Electric Power Service Corporation is authorizing this submittal on their docket no. 50-316.

This submittal contains proprietary information of Westinghouse Electric Corporation. In conformance with the requirements of 10CFR Section 2.790, as amended, of the Commission's regulations, we are enclosing with this submittal an application for withholding from public disclosure and an affidavit. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission.

Correspondence with respect to the affidavit or application for withholding should reference AW-78- and should be addressed to R. A. Wiesemann, Manager of Licensing Programs, Westinghouse Electric Corporation, P.O. Box 355, Pittsburgh, Pa. 15230.

Very truly yours,

T. M. Anderson, Manager
Nuclear Safety Department

/dcc

I. C. Ratsep/cj
Attachment

cc: R. W. Jurgensen, IL, (AEP), 1A, (1P, 1E)
R. F. Hering, IL (AEP)
S. M. Horowitz, IL (AEP)
S. J. Miliotti, IL (AEP)
J. G. Feinstein, IL (AEP) 1A

ENCLOSURE 2

ADDITIONAL EQUIPMENT REQUIRING JCO NOT REVIEWED IN SER/TER

Additional Equipment

1-MXS-46-1AC
1-MXS-46-1DC
2-MXS-46-1AC
2-MXS-46-1DC

Powell Electrical Manufacturing Company Transfer Switches

Status IV

Environmental Analysis and Justification for Continued Operation

The transfer switches are located in the auxiliary building, elevation 669, room A1. They must remain operational to perform safety-related functions in the event of a high energy line break (HELB) accident. The environmental conditions in which they must operate in the event of an accident are 134° F, 100 percent relative humidity, and 1×10^4 rads gamma radiation dose.

The switches lack environmental qualification data to substantiate their required operation following an HELB, and Nonconformance Report (NCR) SQNEEB8311 has been written to document this deficiency. The switches will be either replaced or relocated to a non-harsh environment. Until corrective action is complete, though, we believe the switches are suitable for interim operation for the following reasons:

1. The switches are contained in NEMA 1 enclosures which offer a measure of protection from adverse environmental effects.

2. The HELB conditions are relatively mild.

TER ITEM NO. N/A

MANUFACTURER/MODEL NO. Bailey/Model 555

STATUS IV

JUSTIFICATION FOR CONTINUED OPERATION For equipment added to SQN 10CFR50.49, Table ii.

1. Flow transmitters 1,2-FT-3-147 and -155 are located in the auxiliary building (714/A6, A10). Flow transmitters 1,2-FT-3-163 and -170 are located in the auxiiary building (690/A6, A19). They are required to operate for 100 days after the start of a LOCA/HELB inside containment and for 1 month after the start of all HELBs outside containment.

2. Flow transmitters 1,2-FT-3-147 and -155 are subject to HELB (Volume 14) and LOCA conditions. They are required to operate in the following environments[1]:

	Normal	Accident
Temperature:	104° F	192° F
Pressure:	Atm	Atm
Relative Humidity:	80%	100%
Radiation:	3.5×10^4 rads (40 yr. TID)	$< 1 \times 10^4$ rads (LOCA)
Spray/Flooding:	N/A	N/A

Flow transmitters 1,2-FT-3-163 and -170 are subject to HELB and LOCA conditions (Volume 15). They are required to operate in the following environments[2]:

	Normal	Accident
Temperature:	104° F	196° F
Pressure:	Atm	Atm
Relative Humidity:	80%	100%
Radiation:	U1 - 1.75×10^3 rads (40 yr. TID) U2 - 3.5×10^4 rads (40 yr. TID)	$< 1 \times 10^4$ rads (LOCA)
Spray/Flooding:	N/A	N/A

3. The manufacturer's specifications for the flow transmitters are:

Temperature:	-20°F to 185°F
Pressure:	Atm
Relative Humidity:	Not specified*
Radiation:	Not specified

*Rated for all outdoor installations.

4. See generic positions 4.1.5 for radiation and 4.1.8 for relative humidity.

5. The maximum normal operating temperature is 104°F. During an HELB, the temperature will rise to 196°F within 625 seconds, and then decrease linearly to the maximum normal operating temperature within 24 hours. The 11°F temperature rise above the manufacturer's specified maximum operating temperature of 185°F is of such short duration that it will not effect the operation of the transmitters.

6. The above information shows that the flow transmitters will function properly as required and are, therefore, qualified for an interim period. However, due to the lack of documentation required by NUREG-0588, TVA will replace these devices in accordance with 10CFR50.49 requirements.

[1]See SQN/WBN Environmental Data Drawing 47E235-83, -52.

