P.O. BOX 029100 MIAMI, FLA 33152

FPL
FLORIDA POWER & LIGHT COMPANY

July 3, 1979
L-79-182

Mr. James P. O'Reilly, Director, Region II
Office of Inspection and Enforcement
U. S. Nuclear Regulatory Commission
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

Re: RII:JPO
50-250, 50-251
IE Bulletin 79-01

The attached information is submitted in response to the subject Bulletin. A detailed test documentation package will be available at the Turkey Point plant site by early August, 1979.

As discussed in the Attachment, the following equipment will be replaced:

(a) ASCO solenoid valves and NAMCO limit switches, including sealant material, on Letdown Line isolation valves, Containment Purge Supply and Exhaust isolation valves, the Instrument Air Bleed isolation valve, and CVCS to RCS Cold Leg isolation valves, and

(b) Magnetrol Level Switches in the containment sumps.

In addition, a design verification review will be performed for the instrumentation in the Emergency Containment Filter Unit.

The Attachment also discusses the justification for continued operation until the above actions can be performed.

Very truly yours,

Robert E. Uhrig

Robert E. Uhrig
Vice President
Advanced Systems & Technology

REU/MAS/cph
Attachment
cc: Robert Lowenstein, Esquire

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FLORIDA POWER AND LIGHT CO.

RESPONSE TO I&E BULLETIN 79-01

FOR TURKEY POINT UNITS 3 & 4

ENVIRONMENTAL QUALIFICATION

OF CLASS IE EQUIPMENT

July 2, 1979

595. 087

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1. Introduction

This report is in response to I&E Bulletin 79-01 which contained the NRC's request for written evidence of the qualification of electrical equipment required to function under post-accident conditions. The report includes a description of the licensed post-accident environmental conditions, the actual qualification data available and our conclusions. The equipment required and environmental conditions described have been selected following a review of the Turkey Point 3 & 4 licensing docket. Documents contained therein which were utilized to establish qualification parameters include the FSAR, the SER and various letters to the AEC/NRC outlining changes in the license and operating procedures. This search was undertaken to ensure the report contained a complete and updated compilation of electrical equipment inside containment required post-LOCA, plus the limiting environmental conditions.

The construction of Turkey Point 3 & 4 was announced on November 15, 1965, with a Construction Permit granted on April 27, 1967. Unit 3 received its Operating License on July 19, 1972, and Unit 4 on April 10, 1973. Due to the early vintage of these units, much of the equipment purchased was state of the art at that time. In addition, the Quality Assurance/ Quality Control programs and documentation requirements were not as well developed or extensively applied as they are presently. The result of this has led to difficulties in locating the documentation of the testing and qualification of some of the electrical equipment discussed in this report.

The search for the documentation included file searches, both at the FPL General Office and at the plant and visits and communications with the equipment vendors to obtain records held in their files. This effort became more difficult with the passage of time as companies relocated, were purchased and absorbed by larger firms or dropped out of the nuclear supply business. Difficulties such as these have led to time consuming delays in many cases when searching for documentation. Additional problems which occurred during this review, include such things as the lack of an FSAR commitment for qualification to the containment chemical spray environment and the periodic changeout of original equipment due to normal plant maintenance.

A significant amount of qualification documentation was recovered for these electrical devices. In combination with the engineering extrapolations and analyses performed where necessary, the majority of the equipment located inside the containment was shown to be capable of performing asdesigned post-accident. In certain cases such documentation could not be found, or the available documentation was insufficient to draw any firm conclusions. The following summarizes the status of these devices:

1) ASCO Solenoids (SV-200A,200B,200C; SV-2601,2603,2804,2806; SV-2819; SV-310A,310B): These have been reordered and will be replaced during the first available outage following receipt.

2) NAMCO Limit Switches: These are being reordered and will be replaced during the first available outage following receipt.

3) Emergency Containment Filter Unit Thermocouple Reference Junction, Thermocouples, Thermocouple Extension Wire and Air Flow Switches: A post-accident design verification is underway and subsequent action will be taken to meet system qualification guidelines pending the outcome. Followup action will be scheduled upon completion of the design review.

4) Magnetrol Limit Switch: We are currently investigating qualified replacements. These switches will be replaced at the first available outage following receipt.

In all these cases, the function of the devices were reviewed and the determination was made that the plant could continue to operate until replacements could be made without undue risk to the health and safety of the public.

2. Post-Accident Environment

2.1 Post-LOCA Environmental Conditions

The environmentally limiting Design Bases Events for Turkey Point Units 3 & 4 are the Loss of Coolant Accident and Steam Line Break (inside containment). The post-LOCA environment is the most limiting with respect to total mass and energy release to the containment plus maximum containment pressure (see FSAR section 14.2.5 and 14.3.4). The Turkey Point FSAR does not contain pressure/temperature envelopes for the time spans required. Therefore we have conservatively developed envelopes to be used in this effort.

The environment caused by the postulated double ended break LOCA (minimum safeguards operating) is described in the FSAR Section 14.3.4. The containment pressure envelope which bounds the FSAR curves is shown in Figure 1. In the FSAR the containment pressure transient was calculated for a range of large area ruptures of the Reactor Coolant System. The rupture sizes considered were (a) double ended rupture (b) 6 ft^2 break (c) 3 ft^2 break and (d) 0.5 ft^2 break. FSAR figure 14.3.4-2 presents the results of the transients. For all cases a pressure peak of less than 49.9 psig was calculated. In the transients one of two spray pumps and two of three fan coolers starting at 60 seconds were assumed.

The containment temperature envelope shown in Figure 2 was developed from the double ended break pressure transient of Figure 1. The temperatures associated with the respective pressures were obtained from outputs of the COCO program runs provided by Westinghouse during the development of the FSAR accident analyses cases. This figure is not provided in the FSAR, however the maximum temperature associated with the maximum pressure (49.9 psig) is provided in the FSAR as 276°F.

The Radiation Dose that the equipment will be exposed to is dependent on the specific period of time the equipment is required to operate following a LOCA. The FSAR states that the maximum dose rates within the containment would be approximately 4.2×10^6 rads per hour or 2.6×10^7 rads per week. Furthermore, the LOCA radiation dose was described in Florida Power and Light Company letter to the NRC dated February 7, 1969, Docket Numbers 50-250 and 50-251. The calculated intensity of the radioactivity in the containment building as a function of time after a LOCA was provided in Figure 1 of the aforementioned submittal. The amount of radioactivity postulated to be released into the containment from the core was calculated according to the assumptions given in TID-14844 reference (1).

The exposure rate to equipment inside containment is shown in Figure 3 attached "Exposure Rate of Motors and Blowers to Radioactivity." The assumptions for the calculations are given in the figure, which was submitted to the NRC on February 7, 1969.

The total radiation dose to each specific equipment was obtained by using the curve in Figure 3 for time periods between 100 seconds and 10^7 seconds (~116 days). For the first 100 seconds of time it was conservatively assumed that at time 1 second the dose rate was 4.2×10^6 rads per hour (per FSAR page 7.5-11 maximum dose rate) which then linearly decreased to the value shown in Figure 3 at time 100 seconds.

The post-LOCA dose to each piece of equipment was calculated based on the dose rate values in Figure 3 (for the specified time period) multiplied by the time the equipment is required to function in the post-LOCA environment.

To arrive at the "total radiation dose" for which the equipment should be qualified, the 40 year normal operation integrated dose (conservatively estimated as 1 rad per hr for 40 years continuous) of 3.5×10^5 rads is added to the post-LOCA dose.

Based on a review of the licensing commitments, operational time requirements were determined to be one of the following: 5 minutes, 30 minutes, 2 hours, 3 hours, eight hours, 20 hours, 24 hours, and 31 days. Using these time periods, a bounding pressure envelope was developed. The envelope conservatively bounds the FSAR containment pressure transient (figure 14.3.4-2). For times greater than 10,000 sec and less than 24 hours, the transient data was obtained from curves provided by Westinghouse for FPL (letter was dated March 21, 1968, FPL- W-704) for the double ended cold leg break with 2 emergency containment coolers operating. For times greater than 24 hours and less than 31 days it was concluded that the pressure would be below 5 psig, based on the data provided in WCAP-7410-L which states that the pressure transients shown represents maximum conditions for Westinghouse PWR designed reactors, (see WCAP 7410-L Figure 1). A similar procedure was used in developing a bounding temperature envelope.

The total radiation dose envelope for equipment is the sum of the 40 year normal operation integrated dose (3.5×10^5 rads) plus the radiation dose during the post-LOCA operation period.

The relative humidity was assumed as 100% throughout the post-accident operation period required for the specific equipment.

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REFERENCES

1) J. J. DiNunno, F. D. Anderson, R. E. Baker, and R. L. Waterfield, Calculation of Distance Factors for Power and Test Reactor Sites, USAEC Report TID-14844, Mar. 23, 1962.

TABLE I
TURKEY POINT 3 & 4 LOCA ENVIRONMENT QUALIFICATION
CONDITIONS

Qualification Level	Time	Temperature (°F)	Pressure (PSIG)	Humidity (%)	Radiation (R)
I	0 - 5 min	276	50	100	2×10^5
II	5 - 30 min	266	42	100	6×10^5
III	30 min - 2 hr	226	22	100	2×10^6
IV	2 - 3 hr	216	18	100	8×10^5
V	3 - 8 hr	206	15	100	3×10^6
VI	8 - 20 hr	198	13	100	4×10^6
VII	20 - 24 hr	198	13	100	8×10^5
VIII	24 hr - 31 days	152	5	100	3×10^7
TOTAL LOCA DOSE:					4.2×10^7

NOTE: 40 year normal operation integrated dose to be added to the total LOCA dose = 3.5×10^5 Rads

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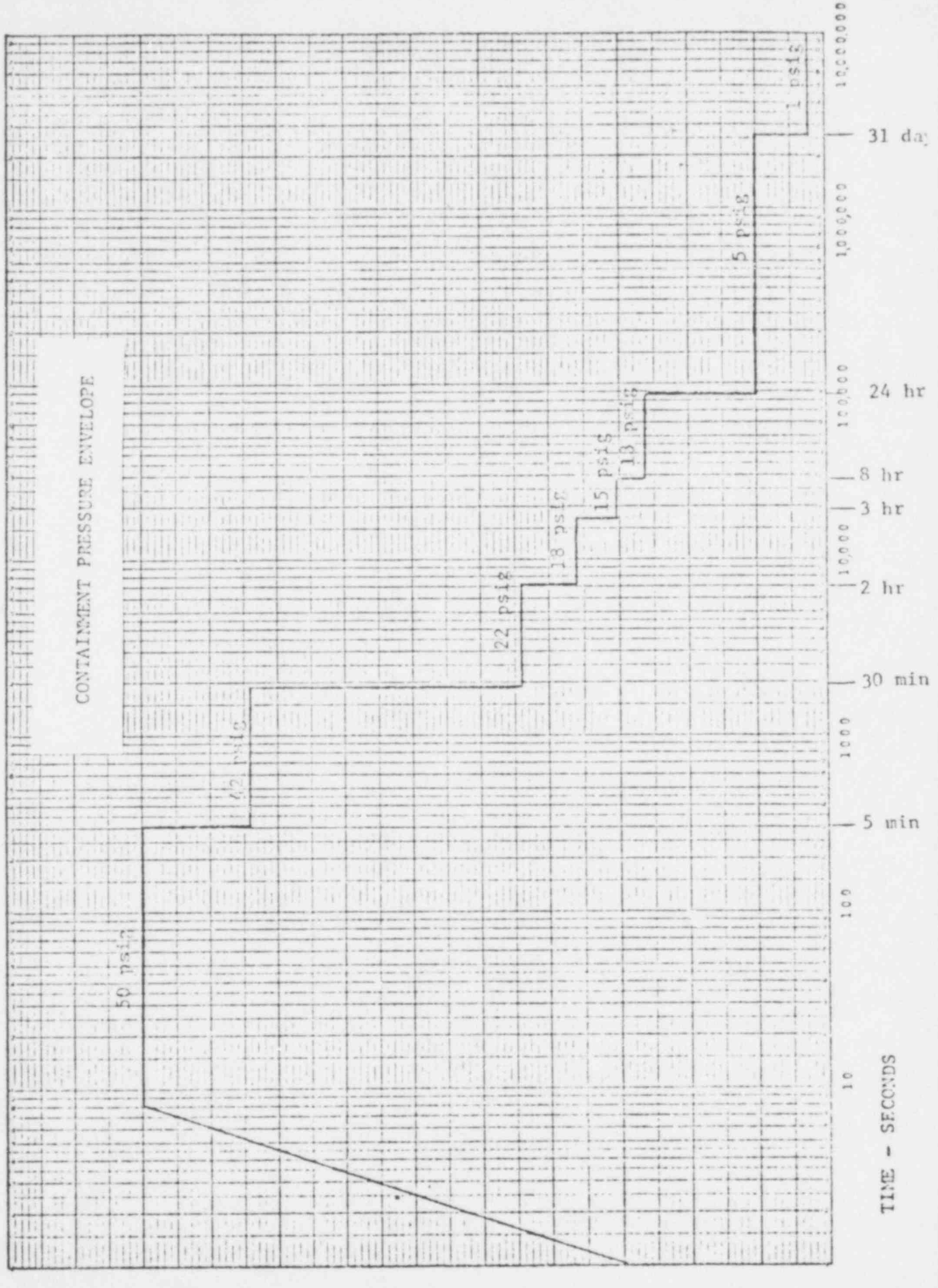