[2]See SQN/WBN Environmental Data Drawing 47E235-59, -60.

TER ITEM NO. N/A

MANUFACTURER/MODEL NO. Masoneilan/Model 496-2

STATUS IV

JUSTIFICATION FOR CONTINUED OPERATION For equipment added to SQN 10CFR50.49, Table ii.

1. Limit switches associated with 1,2-FCV-70-85 are located in the auxiliary building (pipe chase area, Elev. 690/A28, A29). They are required to operate for 5 minutes after the start of an accident and not to fail detrimental to plant safety for 100 days thereafter.

2. Limit switches are required to operate in the following environments[1]:

	Normal	Abnormal	Accident
Temperature:	104° F	110°F	110° F
Pressure:	Atm	Atm	N/A
Relative Humidity:	80%	90%	N/A
Radiation:	3.5×10^5 rads (40 yr. TID)	N/A	1×10^4 rads (LOCA)
Spray/Flooding:	N/A	N/A	N/A

3. The manufacturer's specifications for limit switches are as follows:

Temperature:	180° F
Pressure:	Atm
Relative Humidity:	NEMA 4 Enclosure
Radiation:	Not specified

4. See generic positions 4.1.5 for radiation and 4.1.8 for relative humidity.

5. The above information shows that the limit switches will function properly as required and are, therefore, qualified for an interim period. However, due to the lack of documentation required by NUREG-0588, TVA will replace these devices in accordance with 10CFR50.49 requirenents.

[1]See SQN/WBN Environmental Data Drawing 47E235-64.

TER ITEM NO. N/A

MANUFACTURER/MODEL NO. Namco Controls/Model EA700

STATUS IV

JUSTIFICATION FOR CONTINUED OPERATION For equipment added to SQN 10CFR50.49, Table ii.

1. Limit switches 2-ZS-1-181, -182, -183, and -184 are located in the reactor building, lower containment, Elev. 712. They are required to operate for 5 minutes after the start of an accident and not to fail in a manner detrimental to plant safety for 100 days thereafter (depending on which accident occurs).

2. Limit switches are subject to LOCA/HELB conditions. They are required to operate and not to fail in then following environment[1]:

	Normal	Abnormal	Accident
Temperature:	120° F	130°F	327° F
Pressure:	14.7 psia	14.7 psia	26.4 psia
Relative Humidity:	80%	100%	100%
Radiation:	$2x10^7$ rads (40 yr. TID)	N/A	$1x10^8$ rads
Spray/Flooding:	N/A		Spray only

3. The manufacturer's specifications for the switches are:

Temperature:	194° F
Pressure:	Atm
Relative Humidity:	NEMA 4 Enclosure
Radiation:	Not specified

4. The above information indicates that limit switches will function properly for an interim period under normal and abnormal conditions (until replaced per NCR SQNEEB8309). Limit switches are not qualified for their required operating accident environment.

5. TVA will replace these limit switches with qualified switches in accordance with 10CFR50.49 requirements.

[1]See SQN/WBN Environmental Data Drawing 47E235-45.

TER ITEM NO. N/A

MANUFACTURER/MODEL NO. Custom Components/Model 604G

STATUS IV

JUSTIFICATION FOR CONTINUED OPERATION For equipment added to SQN 10CFR50.49, Table ii.

1. Pressure switches 1,2-PS-3-160A,-160B,-165A and -165B are located in the auxiliary building (west valve vaults, 706/A1, A11). They are required to to operatate for 5 minutes after being subjected to a main steam line break or a feedwater line break inside valve vaults and not to fail detrimental to plant safety for 100 days thereafter.

2. The pressure switches are required to operate in the following environments[1]:

	Normal	Accident
Temperature:	130° F	307° F
Pressure:	Atm	22.9 psia
Relative Humidity:	50%	100%
Radiation:	1.75×10^3 rads (40 yr. TID)	N/A
Spray/Flooding:	N/A	N/A

3. The manufacturer's specification for the pressure swithces are:

Temperature:	160° F
Pressure:	Atm
Relative Humidity:	NEMA 4 Enclosure
Radiation:	Not specified

4. See generic positions 4.1.5 for radiation and 4.1.8 for relative humidity.

5. The above information indicates that these switches are not qualified for their accident environment. These switches will be located to an area with less harsh environments and replaced with fully qualified devices in accordance with 10CFR50.49 requirements.

[1]See SQN/WBN Environmental Data Drawing 47E235-79.

TER ITEM NO. N/A

MANUFACTURER/MODEL NO. Mascneilan/Model 8012

STATUS III

JUSTIFICATION FOR CONTINUED OPERATION For equipment added to SQN 10CFR50.49, Table ii.