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FIGURE 1

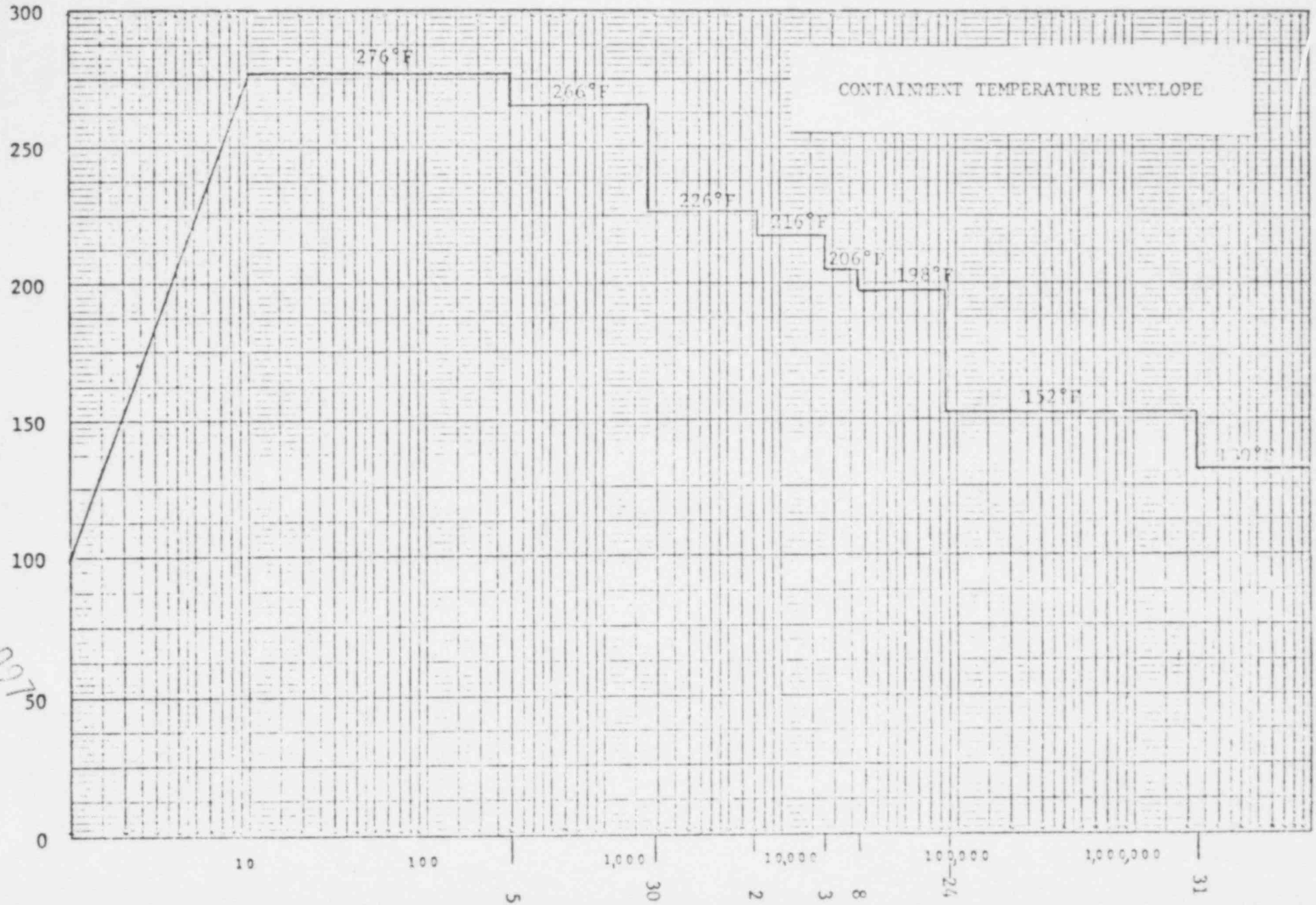

FIGURE 2

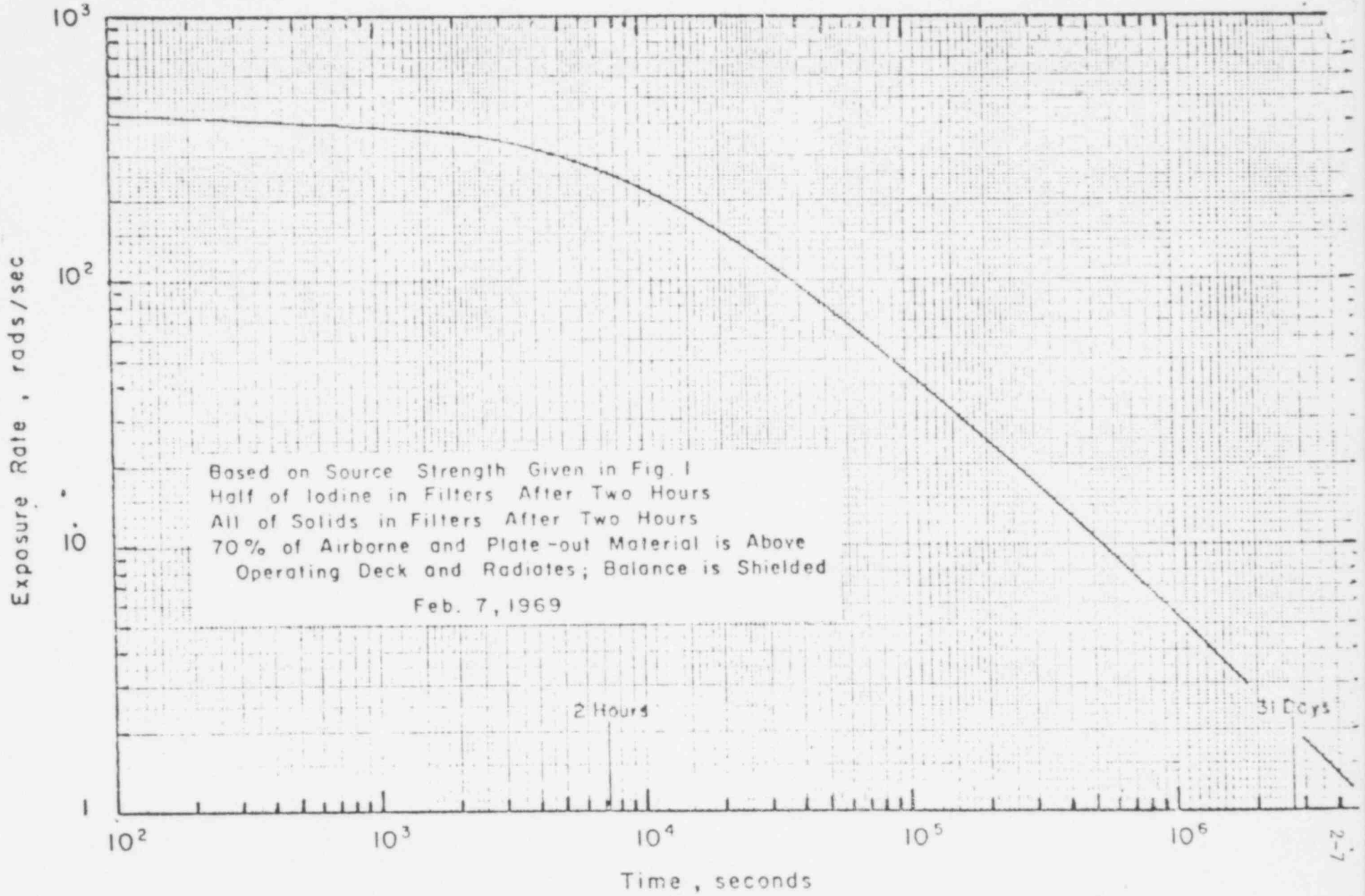

Fig. 3 Exposure Rate of Motors and Blowers to Radioactivity.

FPL
Docket Nos. 50-250
50-251

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2.2 Containment Spray Chemical Environmental Conditions

Testing of electrical equipment required for the safe shutdown of the plant to determine the effects of the chemistry of the containment spray was not a design commitment of Turkey Point. The commitment to raise the pH to 7.2 in the sump recirculation water within 12 hours arose from concerns over the prevention of chloride stress corrosion. The pH of the sump recirculation, up until the first batch of borax, is injected is 4.98.

The effects of this mild acidic environment will only be seen directly by electrical equipment during the length of time the containment spray is operating. The containment sprays are initiated at pressure over 20 psig and the operating procedures allow for termination of spray any time after switch over from injection to recirculation provided containment pressure is below 30 psig. Therefore, it is most probable that the sprays will only be operated for approximately 1/2 hour post-LOCA (see section 2.1 for a description of the post-LOCA environment).

Therefore, due to the mild acidic nature of the spray and the short term exposure the devices will see, no significant corrosion problem will develop causing the potential for equipment failure. Should sprays be required during the long term post-accident time period, the pH of the spray will have been raised to a virtually neutral level.

3. Qualification of Electrical Equipment

3.1 Introduction to Section

The purpose of this section is to present a summary of the qualification data for electrical equipment located inside the containment which is required to function under postulated accident conditions (see Section 2 for description of the post-accident conditions). The selection of the summarized equipment corresponds to those required for the safe shutdown of the plant following a Design Bases Accident as stated in the various licensing documents in the docket (FSAR, SER, letters to the NRC, etc.).

The summary sheets in section 3.2 discuss the method used in qualifying electrical equipment as found in the available documents. The actual documentation and a summary of the report results are refetenced in the appropriate page of Section 5. In those cases where further analytical work was required or where justification for continued unit operation has been given interim to replacement or requalifying equipment, a reference has been provided to the appropriate page in Subsection 3.3. Qualification test records and analyses will be available in site.

The investigation for data was done on a "loop" basis. That is, the emphasis was placed on obtaining qualification data for the entire electrical loop from the penetration to the device. For example, the manufacturer and model number was obtained for the penetration, cable, splices, valve position indication and valve operator for all containment isolation valves, and qualification data was pursued for each component in the loop. This approach was utilized to avoid a piecemeal component search, assure completeness and assure post-accident operability of each individual component required to perform a function necessary for the safe shutdown of the plant.

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SECTION 3.2

POST - ACCIDENT EQUIPMENT

QUALIFICATION SUMMARY

MANUFACTURER & MODEL	POST-ACCIDENT FUNCTION	TIME REQUIRED	AVAILABLE QUALIFICATION DATA	QUALIFICATION METHOD(S)	REMARKS
1) Fischer & Porter Company 50EP1041BCXA-NS	- Pressurizer pressure input to S.I. initiation logic - Needed to decide when to initiate steam dump following a small break LOCA	30 Min.	Page 5-1	By Test	-
2) Fischer & Porter Company 10B2496PBBABBB-NS	- Steam generator steam flow input to S.I. initiation logic	5 Min.	Page 5-2	By Test	-
3) Fischer & Porter Company 13D2495KBBABBB-NS	- Post-accident steam generator level indication for level control	24 Hrs.	Page 5-3	By Test and FPL Analysis	See section 3.3-1
4) ITT Barton 386/351	- Pressurizer water level input to S.I. initiation logic - Pressurizer water level input to steam line isolation logic	30 Min.	Page 5-4	By Test	-
5) Rosemount Inc. 176KF	- RCS average temperature input to S.I. initiation actuation logic - RCS average temperature to steam line isolation actuation logic	5 Min.	Page 5-5	By Test	-
6) Conax Corporation 300-E-SS12-GT4	- Thermocouples installed to record the air and charcoal temperature in the emergency filter units	3 Hrs.	None	-	See section 3.3-2

MANUFACTURER & MODEL	POST-ACCIDENT FUNCTION	TIME REQUIRED	AVAILABLE QUALIFICATION DATA	QUALIFICATION METHOD(S)	REMARKS
7) Consolidated Ohmic Devices EZT 213-D9 Poc	- Provides reference junction for the emergency containment filter temperature elements	3 Hrs.	None	-	See section 3.3-3
8) Magnetrol Inc. A153-F-EP/VP-X-Y-M13H-M13H	- Level switch provides containment recirculation sump level indication	3 Hrs.	None	-	See section 3.3-4
9) Ball Manufacturing Company	- Air flow switches detect loss of air flow thru containment filter units and initiate opening of the charcoal filter unit dousing valves	3 Hrs.	None	-	See section 3.3-5
10) Limitorque Corporation SMB-3	- Motor operator for valve in low-head safety injection path. - Closure required to block cold leg injection to lineup the redundant low head hot leg injection. - Open on S.I. signal	20 Hrs.	Page 5-6	By Test	-
11) Limitorque Corporation SMB-00	- Motor operator for valve in hot leg injection path to preclude postulated boric acid concentration	2 Hrs.	Page 5-7	By Test	-

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MANUFACTURER & MODEL	POST-ACCIDENT FUNCTION	TIME REQUIRED	AVAILABLE QUALIFICATION DATA	QUALIFICATION METHOD(S)	REMARKS
(12) Limitorque Corporation SMB-1	- Motor operator for redundant low head hot leg injection valve used to prevent postulated boric acid concentration	2 Hrs.	Page 5-8	By Test	-
(13) Item 1 Automatic Switch Company (ASCO) LB831614	- Air supply solenoid to the instrument air bleed containment isolation valve	5 Min.	None	-	See section 3.3-6a
Item 2 Automatic Switch Company (ASCO) LB831654	- Air supply solenoid to the CVCS charging line valves (HCV-310A & B) used for post-LOCA chemical injection to RCS to control sump water pH	8 Hrs.	None	-	See section 3.3-6b
Item 3 Automatic Switch Company (ASCO) L3831654	- Solenoid operator for chemical and volume control system letdown line containment isolation valve	5 Min.	None	-	See section 3.3-6c
Item 4 Automatic Switch Company (ASCO) LB-831665	- Solenoid operator for containment purge system isolation valves	5 Min.	None	-	See section 3.3-6d

MANUFACTURER & MODEL	POST-ACCIDENT FUNCTION	TIME REQUIRED	AVAILABLE QUALIFICATION DATA	QUALIFICATION METHOD(S)	REMARKS
(14) Automatic Switch Company (ASCO) X8211-B46SW (HV-164-196)	- Solenoid operator for valve which provides water spray to charcoal filter to prevent iodine re-release upon filter heat up from decay heat following loss of air flow	72 Hrs.	Page 5-9	By Test and FPL analysis	See section 3.3-7
(15) Reliance Electric Company 38-26.5-1170	- Emergency containment cooler motor used to remove heat from containment post-accident	3 Hrs.	Page 5-10	By Test	-
(16) Reliance Electric Company (Motor) P/BC42.25-26.5 1170	- Emergency containment filter motor used to remove iodine from post-LOCA containment atmosphere - Provides decay heat removal from charcoal beds	3 Hrs.	Page 5-11	By Test	-
(17) Item 1 NAMCO D 2400X	- Position indication only of post-LOCA chemical addition valves	8 Hrs.	None	-	See section 3.3-8a
Item 2 NAMCO D 2400X	- Position indication only of CVCS letdown isolation valves	5 Min.	None	-	See section 3.3-8b

MANUFACTURER & MODEL	POST-ACCIDENT FUNCTION	TIME REQUIRED	AVAILABLE QUALIFICATION DATA	QUALIFICATION METHOD(S)	REMARKS
Item 3 NAMCO D1200G	- Position indication only of containment purge isolation valves	5 Min.	None	-	See section 3.3-8c
Item 4 NAMCO D 1200G	- Position indication only of instrument air bleed valve	5 Min.	None	-	See section 3.3-8d
18) The Okonite Company X-Olene/Okoseal	- Cable to equipment requiring post-LOCA operation	31 Days	Page 5-12	By Test	-
19) General Electric Company Vulkene	- Cable to equipment requiring post-LOCA operation	24 Hrs.	Page 5-13	By Test	-
20) Thermo Electric Company Inc.	- Wire to thermocouples installed to record the air and charcoal temperature in the emergency filter units	3 Hrs.	Page 5-14	By Material Test and FPL Analysis	See section 3.3-9
21) Raychem Corporation	- Heat shrink insulation used for Unit 3 & 4 requiring post-LOCA operation	30 Days	Page 5-15	By Test	-

MANUFACTURER & MODEL	POST-ACCIDENT FUNCTION	TIME REQUIRED	AVAILABLE QUALIFICATION DATA	QUALIFICATION METHOD(S)	REMARKS
2) General Electric Company	- Terminal blocks on cable to equipment requiring post-LOCA operation	31 Days	Page 5-16	By Test and FPL Analysis	See section 3.3-10
3) Crouse-Hinds Company	- Containment electrical penetrations	31 Days	Page 5-17& 18	By Test and FPL Analysis	See section 3.3-11

Instrumentation, Valves and Other Equipment

Various plant components have been discussed in the Turkey Point Units 3 & 4 FSAR as being required post-LOCA. However, due to plant changes or other reasons as specified below, this equipment is not required following a LOCA.

The following is a discussion of each of these components:

(1) Steam Generator Pressure (PT-494, 495, 496, 484, 485, 486, 474, 475, 476)
This pressure indication is required by FSAR Table 6.7-1 for period of 24 hours post-LOCA. In view of the fact that these transmitters have been relocated to the main steam line outside the containment, this equipment will not experience the post-LOCA environment.

(2) Accumulator Subsystem Nitrogen Bleed (HCV-936)
These valves are normally closed and are designed to fail closed. Following a LOCA the valve is required to remain closed. Table 6.7-1 of the FSAR states that no environmental testing is required on equipment which is normally closed and fails closed. Therefore, these valves meet the FSAR commitments.

(3) Accumulator Nitrogen Supply (AOV-853 A, B & C)
See item 2 above.

(4) Pressurizer Pressure (PT-444, 445, 458)
These are not required for ESF initiation or containment isolation, that function is performed by PT-455, 456, 457 (see page 5-1). Therefore, the requirement for environmental qualification contained on FSAR Table 6.7-1 is inappropriate.

(5) Pressurizer Level (LT-462)
This is a cold calibration wide range transmitter and is not used for ESF initiation or containment isolation, that function is performed by LT-459, 460, and 461 (see page 5-4). Therefore, the requirement for environmental qualification contained on FSAR table 6.7-1 is inappropriate.

(6) Accumulator Isolation Valves (MOV 865, A, B, C)
These valves are normally open, with power racked out and receives a confirmatory SIS signal. In view of the fact that these valves are maintained in the correct position and have no credible mode of failing closed. Therefore, the requirement for environmental qualification contained on FSAR table 6.7-1 is inappropriate.

(7) Accumulator Tank Level (LT-920, 922, 924, 926, 928, 930), Accumulator Tank Pressure (PT 921, 923, 925, 927, 929, 931)

The accumulators are a passive ESF device; they are capable of discharging borated water into the RCS post-LOCA without any activation signals or valve movement. Therefore, the level and pressure indication is not required for accident mitigation, and therefore the requirement for environmental qualification contained on FSAR table 6.7-1 is inappropriate.

(8) High Head Flow Instrumentation (FT-932, 933)
These devices were intended to be used to monitor hi-head safety injection flow to hot leg A & B. However, this injection path is no longer used until 20 hrs following a LOCA and MOV-866A, 866B are closed with their motor control center breakers locked open to prevent the valves from opening to allow flow.

(9) Containment Purge
This system was initially intended to purge hydrogen from the containment post-LOCA. Since then, the post-accident containment vent system with all active components located outside containment has been added to perform this function. Therefore, the containment purge system has no long term post-LOCA function and no further qualification is required.

(10) For the following containment isolation valves, the FSAR requires position indication. However, since all valves are normally closed and have redundant valves outside containment (either normally closed or receive an isolation signal) no indication is required post-LOCA:

(a) RCS seal water leakoff intermediate - 307

(b) Pressurizer Steam Space Sample Line - 951

(c) Pressurizer Liquid Space Sample Line - 953

(d) Hot Leg RCS Sample 955A, 955B

3.3 Remarks and Justification for Continued Operation

3.3-1

Fischer & Porter Company
Model: 13D2495KBBABB-NS
Steam Generator Level Transmitters
Tag No: LT474, 475, 476, 484, 485, 486, 494, 495, 496

Post-LOCA operation of the steam generator level transmitters is required for a period of 24 hours. The indication of this instrument informs the operator of the steam generator secondary side level so he may control the level of the steam generator. The available qualification documents summarized on page 5-3 demonstrate that this transmitter has been tested to conditions in excess of those expected following a LOCA for the first 7 hours. In addition, the transmitter was monitored for an additional 17 hours and remained functional. The above test results and an FPL engineering extrapolation of thermal effects demonstrates that the transmitter can operate for the required period.

Based on the above, the transmitter has an adequate margin to ensure proper post-LOCA operation.

3.3-2

Conax Corporation
Model: 300-E-SS12-GT4
Thermocouples in Emergency Containment Filter Air and Charcoal
Tag No: TE 3440 thru 3463

The purpose of these temperature elements is to provide air and charcoal temperature indication to operator. If the charcoal temperature exceeds 325° the filter dousing valves will be opened by the operator to initiate spray cooling of the charcoal. The emergency containment filter motors are qualified for the period of time it is required following a LOCA (page 5-11). However, if motor failure is determined by monitoring motor current, dousing would be manually initiated whether or not temperature indication is available. Therefore, the indication of air and charcoal temperature is not required for the safe operation and iodine retention of the emergency containment filters. It should be further noted that although documentation data is not available, thermocouple materials of this type by virtue of their application, i.e. high temperature measurement, are not expected to be affected by post-LOCA conditions. Since the thermocouple is made of metals, no radiation damage is expected.

Additionally, ultimate resolution of this device is summarized in Section 1.

3.3-3

Consolidated Ohmic Devices
Model: EZT 213-D9 POC
Reference Junction for Emergency Containment Filter Thermocouples

The purpose of this device is to provide a signal used to correct the reference junctions of the thermocouples to 0°C. The reference junctions at Turkey Point are not maintained at a known temperature and therefore requires compensation to obtain accurate temperature signals from the thermocouples.

Per discussion with the manufacturer, these devices are functional for ambient temperature of -65°C to 125°C 100% humidity, and 10^8 R gamma. At this time we are still pursuing additional qualification documentation from the vendor.

As discussed in section 3.3-2, if motor failure in indicated, filter dousing would be manually initiated, hence charcoal temperature indication would not be required.

Additionally, ultimate resolution of this device is summarized in Section 1.

3.3-4

Magnetrol Inc.
Model: A153-F-EP/VP-X-Y-M13H-M13H
Containment Sump Level Switch
Tag No: LS-1570, LS-1571

The purpose of these level switches is to provide backup indication to the control room operator concerning containment recirculation sump level and NPSH availability when post-LOCA injection is to be terminated and recirculation initiated. The operator's primary indication for this procedure is level indication in the Refueling Water Storage Tank located outside the containment. The Emergency Procedure states that following termination of injection and prior to initiation of recirculation, the sump level lights should be lit.

In the unlikely event that these switches should fail to function, the operator should not be deterred from realigning the system to the recirculation phase in light of availability of RWST level indication. If backup level indication is required, the operator may: (1) use a pressure sensing device in test connection 942N to determine pressure from which level can be inferred. This operation can be done outside containment without opening V860A, the first isolation outside containment, or (2) open either V-860A and 861A or V-860B, 861B and utilize the existing pressure indication located upstream of the RHR pumps (PI-1596, 1595) and/or the High Head SI pumps (PIC-957A, 957B), or (3) open all isolation valves, start all pumps, and observe pump operation for excessive noise and vibration characteristic of cavitation caused by low level.

Additionally, ultimate resolution of this device is summarized in Section 1.

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3.3-5

Ball Manufacturing Company
Model No.: 35005 Series D
Emergency Containment Filter Air Flow Switches
(FS-1422, 1423, 1424, 1425, 1426, 1427)

The purpose of these devices is to automatically open the filter dousing valves upon loss of air flow. This is intended to prevent the charcoal from igniting due to decay heat buildup from the absorbed iodine after loss of air flow.

The emergency containment filter unit is qualified for the period of time it is required (page 5-11) thereby guaranteeing air flow. In the case of a random single failure causing the motor to malfunction, the dousing valves will be remote-manually actuated. Motor operation will be monitored outside the containment by measuring current on the operating filter motors.

The FSAR commits to specifying these valves to operate with a radiation dose of 1.7×10^8 R with no requirement for testing. The specification has been reviewed and found to have been developed in accordance with this commitment.