I. 1. Positioners on each of 1,2-LCV-3-148, -156, -164, and -171 are located in the auxiliary building (714/A1). They are required to operate for 100 days after the start of a LOCA/HELB inside containment and for 1 month after the start of all HELBs outside containment.

2. The positioners are subject to HELB (Volume 12) and LOCA conditions. They are required to operate in the following environments[1]:

	Normal	Accident
Temperature:	104° F	129° F
Pressure:	Atm	Atm
Relative Humidity:	80%	100%
Radiation:	5×10^2 rads (40 yr. TID)	$< 1 \times 10^4$ rads (LOCA)
Spray/Flooding:	N/A	N/A

3. The manufacturer's specifications for the positioners are:

Temperature:	180° F
Pressure:	Atm
Relative Humidity:	NEMA 4 Enclosure
Radiation:	Not specified

4. See generic positions 4.1.5 for radiation and 4.1.8 for relative humidity.

5. An accident simulation test to temperatures in excess of 320°F has been performed at Wyle Laboratories and has shown that these positioners will function properly as required and are, therefore, qualified for an interim period. Further testing is being done at Wyle Laboratories in Huntsville, Alabama, to provide qualification documentation as required by NUREG-0588. Testing will be completed by June 1, 1984.

[1]See SQN/WBN Environmental Data Drawing 47E235-49, -50.

II. 1. Positioners on each of 1,2-LCV-3-172, and -173 are located in the auxiliary building (714/A6, A10). They are required to operate for 100 days after the start of a LOCA/HELB inside containment and for 1 month after the start of all HELBs, except for an AFW pump turbine steam line break, outside containment. For an AFW pump turbine steam line break, positioners are classified category C.

2. The positioners are subject to HELB (Volume 14) and LOCA conditions. They are required to operate in the following environments[2]:

	Normal	Accident
Temperature:	104° F	192° F
Pressure:	Atm	Atm
Relative Humidity:	80%	100%
Radiation:	1×10^6 rads (40 yr. TID)	$< 1 \times 10^4$ rads (LOCA)
Spray/Flooding:	N/A	N/A

3. The manufacturer's specifications for the positioners are:

Temperature:	180° F
Pressure:	Atm
Relative Humidity:-	NEMA 4 Enclosure
Radiation:	Not specified

4. See generic positions 4.1.5 for radiation and 4.1.8 for relative humidity.

5. An accident simulation test to temperatures in excess of 320°F has been performed at Wyle Laboratories and has shown that these positioners will function properly as required and are, therefore, qualified for an interim period. Further testing is being done at Wyle Laboratories in Huntsville, Alabama, to provide qualification documentation as required by NUREG-0588. Testing will be completed by June 1, 1984.

[2]See SQN/WBN Environmental Data Drawing 47E235-83, -52.

III. 1. Positioners on each of 1,2-LCV-3-174, and -175 are located in the auxiliary building (west valve vaults, 706/A1, A11). They are required to operate for 100 days after being subjected to a main steam line break or a feedwater line break inside valve vaults.

2. The positioners are required to operate in the following environments[3]:

	Normal	Accident
Temperature:	130° F	307° F
Pressure:	Atm	22.9 psia
Relative Humidity:	50%	100%
Radiation:	1.75×10^3 rads (40 yr. TID)	N/A
Spray/Flooding:	N/A	N/A

3. The manufacturer's specifications for the positioners are:

Temperature:	180° F
Pressure:	Atm
Relative Humidity:	NEMA 4 Enclosure
Radiation:	Not specified

4. See generic positions 4.1.5 for radiation and 4.1.8 for relative humidity.

5. An accident simulation test to temperatures in excess of 320°F has been performed at Wyle Laboratories and has shown that these positioners will function properly as required and are, therefore, qualified for an interim period. Further testing is being done at Wyle Laboratories in Huntsville, Alabama, to provide qualification documentation as required by NUREG-0588. Testing will be completed by June 1, 1984.

[3]See SQN/WBN Environmental Data Drawing 47E235-79.

TER ITEM NO. N/A

MANUFACTURER/MODEL NO. Bailey/Model 556

STATUS IV

JUSTIFICATION FOR CONTINUED OPERATION For equipment added to SQN 10CFR50.49, Table ii.

1. Pressure transmitters 1,2-PT-3-122A are located in the auxiliary building (690A1). They are required to operate for 100 days after the start of a LOCA/HELB inside containment and for 1 month after the start of all HELBs outside containment.