The function of this device is being reviewed along with the other instrumentation of the Emergency Filter Unit as noted in Section 1.

3.3-6

ASCO Solenoid Valves

The ASCO solenoid valves are used on valve operators inside the containment to control the associated valve operator during normal operation and automatically place the valve in the desired position following receipt of a containment isolation signal. These valves have been analyzed in a generic Westinghouse letter which demonstrated that all failure modes of the valve will result in safe operation. Potential modes of failure identified for solenoid valves in the letter were loss of air supply, electrical failures of the solenoid, environmentally caused degradation of materials of construction, and plunger binding due to thermal expansion of the plunger to the core. The NRC has accepted this evaluation in a letter dated on January 31, 1979. The application of these solenoids is discussed in detail on the following pages in this subsection for the particular valve operator. These discussions provide justification for continued operation as continued service in a post-LOCA environment is not required for the safe shutdown of the unit.

However, in order to provide additional safety margin and to ensure long term solenoid valve operation, we have ordered replacement solenoid valves. These replacement valves are qualified for the post-LOCA environment as evidenced by the attached data sheet (written documentation to support the data will be delivered with the valves). The valves are ordered and are scheduled to be installed on the first available outage. See Section 3.3-6e for qualification data on replacement solenoid valves.

3.3-6a

1) Instrument Air Bleed Isolation (CV-2819)

This is a fail closed valve required for containment isolation. The ASCO solenoid valve (SV-2819) regulates the air supply to the operator. A generic Westinghouse letter (NS-CE-755, response to commitment for WCAP-7410-L) demonstrates that the solenoid valve, which regulates air supply to containment isolation air operator will close (its safe position) in all postulated modes of failure.

Therefore, it can reasonably be expected that even if the solenoid valve fails, the air operated valve will isolate the containment as designed. It should be noted that a redundant isolation valve CV-2826, is provided outside the containment and will provide a backup method of isolation.

3.3-6b

2) CVCS Charging Lines to RCS (HCV-310A, 310B)

Valve HCV-310A is in the normal CVCS charging path to the cold leg of an RCS loop. Valve HCV-310B is in the alternate charging path provided to an RCS loop hot leg. Both of these are fail open valves, with only one required for post-LOCA chemical addition for pH control. These valves are not containment isolation valves.

Valve HCV-310A is normally open, and is the normal charging path to the RCS. Since this valve is open and fails open there will be no need to operate this valve following a postulated accident. Furthermore, potential modes of failure identified for the solenoid valves such as: loss of air supply, electrical failure for the solenoid, environmentally caused degradation of materials of construction and plunger binding due to thermal expansion of the plunger to the core, will not result in failure of the line valve (HCV-310A) to the non-preferred (closed) position.

In the unlikely event of non-mechanistic failure of the solenoid valve (SV-310A) to the non-preferred position (solenoid energized valve closed) the operator will be instructed by administrative procedures to close the instrument air supply line valve (CV-2803) into containment thereby causing loss of air pressure due to bleed-off of air causing both valves to move to their preferred (open) position.

In view of the fact that injection for pH control is not required for eight hours post-LOCA it can reasonably be expected that such actions can provide the necessary redundancy.

595 113

3.3-6c

3) CVCS Letdown Line Isolation (CV-200A, 200B, 200C)

These are fail closed valves required for containment isolation. The ASCO solenoid valves (SV-200A, 200B, 200C) regulate the air supply. A generic Westinghouse letter (NS-CE-755, response to commitment for WCAP-7410-L) demonstrates that the solenoid valves, which regulate air supply to containment isolation air operators, will close (its safe position) in all postulated modes of failure.

Therefore it can reasonably be expected that even if the valve fails, it will isolate the containment as designed. It should be noted that a redundant isolation valve CV-204, is provided outside the containment and provides a redundant method of isolation.

3.3-6d

4) Containment Purge Isolation Valves (Supply and Exhaust) (CV-2601, 2603)

These are fail closed valves required for containment purging and isolation. There are two ASCO solenoid valves (SV-2601, 2804, 2603, 2806) in series which regulate the air supply to each purge valve. Both solenoids must be open to supply air to the valves and closure of either solenoid valve will dump air from the diaphram. This provides assurance that even if one of the solenoid valves were to fail, the purge valve will close and provide containment isolation. A generic Westinghouse letter (NS-CE-755, response to commitment for WCAP-7410-L) demonstrates that the solenoid valves, which regulate air supply to containment isolation air operators, will close (its safe position) in all postulated modes of failure.

Therefore, it can reasonably be expected that even if the valve fails, it will isolate the containment as designed. It should be noted that redundant isolation valves (POV2600, 2602) are provided outside the containment and will provide a redundant method of isolation.

TURKEY POINT UNITS 3 & 4

Section 3.3-6e

EQUIPMENT Replacement Solenoid Valves For Air Operated Valves

TAG NUMBERS

MANUFACTURER Automatic Switch Company

MODEL

QUALIFICATION DOCUMENTATION

ASCO Test Report AOS-21678/TR

QUALIFICATION ENVIRONMENT

	Aging	LOCA Simulation								
TIME	12 Days	12 Min.	3 HR	2 HR	8 Min.	3 HR	3 HR	4 Days	30 Days	
PRESS psig	-	0 to 110	110	110 to 0	0 to 110	110	75	15	10	
TEMP °F	268	140 to 346	346	346 to 140	140 to 346	346	320	250	200	
REL. HUM. %	-	100	100	100	100	100	100	100	100	
CHEM	3000 ppm Boron as Boric Acid in solution with 0.064 Molar sodium thiosulfate buffered with NaOH to a pH of 10 at room temp. (starting at 288°F on first transient, continued for entire test)									
RAD	2×10^8 Rads									

QUALIFICATION METHODS

Thermal aging, then radiation, then wear aging, then seismic, then accident radiation, then synergistic test for press., temp., humidity, chemical spray - all on same valves.

Note: This test valid for sealed entrance to solenoid housing to prevent entry of humidity or chemistry. Such sealant materials are under investigation.

595 175

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

3.3-7

Automatic Switch Company
Model No.: X8211-B46SW (HV-164-196)
Emergency Containment Filter Dousing Valves
(SV - 2905 thru 2910)

Post-LOCA operation of these valves is required until the decay heat load from the radioactive iodine has sufficiently diminished. The available documentation demonstrates that this solenoid valve has been tested to conditions generally in excess of the expected environment following a LOCA for 2 hours. FPL Engineering Analysis of ASCO's stated design, test reports, and published information on the effects of radiation shows that the valves will perform their intended function for 6 days, which is in excess of the required post-LOCA service period.

3.3-8

NAMCO Limit Switches

The NAMCO limit switches used on valves located inside the containment serve to provide valve position indication during normal operation and as verification of valve position following containment isolation. They are not used for any associated control function.

Following containment isolation there are backup position indication methods available to the control room operator to verify that the containment boundary is maintained and isolation completed, should the limit switches inside containment fail under post-accident conditions. These methods are discussed in detail on the following pages in this subsection for the particular valves associated with these switches. These discussions provide justification for continued operation as continued service in a post-LOCA environment is not required for the safe shutdown of the unit.

However, in order to provide additional safety margin and to ensure post-LOCA valve position indication we are ordering replacement limit switches. These replacement switches will be qualified for the post-LOCA environment as evidenced by the attached data sheet in section 3.3-8e (written documentation to support the data will be delivered with the switches). The switches will be installed on the first available outage following receipt.

595 116

3.3-8a

1) CVCS to RCS Loop A Cold Leg and Loop C Hot Leg (HCV-310A, B)

The charging line valves to RCS Loops A and B (HCV-310A and B) are used for post-LOCA chemical addition to control the pH of the sump water and do not serve containment isolation functions. The limit switches are not used for control, and indication would be desirable only during chemical injection.

It has been stated in a previous submittal that the valves required for post-LOCA pH control of containment sump water have position indication on the control room board for the operator to observe that either valve (HCV-310A or HCV-310B) is open.

There are two flow transmitter (FT-110 and FT-122) outside containment in the charging line with indication in the control room (FI-110 and FI-122). This indication will serve as verification that either valve 310A or 310B is in the open position.

The operating procedure specifically instructs the operator to monitor both flow indicators to assure there is adequate flow during chemical injection. The flow transmitter will positively provide indication that either of the valves is in the open position.

Furthermore the operator will be instructed to remote-manually initiate opening of the valve following receipt of CIS.

3.3-8b

2) CVCS Letdown Line Isolation (CV-200 A, B, C)

These are the CVCS letdown line isolation valves inside containment which are parallel to each other. Valve CV-200A and CV-200B are normally closed. Valve 200C is normally open. These valves are solenoid operated valves which fail closed on receipt of containment isolation signal.

The second isolation valve (CV-204) on this line is located outside containment, fails closed and closes on receipt of containment isolation signal. Therefore, indication of the outside valve position serves as a backup indication of containment isolation.

Furthermore, the operator will be instructed to initiate remote-manual closure of these valves following receipt of CIS.

595 117

3.3-8c

3) Containment Purge Isolation Valves (CV-2601, CV-2603)

These valves are located within containment on the containment purge supply and exhaust lines. Each isolation valve inside containment is redundant to one outside containment which will not be subjected to the post-LOCA environment. These valves fail closed and close on CIS and high activity (from air particulate detector or radiogas detector). Failure of the position indicator does not affect the ability of the valve to close.

Assuming position indication failure for the valves inside containment, the redundant valve outside in the supply and exhaust lines which are not located in a hostile environment will provide indication of outside valve closure and thus verification of containment isolation.

Furthermore, the operator will be instructed to initiate remote-manual closure of these valves upon receipt of CIS or high activity.

3.3-8d

4) Instrument Air Bleed Valve (CV-2819)

This valve is located within containment on the instrument air bleed line. The isolation valve inside containment is redundant to one outside containment which will not be subjected to the post-LOCA environment. This valve fails closed and closes on CIS. Failure of the position indicator does not affect the ability of the valve to close.

Assuming position indication failure for the valve inside containment, the limit switch on the redundant valve outside containment which is not located in a hostile environment, will provide indication of outside valve closure and thus verification of containment isolation.

Furthermore, the operator will be instructed to initiate remote-manual closure of this valve upon receipt of CIS.

595 118

TURKEY POINT UNITS 3 & 4

Section 3.3-8e

EQUIPMENT: Replacement Limit Switches For

TAG NUMBERS: CV-200 A, B, C; HCV-310 A, B; CV-2601, 2603; CV-2819

MANUFACTURER: NAMCO

MODEL: EA18011302

QUALIFICATION DOCUMENTATION

Per telecon between FPL's B.N. Gorodetzer and NAMCO, the replacement limit switches are qualified to the IEEE-323 LOCA profile. A copy of the test report will be furnished with the switch purchase.

QUALIFICATION ENVIRONMENT

IEEE 323 Curve Given For Reference

TIME	0 to 5 Min.	5 Min. to 3 Hr.	3 Hr. to 5 Hr.	5 Hr. to 5 Hr.5Min	5Hr.5Min to 6 Hr.	6 Hr. to 10 Hr.	10 Hr. to 4 Days	4 Days to 30Days
PRESS psig	0 to 62	40	40 to 0	0 to 40	40	25	25	5
TEMP °F	0 to 300	300	300 to 140	140 to 300	300 to 250	250	210	167
REL. HUM.	← Steam Autoclave →							
CHEM	First 24 hrs spray with H_3BO_3 and $Na_2S_2O_3$. Buffered to pH of 10.5 with NaOH.							
RAD	← 2×10^8 Rads →							

QUALIFICATION METHODS

Testing was done in accordance with IEEE 323 - (curve given above reference). Testing was done with conduit brought out of the test chamber. This will require sealing the limit switch conduit entry point with a qualified sealant material. Such sealant materials are being investigated.

595 119

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

3.3-9

Thermocouple Extension Wire
Thermo Electric Co. Inc. E/GS/CVGS TW-20EEX

Post-LOCA operation of this thermocouple extension wire is required for a period of 3 hours. Although there is a lack of written qualification documentation for this extension wire, FPL Engineering Analysis of the materials of the thermocouple extension wire demonstrates that this wire is qualified for the time period of operation required following a LOCA. This analysis considered the effects of radiation, pressure, temperature, humidity and chemical sprays. Furthermore, this component is included in accident design verification effort focused on the Emergency Containment Filter unit and related components as discussed in Section 1.

3.3-10

Terminal Blocks
General Electric EB-5

These General Electric EB-5 terminal blocks are presently installed on the circuits for the following components: Emergency Containment Filter air flow switches, containment recirculation sump level switches, Emergency Containment Filter charcoal dousing valves, Emergency Containment Filter thermocouples and thermocouple reference junctions.

FPL has performed tests and analyses on the GE EB-5 terminal blocks. Based on the tests and analyses it is concluded that the test environment is generally more severe than that which the terminal blocks are expected to see following a LOCA. Based on the above it is expected that the terminal block design has an adequate margin to ensure its satisfactory operation for the operation period required following a LOCA.

Furthermore, this component is included in the post-accident design verification effort focused on the Emergency Containment Filter and related components as discussed in Section 1.

3.3-11

Penetrations
Crouse-Hinds Company

In addition to the qualification data, FPL analysis of the effects of temperature, pressure, humidity radiation, and Boric acid on the materials involved in the construction of the penetration, concluded that the penetrations will continue to function for 31 days following a LOCA.

4. Conclusions

The review of the written evidence of the qualification of electrical equipment required to function under accident conditions has been completed with the majority of documentation successfully located. Turkey Point 3 & 4 did not contain a licensing commitment to test electrical equipment for chemical spray environment, therefore the matter is discussed on a generic basis in Section 2.2.

Generic problems with the qualification of NAMCO limit switches (as developed from I&E Circular 78-08) and qualification for extended post-LOCA operation of ASCO solenoid valves (raised in I&E Bulletin 79-01A) have been identified. An engineering evaluation was performed on each application of these devices to determine whether replacement or requalification was necessary, and whether the safe operation of the unit could be assured with the existing equipment. The results of this evaluation are contained in the appropriate subsection of Section 3 and indicate that continued operation of Turkey Point Units 3 & 4 is justified. In those places where the replacement option was chosen, it was done so in an effort to increase the margin of safety, and provide the ability for extended post-LOCA operation.

We have uncovered several areas where documentation did not exist to adequately support qualification of the electrical devices. These devices will be replaced; the schedules involved and qualification of the replacements are noted in the appropriate subsection in Section 3. In the case of the instrumentation for the Emergency Containment Filter Unit, an engineering design verification will be performed for the entire system in an effort to optimize the unit design and ensure post-LOCA operation of all required components. In all of these areas, a detailed review was performed to ensure that the safe operation of the plant could be reasonably assured during the interim period prior to replacement or resolution of the design verification and subsequent actions.

Therefore, we feel assured that continued operation of Turkey Point 3 & 4 will not be inimical to the health and safety of the public.

SECTION 5

QUALIFICATION DATA

SHEETS

TURKEY POINT UNITS 3 & 4

EQUIPMENT: Pressurizer Pressure Transmitters

TAG NUMBERS: PT-455, 456, 457

MANUFACTURER: Fischer & Porter Company

MODEL: 50EP1041BCXA-NS W/"Special Modifcations"
(sealed unit containing OSC/AMP #805B241U01 or #805B230U01

QUALIFICATION DOCUMENTATION

1) Fischer & Porter Co. Test Report 2204-51-B-006

2) Fischer & Porter Co. Engineering Report DP #2224-1, RPT #002

3) Westinghouse WCAP 7410-L (containing FIRL Report F-C2639)

4) Westinghouse letter NS-CE-1586 to NRC dated Oct. 28, 1977

5) Fischer & Porter Co. letter to FPL dated May 29, 1979

6) Ameron letter to FPL dated Nov. 20, 1972

QUALIFICATION ENVIRONMENT

	Qual. Doc. #1					Qual. Doc. #3 (3 Tests)
TIME	0 - 1 Min.	1 Min to 1 Hr	1 - 3 Hr	3 - $6\frac{1}{2}$ Hr	$6\frac{1}{2}$ - 7 Hr	2 Hours
PRESS psig	0 to 75	75	45	5	35	60 (Rise in 5 sec)
TEMP °F	AMB to 320	320	293	227 *	281 *	290 (82-293 in 5 sec.)
REL. HUM %	100%	100%	100%	100%	100%	100%
CHEM	Transmitter coating tested for 3 hours under 0.1% NaOH, 1% Sodium Thiosulfate by weight, 15,000 ppm Boric Acid at pH 10.5					
RAD	1.5×10^7 Rads (Qual. Doc. #2)					2.16×10^8 Rads (Qual. Doc. #3)

* Temperature from steam tables based on saturated steam at respective pressures

QUALIFICATION METHODS

595 123

1) Synergistic test on press., temp., humidity (contained OSC/AMP #805B230U01)

2) Radiation test on different instrument than 1)(contained OSC/AMP #805B230001)

3) Synergistic test on press., temp., humidity, followed by seismic, on F&P 50EP, 50EQ, and 10B2496 transmitters, the 10B transmitter which uses electronic identical to the 50EP (Ref. Qual. Doc. 5) was then radiation tested. These transmitters contained OSC/AMP #805B241U01)

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

TURKEY POINT UNITS 3 & 4

EQUIPMENT: Steam Generator Steam Flow Transmitters

TAG NUMBERS: FT-474, 475, 484, 485, 494, 495

MANUFACTURER: Fischer & Porter Company

MODEL: 10B2496PBBABBB-NS (not sealed)

QUALIFICATION DOCUMENTATION

1) Fischer & Porter Co. Engineering Report DP #2224-1, RPT #002 (containing FIRL Report F-C2815)
2) Westinghouse WCAP 9157
3) Fischer & Porter Co. letter to FPL dated May 29, 1979
4) Ameron letter to FPL dated Nov. 20, 1972

QUALIFICATION ENVIRONMENT
(Qual. Doc. 2)

TIME	6 min.
PRESS	66 psig
TEMP.	AMB to 280°F in 3 sec., 350°F in 15 sec., > 300°F for 6 min.
REL. HUM.	100%
CHEM Qual. Doc. #4	Transmitter coating tested for 3 hours under 0.1% NaOH, 1% Sodium Thiosulfate by weight, 15,000 ppm Boric Acid at pH 10.5
RAD	8.2×10^5 Rads (Qual. Doc. #1) 4×10^4 Rads (Qual. Doc. #2)

QUALIFICATION METHODS

1) Radiation test on complete 10B2495 transmitter which uses same electronics as F&P 10B2496 (Ref. Qual. Doc. #3)
2) Radiation test, then synergistic test for press., temp., humidity - on same instruments.