2. The pressure transmitters are subject to HELB (Volume 9, 19) and LOCA conditions. They are required to operate in the following environments[1]:

	Normal	Accident
Temperature:	104° F	113° F (Volume 9) 118° F (Volume 19)
Pressure:	Atm	Atm
Relative Humidity:	80%	100%
Radiation:	5×10^2 rads (40 yr. TID)	$< 1 \times 10^4$ rads (LOCA)
Spray/Flooding:	N/A	N/A

3. The manufacturer's specifications for the pressure transmitters are:

Temperature:	180° F
Pressure:	Atm
Relative Humidity:	NEMA 4 Enclosure
Radiation:	Not specified

4. The temperature and pressure environment in which the transmitters are located and the accident temperature and pressure environment to which they may be subjected is less severe than the manufacturer's specifications. See generic positions 4.1.5 for radiation and 4.1.8 for relative humidity.

5. The above information shows that these pressure transmitters will function as required and, therefore, qualified for an interim period. However, due to lack of documentation required by NUREG-5088, TVA will replace these devices in accordance with 10CFR50.49 requirements.

[1]See SQN/WBN Environmental Data Drawing 47E235-55, -57, and -58.

TER ITEM NO. N/A

MANUFACTURER/MODEL NO. ITT Barton/Model 288

STATUS IV

JUSTIFICATION FOR CONTINUED OPERATION For equipment added to SQN 10CFR50.49, Table ii.

1. For flow switches

   0-FS-65-25A/B
   0-FS-65-25B/A
   0-FS-65-31A/B
   0-FS-65-31B/A
   0-FS-65-44A/B
   0-FS-65-44B/A
   0-FS-65-55A/B
   0-FS-65-55B/A
   0-FS-65-56A/B
   0-FS-65-56B/A

2. Flow switches are located in the auxilary building (734/A16). They are required to operate for 100 days following a LOCA inside containment. For all HELBs, flow switches are classified category C.

3. Flow switches are required to operate in the following environments[1]:

	Normal	Abnormal	Accident
Temperature:	104° F	110°F	110° F
Pressure:	Atm	Atm	N/A
Relative Humidity:	80%	90%	N/A
Radiation:	3.5×10^2 rads (40 yr. TID)	N/A	1×10^7 rads (LOCA)
Spray/Flooding:	N/A	N/A	N/A

4. The manufacturer's specifications for limit switches are as follows:

Temperature:	200° F
Pressure:	Atm
Relative Humidity:	NEMA 4 Enclosure
Radiation:	Not specified

5. See generic position 4.1.8 for relative humidity.

6. Flow switches are not qualified for their accident radiation environment. TVA will electrically remove (per ECN L5124) flow switches from control circuit to eliminate their safety function until environmentally qualified replacements are installed.

[1]See SQN/WBN Environmental Data Drawing 47E235-81.

TER ITEM NO. N/A

MANUFACTURER/MODEL NO. Custom Components/Model 604G

STATUS IV

JUSTIFICATION FOR CONTINUED OPERATION For equipment added to SQN 10CFR50.49, Table ii.

1. Pressure switches 1,2-PS-3-121A, -121B, and -121D are located in the auxiliary building (669 A6, A26). They are required to operate for 100 days after the start of a LOCA/HELB inside containment and for 1 month after the start of all HELBs, except for an AFW pump turbing steam line break, outside containment. For an AFW pump turbine steam line break, pressure switches are classified category C.

2. The pressure switches are subject to HELB (Volume 5) and LOCA conditions. They are required to operate in the following environments :

	Normal	Accident
Temperature:	104° F	172° F
Pressure:	Atm	Atm
Relative Humidity:	80%	90%
Radiation:	$5x10^2$ rads (40 yr. TID)	$1x10^4$ rads (LOCA)
Spray/Flooding:	N/A	N/A

3. The manufacturer's specifications for the switches are:

Temperature:	160° F
Pressure:	Atm
Relative Humidity:	NEMA 4 Enclosure
Radiation:	Not specified

4. See generic positions 4.1.5 for radiation and 4.1.8 for relative humidity.

The maximum normal operating temperature is 104°F. During an HELB, the temperature will rise to 172°F within 650 seconds, decrease to 144°F within 800 seconds (from start of accident) and then decrease to the maximum normal operating temperature within 24 hours. The 12°F temperature rise above the manufacturer's specified maximum operating temperature of 160°F is of such short duration that it will not effect the operation of the pressure switches.

6. The above information shows that the pressure switches will function properly as required and are, therefore, qualified for an interim period. However, due to the lack of documentation required by NUREG-0588, TVA will replace these devices in accordance with 10CFR50.49 requirements.

[1]See SQN/WBN Environmental Data Drawing 47E235-71, -72.