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

TURKEY POINT UNITS 3 & 4

EQUIPMENT: Steam Generator Level Transmitters

TAG NUMBERS: LT-474, 475, 476, 484, 485, 486, 494, 495, 496

MANUFACTURER: Fischer & Porter Company

MODEL: 13D2495KBBABBB-NS w/ "Special Modifications"
(Sealed unit containing OSC/AMP #805B241U01 or #805B230U01)

QUALIFICATION DOCUMENTATION

1) Fischer & Porter Co. Test Report 2204-51-B-006

2) Fischer & Porter Co. Engineering Report DP #2224-1, RPT #002

3) Westinghouse WCAP 7410-L (containing FIRL Report F-C2639)

4) Westinghouse letter NS-CE-1586 to NRC dated Oct. 28, 1977

5) Fischer & Porter letter to FPL dated May 29, 1979

6) Ameron letter to FPL dated Nov. 20, 1972

QUALIFICATION ENVIRONMENT

	Qual. Doc. #1					Qual. Doc. #3 (3 Tests)
TIME	0 - 1 Min	1 Min to 1 Hr	1 - 3 Hr	3 - $6\frac{1}{2}$ Hr	$6\frac{1}{2}$ - 7 Hr	2 Hours
PRESS psig	0 to 75	75	45	5	35	60 (Rise in 5 sec)
TEMP °F	AMB to 320	320	293	227 *	281 *	290 (82-293 in 5 sec.)
REL. HUM %	100	100	100	100	100	100%
CHEM Qual. Doc. #6	Transmitter coating tested for 3 hours under 0.1% NaOH, 1% Sodium Thiosulfate by weight, 15,000 ppm Boric Acid at pH 10.5					
RAD	1.5×10^7 Rads (Qual. Doc. #2)					2.16×10^8 Rads (Qual. Doc. #3)

* Temperature from steam tables based on saturated steam at respective pressures

QUALIFICATION METHODS

1) Synergistic test on press, temp, humidity (contained OSC/AMP #805B230U01)

2) Radiation test on different instrument than 1) (contained OSC/AMP #805B230U01)

3) Synergistic test on press, temp, humidity; followed by seismic; then radiation - all on same instrument
This test was on F&P 50EP and 10B transmitters which use same electronics as the 13D transmitters (Ref. Qual. Doc. #5)
These transmitters contained OSC/AMP #805B241U01

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

595 125

TURKEY POINT UNITS 3 & 4

EQUIPMENT: Pressurizer Level Tansmitters

TAG NUMBERS: LT-459, 460, 461

MANUFACTURER: ITT - Barton

MODEL: 386/351

QUALIFICATION DOCUMENTATION

1) Westinghouse letter NS-CE-1586 to NRC dated Oct. 28, 1977

2) Westinghouse WCAP 7410-L (contains FIRL Report F-C2667)

QUALIFICATION ENVIRONMENT
Qual. Doc. #2

TIME	2 hours
PRESS	∿ 60 psig (0-60 psig in 7 sec.)
TEMP.	288°F
REL. HUM.	100%
CHEM	None
RAD	2.4×10^8 Rads

QUALIFICATION METHODS

Synergistic test on press., temp., humidity, followed by seismic, then radiation - on same instrument.

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

595 126

TURKEY POINT UNITS 3 & 4

EQUIPMENT: RCS ΔT-Tavg Temperature Elements

TAG NUMBERS: TE-412B, 412D, 422B, 422D, 432B, 432D

MANUFACTURER: Rosemount Incorporated

MODEL: 176 KF

QUALIFICATION DOCUMENTATION

Westinghouse WCAP 9157

QUALIFICATION ENVIRONMENT

TIME	6 Days
PRESS	66 psig
TEMP	50°F to 290°F in 5 sec., 320°F for 20 min., Decline to 220°F in 24 hr., 220°F for 5 Days
REL. HUM	100%
CHEM	None
RAD	1×10^8 Rads

QUALIFICATION METHODS

Radiation test, then synergistic test for press., temp., humidity - on same sensors.

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

TURKEY POINT UNITS 3 & 4

EQUIPMENT: RHR to RCS Inlet Isolation Valve Operators

TAG NUMBERS: MOV-4-744A & MOV-4-744B

MANUFACTURER: Limitorque Corporation

MODEL: SMB-3 (Class H Insulation)

QUALIFICATION DOCUMENTATION

1) Limitorque Letter to FPL dated May 23, 1979

2) Limitorque Test Report 600198 (containing FIRL Report F-C2232-01)

3) Westinghouse Letter NS-CE-692 to NRC dated July 10, 1975 (References FIRL Report F-C3441)

4) FPL letter from M.S. Gonzalez to S.G. Brain dated June 27, 1979

QUALIFICATION ENVIRONMENT
Qual. Doc. #2

TIME	0 - 14 sec.	14 sec. to 1 hr.	1 - 3 hr.	3 - 5 hr.	5 - 24 hr.	1 - 6 Days
PRESS psig	15-90	91	70	40	20	15
TEMP °F	142-329	329	312	287	272 - 256	250 to 247
REL. HUM. %	100	100	100	100	100	100
CHEM See Note Below	Start at 40 min., end at 4 hr. 40 min.					
RAD	2×10^8 Rads(Qual. Doc. #3)					

QUALIFICATION METHODS

2) Synergistic test for press., temp., humidity, chem. spray.

3) Letter states that radiation tests in F-C-3441 apply to motors tested by Limitorque Report 600198.

Note: Chemical Spray Solution:
1.5% boric acid solution prepared by dissolving 7 lbs. tech. grade boric acid in 55 gal. (460 lb.) demineralized water. A 50% solution of reagent grade NaOH was used to titrate boric acid solution to obtain 7.67 pH.

Note: The above results are a summary provided for reviewer convenience.
For complete details, see the above referenced report document(s).

TURKEY POINT UNITS 3 & 4

EQUIPMENT: Hi-Head SI to RCS Hot Leg Isolation Valve Operators

TAG NUMBERS: MOV-866A, 866B

MANUFACTURER: Limitorque Corporation

MODEL: SMB-00 (Class B insulation)

QUALIFICATION DOCUMENTATION

Limitorque letter to FPL dated May 23, 1979

Westinghouse WCAP 7410-L (containing FIRL Report F-C2485-01)

QUALIFICATION ENVIRONMENT

TIME	0-20 min.	20-60 min.	1-3 hr.	3-4 hr.	4 - $5\frac{1}{2}$ hr.	$5\frac{1}{2}$ - 7 hr.	7-8 hr.	8 - 9 hr.
PRESS psig	0-40 (in 7 sec)	40	15	5	50	60	40	5
TEMP °F	112 to 280	285	250	230	298	307	283	227
REL. HUM. %	100	100	100	100	100	100	100	100
CHEM See Note Below	Spray from 20 min. to 4 hr. 20 min. and 5 hr. 20 min. to 6 hr. 30 min.							
RAD	2×10^8 Rads							

QUALIFICATION METHODS

Synergistic test for press., temp., humidity, chem spray

Radiation test on different operator.

Note: Chemical Spray Solution

7 lbs. technical grade boric acid in 55 gal. (460 lb) demineralized water. 50% solution of reagent grade sodium hydroxide was used to titrate the boric acid solution to pH of 7.85.

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

TURKEY POINT UNITS 3 & 4

EQUIPMENT: RCS to RHR Inlet Isolation Valve Operators

TAG NUMBERS: MOV-750, 751

MANUFACTURER: Limitorque Corporation

MODEL: SMB-1 (Class B insulation)

QUALIFICATION DOCUMENTATION

Limitorque letter to FPL dated May 23, 1979

Westinghouse WCAP 7410-L (containing FIRL Report F-C2485-01)

QUALIFICATION ENVIRONMENT

TIME	0-20 min.	20-60 min.	1-3 hr.	3-4 hr.	4 - $5\frac{1}{2}$ hr.	$5\frac{1}{2}$ - 7 hr.	7-8 hr.	8 - 9 hr.
PRESS psig	0-40 (in 7 sec.)	40	15	5	50	60	40	5
TEMP °F	112 to 280	285	250	230	298	307	283	227
REL. HUM %	100	100	100	100	100	100	100	100
CHEM See Note Below	Spray from 20 min. to 4 hr. 20 min. and 5 hr. 20 min. to 6 hr. 30 min.							
RAD	2×10^8 Rads							

QUALIFICATION METHODS

Synergistic test for press., temp., humidity, chem. spray

Radiation test on different operator.

Note: Chemical Spray Solution

7 lbs. technical grade boric acid in 55 gal. (460 lb.) demineralized water. 50% solution of reagent grade sodium hydroxide was used to titrate the boric acid solution to pH of 7.85.

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

595 130

TURKEY POINT UNITS 3 & 4

EQUIPMENT: Emergency Containment Filter Dousing Valve

TAG NUMBERS: SV-2905, 2906, 2907, 2908, 2909, 2910

MANUFACTURER: Automatic Switch Company

MODEL: X8211 - B46 - SW (HV-164-196)

QUALIFICATION DOCUMENTATION

1) Automatic Switch Co. Test Report No. TP-2-068

2) Wyle Laboratories Report No. 42086-1

QUALIFICATION ENVIRONMENT Qual. Doc. #2

	Test #1				Test #2			
TIME	24 Hrs	1 1/2Hrs	1 Hr	8 Hrs	10 Sec	10 sec to 13 sec	1 Hr	
PRESS	AMB	Rise to 60 psig	60 psig	AMB	0 to 58 psig	58 psig to 65 psig	65 psig	
TEMP	122°F	122°F to 284°F	284°F	AMB	122°F to 293°F	293°F to 311°F	311°F	
REL. HUM	60%	100%	100%	80%	100%	100%	100%	
CHEM	None							
RAD	None							

QUALIFICATION METHODS

Synergistic for Temp, Press, Humidity

Both tests on same valve.

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

TURKEY POINT UNITS 3 & 4

EQUIPMENT: Emergency Containment Coolers (Motor)

TAG NUMBERS: 3V30A, B, C ; 4V30A, B, C

MANUFACTURER: Joy Manufacturing Company

MODEL: 38-26.5-1170

QUALIFICATION DOCUMENTATION

Joy Manufacturing Test Report (1969)

QUALIFICATION ENVIRONMENT

TIME	110 hr.	30 min.	2 min.	3 hr.	2 hr.	2 hr.	2 hr.	2 hr.	2 hr.	2 1/2 hr.	1 3/4 hr.	2 hr.	4 hr.	Total Time 25 hr.
PRESS psig	AMB.	0 to 7	7 to 83	> 70	7 - 10	> 75	10	75	10	78	10	75	~ 10	Add'l. Tests 0-80 psig in 8 sec.
TEMP °F	300 to 400	70 to 200	200 to 280	300	220	> 300	200	310	250 to 200	> 300	300 to 250	300 to 320	300 to 200	
REL. HUM. %	–	100	100	100	100	100	100	100	100	100	100	100	100	
CHEM See Note Below	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
RAD	1×10^8 Rads Minimum													

QUALIFICATION METHODS

1) Synergistic - Pressure, temperature, humidity, chemical spray - on prototype unit.

2) Radiation by analysis referencing previous tests on various materials used.

Note: Chemical Spray Solution
Sodium Hydroxide . . . 0.1% by wt.
Sodium Thiosulfate . . 1.0% by wt.
Potassium Hydroxide . . 4 ppm
Boric Acid . . . . . 10000 ppm
pH 6.8

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

TURKEY POINT UNITS 3 & 4

EQUIPMENT: Emergency Containment Filters (Motor)

TAG NUMBERS: 3V3A, B, C ; 4V3A, B, C

MANUFACTURER: Joy Manufacturing Company

MODEL: 42.25-26.5-1170

QUALIFICATION DOCUMENTATION

Joy Manufacturing Test Report (1969)

QUALIFICATION ENVIRONMENT

TIME	110 hr.	30 min.	2 min.	3 hr.	2 hr.	2 hr.	2 hr.	2 hr.	2 hr.	2 1/2 hr.	1 3/4 hr.	2 hr.	4 hr.	Total Time 25 hr.
PRESS psig	AMB	0 to 7	7 to 83	> 70	7-10	> 75	10	75	10	78	10	75	~10	Add'l. tests 0-80 psig in 8 sec.
TEMP °F	300 to 400	70 to 200	200 to 280	300	220	> 300	200	310	250 to 200	> 300	300 to 250	300 to 320	300 to 200	
REL. HUM. %	–	100	100	100	100	100	100	100	100	100	100	100	100	
CHEM See Note Below	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
RAD	1×10^8 Rads													

QUALIFICATION METHODS

1) Synergistic - Pressure, temperature, humidity, chemical spray - on prototype unit.

2) Radiation by analysis referencing previous tests on various materials used.

Note: Chemical Spray Solution

Sodium Hydroxide	0.1% by wt.
Sodium Thiosulfate	1.0% by wt.
Potassium Hydroxide	4 ppm
Boric Acid	10000 ppm
ph	6.8

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

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TURKEY POINT UNITS 3 & 4

EQUIPMENT: 600V Power & Control Cables

TAG NUMBERS: N47, N50, N52, 53, 54, 55, 56

MANUFACTURER: Okonite Company

MODEL: X-Olene/ Okoseal

QUALIFICATION DOCUMENTATION

1) Okonite letter to Bechtel dated March 22, 1971

2) IEEE Transactions Paper Vol. PAS 88, No. 5 May 1969

QUALIFICATION ENVIRONMENT

TIME	32 Days
PRESS	40 psig
TEMP	288°F
REL. HUM	100%
CHEM	None
RAD	1×10^8 Rads

QUALIFICATION METHODS

Irradiated samples were tested synergistically for press., temp., humidity.

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

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TURKEY POINT UNITS 3 & 4

EQUIPMENT: Instrumentation Cables

TAG NUMBERS: 60, 61

MANUFACTURER: General Electric Company

MODEL: Vulkene

QUALIFICATION DOCUMENTATION

1) GE Letter to Bechtel Dated May 30, 1979 (Containing the Following)

2) Technical Review of Vulkene Insulated Cables by F.M. Precopio, Ph.D.

3) Wire and Cable for Nuclear Power Plants, A Status Report on the GE Wire and Cable Department Comprehensive Testing Program

QUALIFICATION ENVIRONMENT
Qual. Doc. 3

TIME	10 Hrs	300 Hrs
PRESS	70 psig	5 psig
TEMP	310°F	150°F
REL. HUM	100%	100%
CHEM	2000ppm H_3BO_3 -NaOH - pH9 (Sprayed on Cables)	
RAD	2×10^8 RAD	

QUALIFICATION METHODS

Radiation Exposure, then Synergistic Test for Press, Temp, Humidity, Chem. Spray on Same Cable. Reference 1 states that the cables tested by Reference 3 could be representative of the cable supplied for Turkey Point.

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

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TURKEY POINT UNITS 3 & 4

EQUIPMENT: Thermocouple Extension Wire

TAG NUMBERS: N77

MANUFACTURER: Thermo Electric Co., Inc.

MODEL: E/GS/CUGS - TW - 20 - EEX

QUALIFICATION DOCUMENTATION

Thermo Electric letter to FPL dated June 4, 1979

QUALIFICATION ENVIRONMENT

TIME	
PRESS	
TEMP	
REL. HUM	
CHEM	
RAD	

QUALIFICATION METHODS

By analysis from data supplied by Thermo Electric in above letter, Bechtel P.O. 5610-E-55, and Thermo Electric Quotation WS-0038 alt. dated May 9, 1968. See Section 3.3-9.

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

TURKEY POINT UNITS 3 & 4

EQUIPMENT Heat Shrink Insulation

TAG NUMBERS

MANUFACTURER Raychem Corporation

MODEL WCSF

QUALIFICATION DOCUMENTATION

Franklin Institute Research Laboratories Final Report F-C4033-3

QUALIFICATION ENVIRONMENT

TIME	7 Days	0-5 min.	5 min. to 10 hr.	10-12 hr.	12 hr. to 4 Days	4 Days to 30 Days
PRESS	Not Measured	0 to 70 psig (in 10 sec.)	> 70 psig	70→31 psig (in 1 hr.)	31 psig	~ 10 psig
TEMP	302°F	140-280°F (in 25 sec.) to 357°F	357°F	357-275°F	275°F	212°F
REL. HUM	Not Measured	100%	100%	100%	100%	100%
CHEM	None	Chemical Spray Solution: 3000 ppm Boron as Boric Acid, 0.064 Molar Sodium Thiosulfate adjusted with NaOH to pH of 10.5 at room temperature				
RAD	5×10^7 Rads	1.5×10^8 Rads (For a total of 2×10^8 R)				

QUALIFICATION METHODS

Synergistic - All parameters.

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

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TURKEY POINT UNITS 3 & 4

EQUIPMENT: Terminal Blocks

TAG NUMBERS:

MANUFACTURER: General Electric Company

MODEL: EB-5

QUALIFICATION DOCUMENTATION

1) FPL Material Test Section Test Report No. R238-1354

2) PSL 1 FSAR 3.11.5.3

QUALIFICATION ENVIRONMENT
Test No. 2

TIME	1 month
PRESS	0 psig
TEMP	250°F
REL. HUM	100%
CHEM	2000 ppm Boron as boric acid
RAD	1×10^8 R

QUALIFICATION METHODS

1) Blocks were tested for temp., humidity, and intermittent chemical spray for one month. There were no failures at at 126VAC or 125VDC.

2) Radiation test was on GE CR151 block, which is same material as the EB-5 block.

3) See analysis on Section 3.3-10.

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

TURKEY POINT UNITS 3 & 4

EQUIPMENT Penetrations

TAG NUMBERS -

MANUFACTURER Crouse-Hinds Company

MODEL -

QUALIFICATION DOCUMENTATION

1) Crouse-Hinds letter to FPL dated May 17, 1979

2) NRP Penetration Steam Incident and Helium Leakage Report

QUALIFICATION ENVIRONMENT

TIME	0-5 sec	5-8 sec	8-16 sec	16-25 sec	25 sec 10 min	10-30 min	30-60 min	60-100 min
PRESS	0-69 psig	69-78 psig	>75 psig	>68 psig	75-82 psig	82-58 psig	58-31 psig	31-8 psig
TEMP	270°F to 283°F	283°F to 296°F	296°F to 318°F	318°F to 320°F	320°F to 315°F	315°F to 310°F	310°F to 297°F	297°F to 262°F
REL. HUM	100%	100%	100%	100%	100%	100%	100%	100%
CHEM	No							
RAD	No							

QUALIFICATION METHODS

2) Tested prototype unit for press, temp, humidity (synergistic)

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).

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TURKEY POINT UNITS 3 & 4

EQUIPMENT: Penetrations

TAG NUMBERS: -

MANUFACTURER: Crouse-Hinds Company

MODEL: -

QUALIFICATION DOCUMENTATION

3) Telecopy from Westinghouse to FPL dated June 12, 1979.

QUALIFICATION ENVIRONMENT
Qual. Doc. #3

TIME	6 Hours	18 Hours
PRESS	56 psig	Not Recorded
TEMP	340°F	320°F to 250°F
REL. HUM.	100%	100%
CHEM	No	No
RAD	No	No

QUALIFICATION METHODS

3) Not specified

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Note: The above results ...

Note: The above results are a summary provided for reviewer convenience. For complete details, see the above referenced report document(s).